**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
- Physical education classes begin
- Fall break: instruction suspended
- Instruction resumes
- Pre-course enrollment for spring
- First-Year Family Weekend
- Homecoming
- Thanksgiving recess: instruction suspended, 1:10 p.m.
- Instruction resumes
- First-Year Family Weekend
- Pre-course enrollment for spring
- Thanksgiving recess: instruction suspended, 1:10 p.m.
- Instruction resumes
- 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
- Physical education classes begin
- 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

<table>
<thead>
<tr>
<th>2003–04</th>
<th>2004–05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday, August 22</td>
<td>Friday, August 20</td>
</tr>
<tr>
<td>Friday, August 22</td>
<td>Friday, August 20</td>
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<tr>
<td>Friday, August 22</td>
<td>Friday, August 20</td>
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<tr>
<td>Monday, August 25</td>
<td>Monday, August 23</td>
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<tr>
<td>Wednesday, August 27</td>
<td>Wednesday, August 25</td>
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<tr>
<td>Thursday, August 28</td>
<td>Thursday, August 26</td>
</tr>
<tr>
<td><strong>TBA</strong></td>
<td><strong>TBA</strong></td>
</tr>
<tr>
<td>Saturday, October 11</td>
<td>Saturday, October 9</td>
</tr>
<tr>
<td>Wednesday, October 15</td>
<td>Wednesday, October 13</td>
</tr>
<tr>
<td><strong>TBA</strong></td>
<td><strong>TBA</strong></td>
</tr>
<tr>
<td>Friday–Sunday, October 31–November 2</td>
<td>Friday–Sunday, TBA</td>
</tr>
<tr>
<td>Saturday, October 25</td>
<td>Saturday, October 16</td>
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<tr>
<td>Wednesday, November 26</td>
<td>Wednesday, November 24</td>
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<tr>
<td>Monday, December 1</td>
<td>Monday, November 29</td>
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<tr>
<td>Saturday, December 6</td>
<td>Saturday, December 4</td>
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<td>Sunday–Wednesday, December 7–10</td>
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<tr>
<td>Thursday, December 11</td>
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<td>Friday, December 19</td>
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<td>Friday, December 26</td>
<td>Monday, December 27</td>
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<td>Monday, January 5</td>
<td>Monday, January 3</td>
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<tr>
<td>Wednesday, January 21</td>
<td>Friday, January 21</td>
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<tr>
<td>Monday, January 19</td>
<td>Monday, January 17</td>
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<tr>
<td>Thursday, January 22</td>
<td>Thursday, January 20</td>
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<tr>
<td>Monday, January 26</td>
<td>Monday, January 24</td>
</tr>
<tr>
<td><strong>TBA</strong></td>
<td><strong>TBA</strong></td>
</tr>
<tr>
<td>Saturday, March 20</td>
<td>Saturday, March 19</td>
</tr>
<tr>
<td>Monday, March 29</td>
<td>Monday, March 28</td>
</tr>
<tr>
<td><strong>TBA</strong></td>
<td><strong>TBA</strong></td>
</tr>
<tr>
<td>Saturday, May 8</td>
<td>Saturday, May 7</td>
</tr>
<tr>
<td>Sunday–Wednesday, May 9–12</td>
<td>Sunday–Wednesday, May 8–11</td>
</tr>
<tr>
<td>Thursday, May 13</td>
<td>Thursday, May 12</td>
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<td>Friday, May 21</td>
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<td>Saturday, May 22</td>
<td>Saturday, May 21</td>
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<tr>
<td>Sunday–Saturday, May 23–29</td>
<td>Sunday–Saturday, May 22–28</td>
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<tr>
<td>Sunday, May 30</td>
<td>Sunday, May 29</td>
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<tr>
<td>Wednesday, June 2</td>
<td>Wednesday, June 1</td>
</tr>
<tr>
<td>Monday, June 14</td>
<td>Monday, June 13</td>
</tr>
<tr>
<td>Monday, June 28</td>
<td>Monday, June 27</td>
</tr>
</tbody>
</table>

*Implementation of online add/drop may affect these dates.

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.*
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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 2003 and spring 2004.
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/library.html), also distributed to each new student, summarizes 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.


College of Veterinary Medicine, Admissions Office, Cornell University, Schuman Hall, Ithaca, NY 14853-6401, 607-255-7000.

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, and in the Course and Time Roster and the Course and Room Roster, published each semester by the Office of the University Registrar. You may access CUINFO through the web. The URL is: www.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, no prerequisites, 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

Engineering

Hotel Administration

Human Ecology

Industrial and Labor Relations

Nutritional Sciences

Officer Education

Group 2: Graduate professional divisions

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

AAS Asian American Studies

AEM Applied Economics and Management

A&EP Applied and Engineering Physics

AIR S Aerospace Studies

AIS American Indian Studies

AM ST American Studies

AN SC Animal Sciences

ANTHR Anthropology

ARCH Architecture

ARKEO Archaeology

ART Art

ART H History of Art

ASIAN Asian Studies

AS&RC Africana Studies and Research Center

BIO Biological and Environmental Engineering

BENG Bengali

BIOAP Animal Physiology

BIOBM Biochemistry, Molecular and Cell Biology

BIOEE Ecology and Evolutionary Biology

BIO G Biology

BIOGD Genetics and Development

BIOMI Microbiology

BIONB Neurobiology and Behavior

BIOPL Plant Biology

BIOSM Shoals Marine Laboratory

BME Biomedical Engineering

B&R SC Bioregion Science

BTRY Biometry and Statistics*

BURM Burmese

CEE Civil and Environmental Engineering

CHEM Chemistry

CHEME Chemical and Biomolecular Engineering

CHLIS Chinese

CHLIT Literature in Chinese

CIS Computing & Information Science

CLASS Classics

COGST Cognitive Studies

COM L Comparative Literature

COMM Communication

COM S Computer Science

CRP City and Regional Planning

CSS Crop and Soil Sciences

CZECH Czech

DANCE Dance

DEA Design and Environmental Analysis

DUTCH Dutch

EAS Earth and Atmospheric Sciences
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/irp/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, mmw5@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, NJ. 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 (see charts below).

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 AP 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 7-11. 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, New York 14853 to the addresses given in the following sections.

CREDIT AND PLACEMENT

The tables below summarize how credit and placement are determined for most subjects. Supplementary information for some subjects follows immediately.

### CEEB's AP Exams

<table>
<thead>
<tr>
<th>Subject</th>
<th>Score</th>
<th>Advanced Placement Credit</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</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>French language</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 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>German</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of German Studies determines placement. Students should take the CASE 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></td>
<td></td>
<td>Placement out of GOVT 131.</td>
</tr>
<tr>
<td>Greek, Ancient and Modern</td>
<td></td>
<td></td>
<td>Department of Classics determines credit and placement based on departmental examination.</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 101 and 102.</td>
</tr>
</tbody>
</table>
### CEEB's AP Exams (continued)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Score</th>
<th>Advanced Placement Credit</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>European history</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of HIST 152.</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 (excluding engineering or BEE students; see following page for further information)</td>
<td>4,5</td>
<td>8 credits</td>
<td>Placement out of MATH 106, 111–112 and 121–122, and permission to take MATH 221, 223, or 213. Students wishing to take engineering calculus may place out of MATH 190 and 191 (4 credits) and into MATH 192. Placement out of MATH 192 and into MATH 293 is available to students who can demonstrate a mastery of introductory multivariable calculus.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4 credits</td>
<td>Placement out of all 1st-semester calculus courses (MATH 106, 111, 121, 190, 191). Permission to take any 2nd-semester calculus course (MATH 112, 122, or 192).</td>
</tr>
<tr>
<td>Mathematics AB or AB subscore of BC exam (excluding engineering or BEE students; see following page for further information)</td>
<td>3,4,5</td>
<td>4 credits</td>
<td>Placement out of all 1st-semester calculus courses (MATH 106, 111, 121, 190, 191). Permission to take any 2nd-semester calculus course (MATH 112, 122, or 192).</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
<td>Department of Music determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>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></td>
<td>4</td>
<td>8 credits</td>
<td>Placement out of PHYS 101–102.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4 credits</td>
<td>Placement out of PHYS 101.</td>
</tr>
<tr>
<td>Physics C–Mechanics</td>
<td>4,5</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>Physics C–Electricity/ Magnetism</td>
<td>5</td>
<td>4 credits</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 engineering students)</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of BTRY 100, ILRST 210, PAM 210, or MATH 171.</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 Baccalauréat 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 placement 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 suitable 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><strong>International Baccalaureate (IB) Higher Level Examination</strong> passes are awarded advanced standing and credit on receipt of the original or a certified copy of the examination results.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthropology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>7</td>
<td>8 credits (Intro BIO)</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6 credits (BIO 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>4 credits and placement out of MATH 106, 111, and 191. Students may obtain more credit by taking the Mathematics Department placement exam.</td>
</tr>
<tr>
<td>Music</td>
<td>7</td>
<td>3 credits</td>
</tr>
<tr>
<td>Philosophy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Science</td>
<td>6 or 7</td>
<td>8 credits (4 credits, CHEM 206; 4 credits, PHYS 101)</td>
</tr>
<tr>
<td>Physics</td>
<td>6 or 7</td>
<td>4 credits (PHYS 101, 112, or 207)</td>
</tr>
</tbody>
</table>

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

<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 (Intro BIO)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>A</td>
<td>8 credits (CHEM 207 and 209)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>4 credits (CHEM 207)</td>
</tr>
<tr>
<td>Economics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>A</td>
<td>6 credits (ECON 101 and 102)</td>
</tr>
<tr>
<td>Literature</td>
<td>B</td>
<td>3 credits</td>
</tr>
<tr>
<td>Mathematics</td>
<td>A, B, or C</td>
<td>4 credits and placement out of MATH 106, 111, and 191. Students may obtain more credit by taking the Mathematics Department placement exam.</td>
</tr>
<tr>
<td>Music</td>
<td>A or B</td>
<td></td>
</tr>
<tr>
<td>Philosophy</td>
<td>A or B</td>
<td>3 credits</td>
</tr>
<tr>
<td>Physics</td>
<td>A or B</td>
<td>4 credits for PHYS 101, 112, or 207.</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 AP test, students who receive scores of 700 or better on the CEEB SAT II examination in English composition, 700 or better on the CEEB SAT II examination in literature, or 4 or 5 on either CEEB Advanced Placement Examination in literature, or 4 on AP English are eligible to enroll, space permitting, in the following English first-year writing seminars: 270, 271, 272.

Mathematics and Statistics
The Cornell calculus sequences discussed below are described under "Basic Sequences" in the placement of Mathematics section of this catalogue.

The non-engineering freshman calculus courses at Cornell do not differ substantially from calculus courses given in many high schools, and it is best to avoid repeating material that has already been covered at an appropriate level. Secondary school students who have had the equivalent of at least one semester of analytic geometry and calculus should, if possible, take one of the CEEB's two Advanced Placement Examinations (Calculus AB or Calculus BC) during their senior year.

Students who have been awarded advanced placement credit for calculus or statistics may not also receive academic credit for similar courses taken at Cornell. In particular, students who have been awarded AP credit for one semester of calculus (four academic credits) may not also receive academic credit for any first-semester calculus course (MATH 106, 111, 121, 190, 191). Students who have been awarded AP credit for two semesters of calculus (eight academic credits) may not also receive academic credit for any first-semester calculus course (MATH 106, 111, 121, 190, 191) nor for any second-semester calculus course (MATH 112, 122, 192). Arts and Sciences students receive a maximum of eight credits for AP Math AB and BC combined. Finally, students who have been awarded AP credit for statistics (three academic credits) may not also receive academic credit for any of the introductory statistics courses, BTRY 100, IBLST 210, or MATH 171.

The following rules apply to students in all colleges and programs except the College of Engineering and the Biological and Environmental Engineering (BEE) program in the College of Agriculture and Life Sciences. Rules applicable to students in these engineering programs are provided near the end of this section.

Students with a score of 4 or 5 on the BC examination may take any of the following third-semester courses, MATH 221, 223, or 213. Students with these scores who wish to take courses in the engineering calculus sequence and who have had no multivariable calculus may give up their AP credit for the second semester and take the second-semester engineering calculus course, MATH 192. On the other hand, students with scores of 4 or 5 on the BC examination who can also demonstrate sufficient mastery of introductory multivariable calculus (which is covered in MATH 192 but not on the BC examination) on the College of Engineering placement exam may take either of the second-year engineering calculus courses, MATH 293 or 294. Students with a 3 on the BC examination or a 3, 4, or 5 on the AB examination, may take any of the second-semester calculus courses (MATH 112, 122, or 192); however, students in the latter category who take MATH 192 may have to make up some material on techniques and applications of integration. For purposes of advanced placement and credit, AB subscores on the BC examination are equivalent to the same scores on the AB examination. Students who receive the borderline passing score of 3 on the AB examination or an AB subscore of 3 on the BC examination and who wish to continue with calculus are strongly advised to take MATH 112 rather than the more demanding courses 122 or 192. Advanced placement credit will be awarded appropriately; however, no credit will be granted for a score of 1 or 2 on the AB examination, nor for a score of 1 or 2 on the BC examination, unless the AB subscore on that examination is at least 3.

A placement examination in mathematics for non-engineering students is offered at Cornell only during Orientation Week and should be taken by:

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

The exam covers the material of the AP calculus program. Students are strongly urged to take this departmental placement exam even if they feel that their grasp of the material is uncertain. The placement information is useful in any case, and the grade on this test does not become a part of the student's record. No advance registration for the departmental examination is necessary.

The College of Engineering and the Biological and Environmental Engineering (BEE) program in the College of Agriculture and Life Sciences will give credit for MATH 191 (four credits), and permission to take MATH 192, for a score of 3, 4, or 5 on the BC examination, or the score of 5 on the AB examination, or for a satisfactory score on the Engineering Mathematics Placement Examination. Credit for MATH 191 and 192 (eight credits), and permission to place MATH 225 or 294, will be given to students in the Engineering College or BEE program who achieve a satisfactory score on the Engineering Mathematics Placement Examination.

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 Languages" in the Arts and Sciences section of this catalogue. 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 65 on the Cornell language placement test given during Orientation Week are eligible to take the Cornell Advanced Standing Examination (CASE). Outstanding performance on this examination can result in a maximum of three credits.

3) For formal language work at an accredited college, credit will be 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.

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 based on this examination. Students who place in MUSIC 251 may 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 website.

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 (which may be taken during Orientation Week or at other times, as arranged). For information about the departmental examination, students should consult the chairperson of the department at 101 Clark Hall, or the department chair, 109 Clark Hall. Physics B: Students earning a score of 4 or 5 may receive eight credits for noncalculus-based PHYS 101 and 102. Those earning a score of 5 in Physics B and a score of 4 or 5 in Calculus BC may choose to accept four credits in calculus-based PHYS 112 or 207 instead of eight credits in PHYS 101 and 102. Those earning a score of 3 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.
University Registration

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

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

To become a registered student at Cornell University, a person must
- complete course enrollment according to individual college requirements;
- settle all financial accounts, including current semester tuition;
- satisfy New York State health requirements;
- have no holds from the college, the office of the Judicial Administrator, 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 partly 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 manual add/drop form. The form is completed by the student and signed by both the student's adviser and a department representative of the department offering the course. The completed and signed form must be returned to the student's college office to be processed.

Professional schools, 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>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Physical education</td>
<td>No fee</td>
<td>No fee</td>
</tr>
<tr>
<td>Veterinary medicine</td>
<td>$100*</td>
<td>$100*</td>
</tr>
</tbody>
</table>

*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.

A student may withdraw from the university at the student's discretion. In addition, a college may withdraw a student who fails to return to the end of a period of authorized leave.

Medical leaves are granted and processed through 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. They 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 2003-2004

<table>
<thead>
<tr>
<th>Endowed Divisions</th>
<th>Undergraduate</th>
<th>Graduate School (with chairman in an endowed college)</th>
<th>Johnson Graduate School of Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture, Art, and Planning</td>
<td>Arts and Sciences</td>
<td>Engineering</td>
<td>Hotel Administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$28,630</td>
</tr>
<tr>
<td>Professional</td>
<td>Law School</td>
<td>Entering students</td>
<td>3rd year students</td>
</tr>
<tr>
<td></td>
<td>2nd year students</td>
<td>3rd year students</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Contract Divisions (tuition rates are tentative)

<table>
<thead>
<tr>
<th>Undergraduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Life Sciences</td>
</tr>
<tr>
<td>Human Ecology</td>
</tr>
<tr>
<td>Industrial and Labor Relations</td>
</tr>
<tr>
<td>New York resident*</td>
</tr>
<tr>
<td>Nonresident (new students)*</td>
</tr>
<tr>
<td>Nonresident (continuing students)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graduate and Professional Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate School (with chair in a contract college)</td>
</tr>
<tr>
<td>Veterinary Medicine</td>
</tr>
<tr>
<td>New York State resident DVM</td>
</tr>
<tr>
<td>Nonresident DVM</td>
</tr>
<tr>
<td>Graduate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Activities Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate students</td>
</tr>
<tr>
<td>Graduate and Professional students</td>
</tr>
<tr>
<td>Summer Session (2003)</td>
</tr>
<tr>
<td>In Absentia Fees</td>
</tr>
<tr>
<td>Summer Session (2003)</td>
</tr>
<tr>
<td>Excess-Hours Tuition</td>
</tr>
</tbody>
</table>

#### 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.

#### 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.

#### Proration Schedule for Withdrawals and Leaves of Absence

<table>
<thead>
<tr>
<th>Fall 2003 and Spring 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Fall 2003</th>
<th>Spring 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>no charge</td>
<td>8/26-8/31</td>
<td>1/22-1/27</td>
</tr>
<tr>
<td>10% charge</td>
<td>9/1-9/7</td>
<td>1/28-2/3</td>
</tr>
<tr>
<td>20% charge</td>
<td>9/8-9/21</td>
<td>2/4-2/17</td>
</tr>
<tr>
<td>30% charge</td>
<td>9/22-9/28</td>
<td>2/18-2/24</td>
</tr>
<tr>
<td>40% charge</td>
<td>9/29-10/5</td>
<td>2/25-3/2</td>
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<tr>
<td>50% charge</td>
<td>10/6-10/12</td>
<td>3/3-3/9</td>
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<tr>
<td>60% charge</td>
<td>10/13-10/19</td>
<td>3/10-3/16</td>
</tr>
<tr>
<td>80% charge</td>
<td>10/20-10/26</td>
<td>3/17-3/23</td>
</tr>
<tr>
<td>100% charge</td>
<td>10/27</td>
<td>3/24</td>
</tr>
</tbody>
</table>

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

The Student Health Insurance Plan provides coverage 24 hours a day, 365 days a year, anywhere in the world. Students graduating 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).
### 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 Meeting Times

**Monday/Wednesday**

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 A.M.</td>
<td>08:50 A.M.</td>
</tr>
<tr>
<td>08:40 A.M.</td>
<td>09:55 A.M.</td>
</tr>
<tr>
<td>09:05 A.M.</td>
<td>09:55 A.M.</td>
</tr>
<tr>
<td>10:10 A.M.</td>
<td>11:00 A.M.</td>
</tr>
<tr>
<td>11:15 A.M.</td>
<td>12:05 P.M.</td>
</tr>
<tr>
<td>12:20 P.M.</td>
<td>01:10 P.M.</td>
</tr>
<tr>
<td>01:25 P.M.</td>
<td>02:15 P.M.</td>
</tr>
<tr>
<td>02:30 P.M.</td>
<td>03:20 P.M.</td>
</tr>
<tr>
<td>03:35 P.M.</td>
<td>04:25 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, 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 (athletic, musical, theatrical, employment, etc.). Any exception to the above regulations, other than those for evening preliminary examinations, will require permission of the dean or director of the college or school offering the course. Exceptions to the regulations on evening preliminary examinations require approval of the dean of the university faculty. All such exceptions must include provision of special arrangements for the students for whom conflicts are generated by such an exception.

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**Laboratories and similar exercises**

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 A.M.</td>
<td>09:55 A.M.</td>
</tr>
<tr>
<td>10:10 A.M.</td>
<td>12:05 P.M.</td>
</tr>
<tr>
<td>12:20 P.M.</td>
<td>02:15 P.M.</td>
</tr>
<tr>
<td>02:30 P.M.</td>
<td>04:25 P.M.</td>
</tr>
<tr>
<td>07:30 P.M.</td>
<td>09:55 A.M.</td>
</tr>
</tbody>
</table>

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**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 a comparable 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 preparing 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, i.e., illness, death in the family, etc.
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 stu-
dents such right of review.

EVENING PRELIMINARY
EXAMINATIONS

The most convenient times and places for
"prelims" are the normal class times and class-
rooms. 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 con-
icts at the time scheduled.

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

Grading Guidelines

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

\[
\begin{align*}
A+ &= 4.3 \\
A &= 4.0 \\
A- &= 3.7 \\
B+ &= 3.3 \\
B &= 3.0 \\
B- &= 2.7 \\
C+ &= 2.3 \\
C &= 2.0 \\
C- &= 1.7 \\
D+ &= 1.3 \\
D &= 1.0 \\
D- &= 0.7 \\
F &= 0.0
\end{align*}
\]

This is how a term average is computed:

\[
\text{Quality} = \frac{\text{Credit Points}}{\text{Total Credits}}
\]

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

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

S-U GRADES

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

"Resolved, that:

a. the S-U system have symbol equivalents
which are uniform within the university:
"S" means C- or above; "U" means D+, D,
D-, or failure.

b. S-U options be chosen by the student
during the first three weeks of the 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
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
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) In a course designated as S or
U, the entire class is so graded. The instructor
must announce this decision within the first
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
adviser on an add drop form in the first 3
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 an
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 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
to these courses to the freshman seminar
requirements. (f) Total of 12 credits in S-U
courses (not counting PE) 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 I&LR 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
academic 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.

Veterinary Medicine. (a) There is one
foundation course in the undergraduate
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 cir-
cumstances 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 instruc-
tor 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
within 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 stu-
dent. 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 a week). The Gannett
Health Center 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 stu-
dent's responsibility to be aware of the specif-
cr 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
their rights concerning 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 law gives students the right
to
a) inspect and review their education
records;
b) challenge contents of education records;
c) a hearing if the challenge is unsatisfactory;
d) include an explanatory statement in the
education records if the outcome of the
hearing is unsatisfactory;
e) prevent disclosure of personally
identifiable information;
f) secure a copy of the institutional policy
which includes the location of all
education records**; and

g) file complaints with the Department of
Education concerning institutional failure
to comply with the act.

*Directory information is a category of
personally identifiable information that
includes name, home address, local address,
local telephone listing, dates of attendance at
Cornell, major field of study and college
attended, previous educational agency or
institution attended, participation in officially
recognized activities (in athletics, the weight
and height of members of athletic teams),
degrees earned, and awards. Directory
information may be released unless the
student indicates otherwise at the time of
registration. Students who wish no release of
their directory information must inform the
privacy office of the university registrar in writing
within 10 days of the date of official university
registration. Students may rescind their no
release request at any time in writing to the
office of the university registrar.

**"Cornell University Policy on Access to and
Release of Student Education Records" is
available on the web at URL:
www.univcornoell.edu/policy/ASL.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 projects begin. The guidelines for the use of human subjects in research are available at www.osp.cornell.edu/Compliance/UCHS/home/UCHS.htm. Inquiries and communications about the guidelines should be directed to the committee’s coordinator, 123 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).

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 should instruct students in the responsible use of animals. For more information see www.univco.cornell.edu/policy/CURA.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 and intellectuals who periodically visit the university for the stated purpose of "contributing to the intellectual and cultural life of the university." Toward this end, Andrew D. White Professors-at-Large engage in a variety of activities including public lectures, ongoing courses, and collaborative research, as well as holding office hours for undergraduate and graduate students. They serve for a six-year term and are full members of the faculty when in residence.

Term Ending in 2004

Bal, Mieke, cultural analyst
Cleese, John, writer and actor
Macdonald, David W., mammalogist and behavioral ecologist
Silajdzic, Haris, political leader, historian of the Middle East

Term Ending in 2005

Jemison, Mae, astronaut
McDonough, William, architect
O’Brien, Stephen J., genetist
Schechter, Richard, director of performance studies

Term Ending in 2006

Goldsworthy, Andy, sculptor
Sacks, Oliver, physician and writer

Term Ending in 2007

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

Term Ending in 2008

Hodlczkl, Bert, zoologist
Subrahmanyan, Sanjay, economic historian

Term Ending in 2009

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

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

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

Term Ending in 2003

Nye, Bill, science guy
Reno, Janet, attorney

Term Ending in 2005

Meier, Richard, architect
Scolnick, Edward M., biomedical scientist

Term Ending in 2006

McKinney, Cynthia, educator and politician
Pilger, John, journalist and documentary filmmaker
COM S 682 Theory of Computing
COM S 677 Reasoning about Uncertainty
MATH 728 Seminar in Partial Differential
COM S 671 Introduction to Automated
MATH 722 Topics in Complex Analysis
MATH 784 Recursion Theory
MATH 787 Set Theory
MATH 788 Topics in Applied Logic

Numerical Mathematics and Operations Research

COM S 715 Seminar in Programming
MATH 486 Applied Logic (also CS 486)
MATH 681 Logic
MATH 781-782 Seminar in Logic
MATH 783 Model Theory
MATH 784 Recursion Theory
MATH 787 Set Theory
MATH 788 Topics in Applied Logic

Discrete Mathematics and Geometry
MATH 441 Introduction to Combinatorics
MATH 442 Introduction to Combinatorics
MATH 455 Applicable Geometry
ORIE 633 Graph Theory and Network Flows
ORIE 636 Integer Programming
ORIE 639 Polyhedral Convexity

Information Communication and Control Theory
CHEM E 472 Feedback Control Systems (also ECE 471 and MAE 478)
ECE 411 Random Signals in Communications and Signal Processing
ECE 425 Digital Signal Processing
ECE 467–468 Telecommunication Systems I and II
ECE 521 Theory of Linear Systems
ECE 522 Nonlinear Systems: Analysis, Stability, Control and Applications
ECE 525 Adaptive Filtering in Communication Systems
ECE 526 Signal Representation and Modeling
ECE 561 Error-Control Codes
ECE 562 Fundamental Information Theory
ECE 563 Communication Networks
ECE 565 Statistical Signal Processing
ECE 567 Advanced Digital Communication
ECE 577 Feedback Neural Networks
M&AE 677 Robust and Optimal Control

Mathematical Biology
BTRY 662 Mathematical Ecology (also STBTRY 662)
BTRY 697 Individual Study in Biomathematics and Statistics

Mathematical Economics
ECON 619 Econometrics I
ECON 620 Econometrics II
ECON 710 Stochastic Economics: Concepts and Techniques
ECON 715–718 Mathematical Economics
ECON 719–720 Advanced Topics in Econometrics

Mechanics and Dynamics
CHEM E 731 Advanced Fluid Mechanics and Heat Transfer
CHEM E 732 Diffusion and Mass Transfer
CHEM E 751 Mathematical Methods of Chemical Engineering Analysis
CHEM E 753 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation
M&AE 601 Foundations of Fluid Dynamics and Aerodynamics
M&AE 602 Fluid Dynamics at High Reynolds Numbers
M&AE 731 Stability of Fluid Flow
M&AE 734 Analysis of Turbulent Flows
M&AE 736 Theory of Computational Aerodynamics
M&AE 737 Computational Fluid Mechanics and Heat Transfer
T&AM 570 Intermediate Dynamics
T&AM 578 Nonlinear Dynamics and Chaos
T&AM 666 Finite Element Analysis (also M&AE 680 and CEE 676)
T&AM 671 Hamiltonian Dynamics
T&AM 672 Celestial Mechanics (also ASTRO 579)
T&AM 673 Mechanics of the Solar System (also ASTRO 571)
T&AM 675 Nonlinear Vibration
T&AM 678 Complex Systems
T&AM 751 Continuum Mechanics and Thermodynamics
T&AM 752 Nonlinear Elasticity
T&AM 776 Applied Dynamical Systems (also MATH 717)

Probability and Statistics
ECE 562 Fundamental Information Theory
ECE 563 Communication Networks
ECE 565 Statistical Signal Processing
ECE 566 Wireless Networks
MATH 671–672 Probability Theory
MATH 674 Introduction to Mathematical Statistics
MATH 777–778 Stochastic Processes
ORIE 561 Queuing Theory and Its Applications
ORIE 563 Applied Time-Series Analysis
ORIE 565 Applied Stochastic Processes
ORIE 561 Probability
ORIE 662 Advanced Stochastic Processes
ORIE 670 Statistical Principles
ORIE 671 Intermediate Applied Statistics
BTRY 408 Theory of 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 796 Statistical Mechanics
CHEM 798 Bonding in Molecules
ECE 407 Quantum Electronics
PHYS 553–554 General Relativity (ASTRO 509–510)
PHYS 651 Classical Electrodynamics
PHYS 652 Statistical Physics
PHYS 572 Quantum Mechanics I
PHYS 574 Quantum Mechanics II
PHYS 651–652 Relativistic Quantum Field Theory
THE MARIO EINAUDI CENTER FOR INTERNATIONAL STUDIES
170 Uris Hall (255–6370)

The Mario Einaudi Center for International Studies, established in 1961 to encourage and support comparative and interdisciplinary research on international subjects, is one of the largest and most diverse centers of its kind in the United States. Currently, it includes four 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 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 and students. Together with the Peace Studies Program, the center hosts a Current Events Roundtable each June that enables Cornell alumni to join faculty 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 with 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: 607–254–5000
www.einaudi.cornell.edu

The Einaudi Center Administration:
TBA, director
Leflani Pett, 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 Koldan, director
190 Uris Hall

South Asia Program:
Alaka Basu, director
170 Uris Hall

Southeast Asia Program:
Thak Chaloemtiarana, director
180 Uris Hall

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

Institute for European Studies:
Jonathan Kirshner, director
309 Myron Taylor Hall

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

International Legal Studies:
John Barcelo, director
309 Myron Taylor Hall

International Political Economy:
Jonathan Kirshner, director
106 West Sibley Hall

Gender and Global Change:
Valerie Bunce, acting director
204 White Hall

Participatory Action Research Network:
Jane Mt Pleasant, director
130 Uris Hall

Peace Studies Program:
Matthew Evangelista, director
130 Uris Hall

Program in International Nutrition:
Kaushik Basu, director
120 Uris Hall

Program on Comparative Economic Development:
Arvind Panagariya, director
31 Warren Hall

Program on International Relations:
Norman Uphoff, director
31 Warren Hall

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: 563 Uris Hall
Phone: 607–255–8674
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Email: inequality@cornell.edu
URL: www.inequality.cornell.edu

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.cornell.edu).

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, 2003 (for further details, see www.inequality.cornell.edu/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.cornell.edu/inequality.cornell.edu/publications/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.cornell.edu/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.cornell.edu/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 transcript (see www.inequality.cornell.edu/ academics/undergraduate.shtml for further information).

For more information about CSI, please contact Jessica Henning, executive adminis-trator of CSI (254-8674 or inequality@cornell.edu).

COGNITIVE STUDIES
282 Uris Hall (255-6431) (cogst@cornell.edu)
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 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, Science and Technology Studies, 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 an 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 607/255-6224, fax 607/255-8700, e-mail: CUAboard@cornell.edu, web: www. einaudi.cornell.edu/cuabroad study abroad is an integral part of a Cornell education. We live in an increasingly global society in which knowledge, resources, and authority transcend national and regional boundaries. To help students develop the knowledge, skills, and attitudes necessary for global citizenship in the twenty-first century, 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 services 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; those 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

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 Fudan Universities (CIEE); International Chinese Language Program at National Taiwan University; IES Beijing
India: School for International Training; St. Stephen's College; Delhi (through Brown or Rutgers Universities);
Indonesia: Institut Keguruan Dan Ilmu Pendidikan (IKIP) in Malang (CIEE);
Japan: *Kyoto Center for Japanese Studies; various university programs, IES Tokyo;
Korea: Yonsei 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, Perth; School for International Training; Sydney Internship (Boston University);
New Zealand: Otago and Lincoln Universities in New Zealand;

EUROPE
Denmark: *Denmark's International Study Program (DIS);
France: *EDUCO (Cornell, Duke, and Emory in Paris) at Universite de Paris VII, Paris IV, Paris I, Institut d'Etudes Politiques de Paris ("Sciences Po"); Critical Studies Program at the University of Paris (CIEE); Paris Internship (Boston University); IES Dijon 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: *Cornell College of Art, Architecture, and Planning Program in Rome; Arcadia University in Florence at the Accademia Italiana; Bologna Cooperative Studies Program; Boston University Program in Padova; IES Milan; Intercollegiate Center for Classical Studies in Rome; Syracuse University program in Florence;
Netherlands: University of Amsterdam; Leiden University;
Russia: St. Petersburg University (CIEE); Moscow International University and other universities (American Council of Teachers of Russian);
**General Information - 2003-2004**

Spain: *Cornell-Michigan-Penn program at the University of Seville; various language and culture programs;*

Sweden: *Swedish Child Care and Family Policy Practicum at the University of Göteborg; 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 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.*

Externally sponsored programs in the UK include the British American Drama Academy, the Arcadia University, Boston, and the University internships, the Marymount College Program at the London College of Fashion, and the Hansard Parliamentary Internship Programme.

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

**Latin America, Central America, and the Caribbean**

Argentina and Chile: various university-based study abroad programs, through the Cooperating 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 Program; 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 (CIEE); 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 to the programs identified for particular countries. In recent years, they have also studied in Austria, Croatia, Czech Republic, Dominican Republic, Finland, the Philippines, Poland, Portugal, Switzerland, Turkey, Venezuela, and elsewhere.

**Who Studies Abroad**

Students from all seven undergraduate colleges and from all major fields study abroad; they are expected to have a cumulative grade point average of 3.0 or above. 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 time for study abroad, although many semester-long programs are 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, 474 Uris Hall, where students are encouraged to consult the library of study abroad materials, talk with staff, 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 downloadable applications and comprehensive information on all aspects of study abroad. Students meet with the study abroad advisers in their college so that 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 2004 semester and the 2004-2005 academic year is February 15, 2004, for all programs except Oxford and Cambridge, for which the deadlines apply to all universities for the full year in 2004-2005 is November 1, 2003. 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, Indonesia, Israel, Italy, Japan, Korea, Netherlands, People's Republic of China, and Sweden. Cornell students who participate in programs in a non-English-speaking country with English-language course work are required to take at least one language course as part of their program of study and are strongly encouraged to take more. Students are advised to consult with their college study abroad advisers 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 uniform Cornell Abroad tuition per semester, which covers tuition, housing during term (except in UK universities), orientation, program-sponsored trips and events, and administrative and financial aid costs, including emergency medical evacuation and repatriation insurance. It may include other
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 should in no way interpret or evaluate events for students abroad. Cornell Abroad does not 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 safety 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 and affiliated institutions on a case-by-case basis. Most institutions sponsoring study abroad programs have policies 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 Gauillon Ph.D., director; Beatrice B. Szewczyk Ph.D., associate director; Libby Okihiro, student services coordinator; Kathy Lynch, financial services coordinator. The Cornell Abroad library contains an extensive collection of university catalogs and study abroad program brochures, files of course syllabi and evaluations, books, videotapes, and 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, faculty, students, and staff discuss programs in a series of information meetings announced in the Cornell Daily Sun and on the Cornell Abroad web site (www.ciuadi.cornell.edu/cuabroad). The director and associate director 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 Wonder, Bi-1 W. Sibley, Arts and Sciences: Dean Pat Wasilow, 55 Goldwin Smith Hall; Engineering: Dan Maloney Hall; 167 Olin Hall; Hotel Administration: Cheryl Farrell, 174B Statler Hall; Human Ecology: Paul Fisher, 172 Martha Van Rensselaer; Industrial and Labor Relations: Kevin Harris, 101 Ives Hall.

Cornell in Washington Program
http://ciw.cornell.edu
M101 McGraw Hall (255-4090)
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 provide 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, Washington’s rich collection 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. The Cornell in Washington program offers two study options: (1) studies in public policy; and (2) studies in the American experience. Students take courses from Cornell faculty, conduct individual research projects, and work as externs in the Washington community.

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. Students are assigned to each efficiency and to 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 available.

Applications
Application forms are available from the Cornell in Washington program office at M101 McGraw Hall. Students may also apply on line 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 March. These meetings are advertised in the Cornell Daily Sun and on campus bulletin boards. Additional information concerning externships, courses, housing and other features of the program may be obtained at either the Cornell in Washington program office at M101 McGraw Hall, (607) 255-4090, or in Washington at the Cornell Center, 2148 O Street, NW, Washington, DC 20037, (202) 465-2184.
**Complementary Degrees**

CIPA students may elect to combine their MPA study program with a complementary degree study, such as a JD from the Cornell Law School, an MBA from the Graduate School of Management, an MM from the Hotel School, or an MRP from the field of City and Regional Planning.

**Accurated 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 MPA in just one year beyond their undergraduate studies.

**Foundation Courses**

Foundation course work is intended to give students the basic analytical and conceptual capabilities for pursuing specialized studies in their chosen concentration. Students take three courses in each of the following areas:

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

**Concentration Areas**

Concentration course work enables students to focus on a specific area of public affairs. Five graduate-level courses are required in the area of the student’s chosen study concentration. These courses are intended to support the student’s thesis work and are to be selected in consultation with the student’s thesis adviser. CIPA offers eight concentration options:

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

**Thesis**

Each fellow writes a thesis integrating conceptual tools, theories, and analytical techniques by applying them to a problem in his or her concentration. The culmination of study in the MPA program, the thesis is intended to be both critical and creative, reflecting the student’s ability to identify and analyze important public policy questions and generate practical solutions.

**Residence Requirement**

Students are required to spend four semesters of study in residence to complete the MPA. Those who enroll in the Cornell Accelerated Master’s Program can earn the equivalent of two semesters in residence during their senior year.

**Internships**

Students are engaged in public affairs work related to their respective areas of concentration during the summer between their first and second year of graduate study. The objective is to gain pragmatic professional experience to complement formal academic study. The following opportunities are available to CIPA fellows at the local, state, national, and international levels.

**Local**

CIPA fellows have been placed in internships throughout the city of Ithaca and Tompkins County. CIPA fellows have worked in the mayor’s office, Ithaca Youth Bureau, Tompkins County Office for the Aging, County Workforce Development Board, Board of Representatives, Department of Planning, and Department of Health.

**State**

The New York State Assembly Graduate Internship program provides research and policy development experiences for qualified graduate students. It affords CIPA fellows a unique professional learning experience and the opportunity to develop their understanding of the legislative process at the state level.

**National**

The Cornell In Washington Program blends practical work experience, Cornell courses, and exposure to one of the world’s great capital cities. It provides the opportunity to investigate and explore public policy from the perspective of institutions in the public, private, and non-profit sectors.

**International**

Many of our CIPA fellows are placed in summer or semester internships with the United Nations either in New York City or abroad in locations such as Nairobi and Bangkok. Through Cornell’s Rome Program, students have the opportunity to be placed in the United Nations and the World Bank in Rome. The Cornell-Nepal Study Program offers students a chance to observe, first-hand, changes in a developing country.

**Student Organization**

Fellows organize and manage a variety of professional development activities that provide opportunities to share their work experience and to meet distinguished faculty and practitioners in the field of public policy from around the world. Students schedule and coordinate the weekly Colloquium Program, they produce a debate-format television show (Point of View) that airs twice a week during the school year, and they publish a journal of student policy research (The Current). Students in the Cornell Public Affairs Society (CPAS) and Women in Public Policy (WPP) guide these endeavors. They are elected in November and serve for one calendar year.

Each year, during spring break, CIPA students travel to Washington, D.C., where they attend a session of Congress and meet with government representatives and officials in organizations such as the World Bank and the U.S. Agency for International Development.

CIPA fellows have a range of on-campus policy-related conferences to choose from each semester. These conferences are sponsored by various public policy-affiliated programs at Cornell. CIPA fellows also attend national conferences of organizations such as APPAM (Association for Public Policy Analysis and Management) and NASPAA (National Association of Schools of Public Affairs and Administration).
Admission
The CIPA program seeks a diverse 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 an evaluation of the applicant’s overall academic record, GRE scores, and potential for public policy leadership as evidenced by professional work, community, extracurricular, or other relevant experience; a written statement of purpose; and letters of recommendation.

CIPA has a policy of rolling admission. For an application or for more information, contact the Cornell Institute for Public Affairs, 473 Hollister Hall (phone: 607-255-8018; fax: 607-255-9240; e-mail: cipa@cornell.edu; website: www.cipa.cornell.edu).

Financial Aid
CIPA offers a variety of funding options. Although the institute is unable to provide full fellowships for any individual student, fellows often win support from Fulbright, Truman, or World Bank fellowships. In addition, CIPA 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 the application by March 1.

CORNELL PLANTATIONS
One Plantations Road (255–5320)
URL www.plantations.cornell.edu
A place of exceptional diversity and learning opportunities, Cornell Plantations comprises the university’s botanical garden, arboretum, and natural areas. Its 3,000+ acres include the woodlands and gardens on and around campus, as well as specialized gardens and a 150-acre arboretum that features a field flower meadow and trees and shrubs hardly in central New York State. 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, 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, bogs, ponds, swamp, 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 also offers relaxation, rejuvenation, and inspiration. The vast open spaces provide room to breathe, while the intimate garden spaces offer escape from the busy campus. Visitors always discover surprises and learn something new in the gardens, which feature herbs, flowers, vegetables, international crops, rock garden plants, peonies, poisonous plants, ground covers, rhododendrons, wildflowers, and a winter garden.

Students are encouraged to volunteer as photographers, tour guides, computer assistants, gardeners, and writers for our magazine and newsletter. A number of student internships are also offered each summer. Maps, information, publications, and class brochures (for noncredit classes and workshops) are available at the Garden Gift Shop in the Lewis Headquarters Building at the botanical garden. Noncredit courses in horticulture, landscape design, botanical arts, and natural history are offered throughout the year. An on-campus seminar series (HORT 480) is offered each fall; a three-credit Public Garden Management course (HORT 485) is offered every other spring semester, and a Master of Professional Studies program offers fully funded fellowships in Public Garden Management.

PROGRAM ON ETHICS & PUBLIC LIFE
240 Goldwin Smith Hall (255–8515)
The critical issues of public life are inescapably ethical issues. In the economy, we face questions of equity and justice and questions about the relation between prosperity, the environment, and the quality of individual lives. In constitutional law, we confront dilemmas about civil rights, freedom of speech, privacy, and abortion. In politics and government, we grapple with questions about campaigning, character, and compromise. And in international affairs, we encounter the complexities of war and peace, human rights, multilateral aid, and climate change.

The university-wide Program on Ethics & 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").

EPL Core Courses
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 & Public Life, and Professor of Philosophy; Burke Hendrix, Assistant Professor of Government and Assistant Professor of Ethics & Public Life; Henry Shue, Professor of Ethics & Public Life and Professor of Philosophy; Tom Berry, Visiting Assistant Professor of Ethics & Public Life.

PROGRAM IN REAL ESTATE
114 West Sibley Hall (255–7110)
The two-year Master of Professional Studies in Real Estate (MPS/RE) degree program is an interdisciplinary program that combines courses from nearly every college at Cornell University. The degree is designed for aspiring real estate professionals who are in the initial or early stages of their careers. 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 financial 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 from several different colleges that is directly involved in the design, delivery, and administration of the real estate curriculum.

INTERDISCIPLINARY CENTERS, PROGRAMS, AND STUDIES
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 a master's 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 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 concentrations 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 marketing and market analysis, or international real estate concentrations). Students complete real-world, semester-long project workshops during their second and final semesters.

Admissions
Applicants to the Program in Real Estate must have completed a bachelor's degree with a good academic record. Applicants must submit a résumé plus two letters of recommendation either from faculty familiar with the applicant's academic work, or if appropriate, professional recommendations based on work experience. Competitive scores for the GMAT are required. International students, for whom English is a second language, will need to achieve a minimum TOEFL score of 250 (computer based) or 600 (paper based). There is no work experience required for admission; however, it is strongly preferred that applicants have at least some work experience; three to five years has been typical. For more information, contact C. Bradley Olson, Director of the Program in Real Estate, or the Graduate Field Assistant, at 607-255-7110, or e-mail real_estate@cornell.edu.

SCIENCE OF EARTH SYSTEMS: AN INTERCOLLEGE MAJOR
During the past several decades, with the increasing concern about air and water pollution, nuclear waste disposal, the ozone hole, and global climate change, the scientific community has gained considerable insight into how the biosphere, hydrosphere, 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 work leading to the M.S. and/or Ph.D. in any of the earth science sub-disciplines (e.g., atmospheric science, geology/geophysics, biogeochemistry, hydrology, oceanography).
- Employment in environmentally oriented careers in both the private and public sector at the B.S. or B.A. level.
- Advanced degree in environmental law or policy. These fields value students with an understanding of the science behind legal and policy decisions.
- Advanced degree in teaching, for example, earth science at the middle or high school level.
- Medical school. The emphasis on basic sciences in the SES curriculum makes the SES major a suitable springboard for a career in medicine.

The SES major is available for students in the College of Agriculture and Life Sciences 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
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, or MATH 190 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 101/103 and 102/104 (or 105–106) or BIO 109 and 110
   e. THREE ADDITIONAL 3-credit courses in basic science and math, generally 100- and 200-level classes. One or both of the following may be included in the selection:
      - EAS 201 Physics and Chemistry of the Earth
      - BIOEE 261 Ecology and the Environment

Other examples are MATH 293, MATH 294, MATH 213, biochemistry, organic chemistry, 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 a-d 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/NTRES 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 in 1. 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, Climate Dynamics, Biogeochemistry, Ecological Systems, Environmental Geology, Ocean Sciences, Environmental Biophysics, Hydrological Systems, and Soil Science.

For more information contact Professor Kerry H. Cook, Department of Earth and Atmospheric Science, khc6@cornell.edu, and visit the web site: www.geo.cornell.edu/ses.

DEPARTMENT OF STATISTICAL SCIENCE
301 Malott Hall (255-8065)

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, 255-8166). 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 and Computational Biology (CALS), STBTRY, 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, data management, 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 life-length 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.

600 Statistics Seminar

Fall and spring. 1 credit. S-U only. Prerequisite or corequisite: BTRY 409 or permission of instructor.

Biological Statistics Unit

STBTRY 301 Statistical Methods I (enroll in BTRY 301)
STBTRY 302 Statistical Methods II (enroll in BTRY 302)
STBTRY 400 Biometry Seminar (enroll in BTRY 400)
STBTRY 408 Theory of Probability (enroll in BTRY 408)
STBTRY 409 Theory of Statistics (enroll in BTRY 409)
STBTRY 482 Statistical Genomics (enroll in BTRY 482)
STBTRY 494 Undergraduate Special Topics in Biometry and Statistics (enroll in BTRY 494)
STBTRY 495 Statistical Consulting (enroll in BTRY 495)
STBTRY 497 Undergraduate Individual Study in Biometry and Statistics (enroll in BTRY 497)
STBTRY 498 Undergraduate Supervised Teaching (enroll in BTRY 498)
STBTRY 499 Undergraduate Research (enroll in BTRY 499)
STBTRY 600 Statistics Seminar (enroll in BTRY 600)
STBTRY 601 Statistical Methods I (enroll in BTRY 601)
STBTRY 602 Statistical Methods II (enroll in BTRY 602)
STBTRY 603 Statistical Methods III (enroll in BTRY 603)
STBTRY 604 Statistical Methods IV: Applied Design (enroll in BTRY 604)
STBTRY 652 Computer-Intensive Statistical Inference
STBTRY 672 Topics in Environmental Statistics (BTRY 672)
STBTRY 682 Statistical Genomics (enroll in BTRY 682)
STBTRY 694 Graduate Special Topics in Biometry and Statistics (enroll in BTRY 694)
STBTRY 697 Individual Graduate Study in Biometry and Statistics (enroll in BTRY 697)
STBTRY 717 Linear and Generalized Linear Models (enroll in BTRY 717)
STBTRY 795 Statistical Consulting (enroll in BTRY 795)
STBTRY 798 Graduate Supervised Teaching (enroll in BTRY 798)

Engineering Statistics Unit

STENGR 310 Introduction to Probability and Random Signals (enroll in ECE 310)
STENGR 360 Engineering Probability and Statistics I (enroll in OR&IE 360)
STENGR 361 Introductory Engineering Stochastic Processes I (enroll in OR&IE 361)
STENGR 411 Random Signals in Communications and Signal Processing (enroll in ECE 411)
STENGR 436 A Mathematical Examination of Fair Representation (enroll in OR&IE 436)
STENGR 461 Stochastic Calculus for Applications (enroll in OR&IE 461)
STENGR 467 Telecommunication Systems I (enroll in ECE 467)
STENGR 473 Empirical Research Methods in Financial Engineering (enroll in OR&IE 473)
STENGR 474 Statistical Data Mining (enroll in OR&IE 474)
STENGR 476 Applied Linear Statistical Models (enroll in OR&IE 476)
STENGR 512 Fundamental Information Theory (enroll in ECE 562)

[STENGR 517 Artificial Neural Networks (enroll in ECE 577)]
[STENGR 523 Introductory Engineering Stochastic Processes I (enroll in OR&IE 523)]
[STENGR 560 Engineering Probability and Statistics II (enroll in OR&IE 560)]
[STENGR 561 Queueing Theory and Its Applications (enroll in OR&IE 561)]
[STENGR 577 Quality Control (enroll in OR&IE 577)]
STENGR 580 Simulation Modeling and Analysis (enroll in OR&IE 580)
STENGR 650 Applied Stochastic Processes (enroll in OR&IE 650)
STENGR 651 Probability (enroll in OR&IE 651)
STENGR 662 Advanced Stochastic Processes—Martingale Theory (enroll in OR&IE 662)
[STENGR 665 Storage Data Communication Models (enroll in OR&IE 665)]
STENGR 670 Statistical Principles (enroll in OR&IE 670)
STENGR 671 Intermediate Applied Statistics (enroll in OR&IE 671)
STENGR 674 Statistical Learning Theory for Data Mining (enroll in OR&IE 674)
STENGR 677 Sequential Methods in Statistics (enroll in OR&IE 677)
STENGR 680 Simulation (enroll in OR&IE 680)
STENGR 768 Selected Topics in Applied Probability (enroll in OR&IE 768)
STENGR 769 Selected Topics in Applied Probability (enroll in OR&IE 769)
STENGR 778 Selected Topics in Applied Statistics (enroll in OR&IE 778)

Mathematical Statistics and Probability Unit

STMATH 171 Statistical Theory and Application in the Real World (enroll in MATH 171)
STMATH 311 Introduction to Analysis (enroll in MATH 311)
STMATH 471 Basic Probability (enroll in MATH 471)
STMATH 472 Statistics (enroll in MATH 472)
STMATH 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 774 Asymptotic Statistics (enroll in MATH 774)
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 311 Practical Matrix Algebra (enroll in ILRST 311)
STSOC 312 Applied Regression Methods (enroll in ILRST 312)
STSOC 313 Design and Analysis of Experiments (enroll in ILRST 313)
ENVIRONMENTAL TOXICOLOGY

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 a minor concentration of 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, 213 Rice Hall, telephone: 255-8008, e-mail: envtox@cornell.edu, web: www.cfe.cornell.edu/icet/

STSOC 314 Graphical Methods for Data Analysis (enroll in ILRST 314)
STSOC 315 Statistical Analysis of Legal Data (enroll in ILRST 315)
STSOC 319 Introduction to Statistics and Probability (enroll in ECON 319)
STSOC 320 Introduction to Econometrics II (enroll in ECON 320)
STSOC 321 Applied Econometrics II (enroll in ECON 321)
STSOC 411 Statistical Analysis of Qualitative Data (enroll in ILRST 411)
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 610 Seminar in Modern Data Analysis (enroll in ILRST 610)
STSOC 611 Statistical Consulting (enroll in ILRST 611)
STSOC 612 Statistical Classification Methods (enroll in ILRST 612)
STSOC 613 Bayesian and Conditional Inference (enroll in ILRST 613)
STSOC 614 Structural Equations with Latent Variables (enroll in ILRST 614)
STSOC 615 Expert Systems and Probabilistic Network Models (enroll in ILRST 615)
STSOC 619 Special Topics in Social Statistics (enroll in ILRST 619)
STSOC 620 Econometrics II (enroll in ECON 620)
STSOC 699 Econometrics I (enroll in ECON 699)
STSOC 711 Robust Regression Diagnostics (enroll in ILRST 711)
STSOC 712 Theory of Sampling (enroll in ILRST 712)
STSOC 713 Counting Processes with Statistical Applications (enroll in ILRST 713)
STSOC 714 Topics in Modern Statistical Distribution Theory (enroll in ILRST 714)
STSOC 715 Likelihood Inference (enroll in ILRST 715)
STSOC 716 Statistical Consulting (enroll in ILRST 716)
STSOC 717 The Analysis of Discrete Data (enroll in ILRST 717)
STSOC 721 Time Series Econometrics (enroll in ECON 721)
STSOC 722 Semi/Nonparametric Econometrics (enroll in ECON 722)
STSOC 730 Advanced Topics in Econometrics II (enroll in ECON 720)
STSOC 731 Time Series Econometrics (enroll in ECON 721)
STSOC 739 Advanced Topics in Economics I (enroll in ECON 719)
STSOC 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 101 Introduction to Biometry I
BTRY 102 Introduction to Biometry II
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 522 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
H ADM 370 Hospitality Quantitative Analysis
HD 401 Empirical Research
ILRST 314 Distribution Theory
ILRST 315 Research Methods in Sociology II
ILRST 410 Regression
ILRST 411 Applied Econometrics
ILRST 499 Statistical Analysis of Qualitative Data
ILRST 612 Econometric Modeling
ILRST 613 Statistical Consulting
ILRST 619 Special Topics in Social Sciences
ILRST 620 Econometrics II
ILRST 626 Special Topics in Social Sciences
ILRST 712 Seminar in Modern Data Analysis
ILRST 713 Robust Regression Diagnostics
ILRST 714 Theory of Sampling
ILRST 715 Likelihood Inference
ILRST 716 Statistical Consulting
ILRST 717 The Analysis of Discrete Data
ILRST 721 Time Series Econometrics
ILRST 722 Semi/Nonparametric Econometrics
ILRST 730 Advanced Topics in Econometrics II
ILRST 731 Time Series Econometrics
ILRST 739 Advanced Topics in Economics I
ILRST 799 Directed Studies (Graduate)

PROGRAM IN COMPARATIVE AND ENVIRONMENTAL TOXICOLOGY

213 Rice Hall (255–8008)

The Cornell Program in Comparative and Environmental Toxicology is a broadly based inter-college 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 a minor concentration of 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, 213 Rice Hall, telephone: 255–8008, e-mail: envtox@cornell.edu, web: www.cfe.cornell.edu/icet/.

TOX 370 Pesticides and the Environment
TOX 437 Eukaryotic Cell Proliferation
TOX 490 Insect Toxicology and Insecticidal Chemistry
TOX 607 Ecotoxicology
TOX 610 Introductory Chemical and Environmental Toxicology
TOX 611 Molecular Toxicology
TOX 625 Nutritional Toxicology
TOX 698 Current Topics in Environmental Toxicology
TOX 702 Seminar in Toxicology
TOX 750 Cancer Cell Biology
TOX 899 Master’s Thesis and Research
TOX 999 Doctoral Thesis and Research
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 diverse, students are encouraged to read 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: aem.cornell.edu)

Arts and sciences. Many of the liberal arts majors offered by the College of Arts and Sciences provide students with a background for a successful business career. In particular are majors in economics, mathematics, sociology, and psychology. Economics focuses on the production, distribution, and consumption of goods and services; monetary systems; and economic theories. Students interested in the human dimensions of business can choose sociology or psychology. Mathematics majors can choose concentrations in computer science, operations research, or economics to prepare for careers in areas such as actuarial science or finance. (Web: 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 engineering management, industrial systems and information technology, and operations research and management science. An entrepreneurship in engineering option is also available. (Web: 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, coordination, and law. The school's 150-room conference hotel gives students the opportunity to apply what they learn in a real-world business. (Web: www.hotelschool.cornell.edu)

Human ecology. The College of Human Ecology offers three business-oriented majors. The apparel and textile management major prepares students for careers in the fashion industry, for example, as a retail executive or merchandiser 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 in health care, consumer economics, and family/social services, and its graduates pursue careers as nonprofit managers, consumer advocates, finance specialists, and marketing researchers. (Web: 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 to law school. (Web: 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 and the School of Veterinary Science. (Web: 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 Africana 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 Master of Engineering 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 125 Financial Accounting Principles
H ADM 422 Taxation and Management Decisions
ORIE 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

Communications
COMM 201 Oral Communication
COMM 301 Business and Professional Speaking
COMM 401 Organizational Behavior and Communication
H ADM 165 Managerial Communication I
H ADM 364 Advanced Business Writing
H ADM 462 Communication and the Multicultural Organization
H ADM 463 Persuasive Communication in Organizations

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
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
ENGR 127 Introduction to Entrepreneurship and Enterprise Engineering (also M&AE 127)
H ADM 413 Entrepreneurship
ILRHR 460 Human Resource Strategies for Entrepreneurial Firms
M&AE 461 Entrepreneurship for Engineers (also ENGRG 461 and OR&IE 452)
NBA 300 Entrepreneurship and Private Equity
PAM 457 Innovation and Entrepreneurship in the Health Care Industry
TXA 332 Designers as Entrepreneurs

**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 320 Real Estate Management
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 305 Hospitality Facilities Operations
H ADM 321 Hospitality Financial Management
H ADM 335 Restaurant Management
H ADM 387 Business and Hospitality Law
H ADM 475 Information Technology in the Hospitality Industry

**International Business**
AEM 335 International Technology Marketing of Biotechnology
AEM 430 International Trade Policy
AEM 432 Business and Governments in the Global Economy
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
COMM 428 Communication Law
ECON 354 Economics of Regulation
GOVT 399 International Law
H ADM 422 Taxation and Management
H ADM 487 Real Estate Law
H ADM 489 The Law of the Internet and e-Commerce
ILRHR 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 Policy

**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
ENGRG 323 Engineering Economics and Management
H ADM 111 Principles of 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
H ADM 241 Marketing Principles
H ADM 345 Marketing Research
H ADM 347 Consumer Behavior
H ADM 448 Marketing Communications
PAM 223 Consumer Markets
PAM 323 Consumer Markets II
NCC 553 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
ILRHR 300 Collective Bargaining
ILRHR 260 Human Resource Management
ILRHR 362 Career Development: Theory and Practice
ILRHR 462 Staffing, Training, and Development

**Quantitative Decisions and Decision Science**
AEM 210 Introductory Statistics
AEM 410 Business Statistics
AEM 411 Introduction to Econometrics
AEM 414 Behavioral Economics and Managerial Decisions
AEM 415 Price Analysis (also ECON 415)
AEM 416 Consumer Demographics and Market Analysis (also R SOC 331)
AEM 417 Decision Models for Small and Large Businesses
AEM 419 Strategic Thinking
ECON 319 Introduction to Statistics and Probability
ECON 321 Applied Econometrics
ENGGR 270 Basic Engineering Probability and Statistics
H ADM 301 Hospitality Quantitative Analysis
OR&IE 476 Applied Linear Statistical Models
ILRST 210 Statistics I
ILRST 310 Statistical Sampling
SOC 301 Evaluating Statistical Evidence

**PRELAW STUDY**

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

1. Interest encourages scholarship, and students will derive the greatest benefit from those studies that stimulate their interest.
2. Of first importance to the lawyer is the ability to express thoughts clearly and cogently in both speech and writing. First-year writing seminars, required of nearly all Cornell first-year students, are designed to develop these skills. English literature and composition, and communication courses, also serve this purpose. Logic and mathematics develop exactness of thought. Also of value are economics, history, government, and sociology, because of their close relation to law and their influence on its development and ethics, and philosophy, because of the influence of philosophic
reasoning on legal reasoning and jurisprudence. Psychology and human development lead to an understanding of human nature and mental behavior. Some knowledge of the principles of accounting and of the sciences such as chemistry, physics, biology, and engineering is recommended and will prove of practical value to the lawyer in general practice in the modern world.

3. Cultural subjects, though they may have no direct bearing on law or a legal career, will expand students' interests; help cultivate a wider appreciation of literature, art, and music; and make better-educated and well-rounded persons.

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

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

It may be possible for exceptionally well-qualified students in other Cornell undergraduate colleges to arrange to enter the Law School after three years. The College of Human Ecology offers a program in which students spend their fourth year at the Law School. In addition, members of the Cornell Law School faculty sometimes offer undergraduate courses such as The Nature, Functions, and Limits of Law, which are open to all undergraduates.

PREMEDICAL STUDY

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

There is no major that is the best for those considering medical or dental school, and students are therefore encouraged to pursue their own intellectual interests. Students are more likely to succeed at, and benefit from, subjects that interest and stimulate them, and there is no evidence that medical colleges give special consideration to any particular undergraduate training beyond completion of the required courses. In the past, successful Cornell applicants to medical and dental schools have come from the Colleges of Arts and Sciences, Agriculture and Life Sciences, Human Ecology, and Engineering. The appropriate choice depends to a great extent on the student's other interests.

PREVETERINARY STUDY

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

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

For information on additional preparation, including work experience and necessary examinations, students should consult the brochure, Admissions Information, obtained by writing to the Office of DVM Admissions, College of Veterinary Medicine, Cornell University, S2-009 Schuman 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 public affairs
Donald R. Viands, associate dean and director of academic programs
Vacant, 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
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
Registrar: Barbara Smith, Patricia Austic, Amy Paolangeli
Admissions: Robert Springall, Ann LaFave, Dana Brown
Career development: Amy Benedict-Augustine, Laurie Gillespie, Pamela Hampton
Minority 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. Riha, Bradfield Hall
Biological and environmental engineering: M. F. Walter, Riley-Robb Hall
Biological statistics and computational biology: M. T. Wells, Ives Hall
Communication: J. B. Walthcr, Kennedy Hall
Crop and soil sciences: S. D. DeGloria, Emerson Hall
Ecology and evolutionary biology: N. G. Hairston, Conron Hall
Education: R. S. Caffarella, Kennedy Hall
Entomology: D. A. Rutz, Comstock Hall
Food science: J. H. Hotchkiss, Stotcking Hall
Horticultural science: M. F. Pritts, Plant Science Building
Landscape architecture: K. L. Gleason, Kennedy Hall
Microbiology: S. H. Zinder, Wing Hall
Molecular biology and genetics: T. D. Fox, Biotechnology Building
Natural resources: B. A. Knuth, Femow Hall
Neurobiology and behavior: R. M. Harris-Warrick, S. G. Mudd Hall
Plant breeding: W. R. Coffman, Emerson Hall
Plant pathology: R. Loria, Plant Science Building
Rural sociology: P. D. McMichael, Warren Hall
Statistical sciences: B. W. Turnbull, Mallott Hall

College Focus
The College of Agriculture and Life Sciences provides educational programs that prepare men and women with technical, management, and leadership skills.

The college focuses on a broad-based education for its students, and on a problem-solving and basic research program. The program is geared to the discovery and dissemination of knowledge for the purpose of advancing the food system, agriculture, nutrition, biological sciences, environmental quality, and community and rural development throughout New York State, the nation, and the world.

There are six primary areas of focus, developed in response to the needs of society, and representing agriculture and life sciences in their broadest and most dynamic meaning:

- Agriculture (production and marketing)
- Biological Sciences
- Community, Human, and Rural Resources
- Environment
- Food and Nutrition
- International

Facilities
The College of Agriculture and Life Sciences is located on the upper campus, up the hill from the central area of Cornell University, on land that was once part of the Ezra Cornell family farm.

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

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

Mann Library, with its extensive collections of materials in the agricultural and biological sciences, is at the east end of the Ag Quad. The student lounge and service center, known as the Alfalfa Room, and many of the college classrooms are in Warren Hall. Public computer facilities are available in Warren Hall, in Riley-Robb Hall, and in Mann Library.

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.

Each curriculum in the college creditable toward a degree is registered with the New York State Education Department and is linked with the national Higher Education General Information Survey (HEGIS) codes for federal and state reporting.

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, Bradfield Hall
Biochemistry, Molecular, and Cell Biology: W. J. Brown, Biotechnology Building
Biometry: M. Wells, Warren Hall
Communication: J. E. Shanahan, Kennedy Hall
Development Sociology: C. C. Geisler, Warren Hall
A faculty advising coordinator is listed for Biological Engineering: James Bartsch, 314 Van Rensselaer Hall and department representatives have a contact person and e-mail address:

- Microbiology: S. C. Winans, Wing Hall
- Horticulture: N. L. Bassuk, Plant Science Building
- Genetics and Development: K. J. Kempfues, Biotechnology Building
- Environmental Toxicology: A. Yen, Rice Hall
- Food Science and Technology: A. Yen, Rice Hall
- Food Science: Janice Brown, 107 Stocking Hall
- Animal Sciences: W. Bruce Currie, 434 Morrision Hall
- Biological Sciences: Jeffrey Doyle, 216 Stimson Hall; Bonnie Comella, 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 Pick, 505 Bradford Hall
- Earth and Atmospheric Sciences: Steven Colucci, 1116 Bradford Hall
- Education: George Posner, 416 Kennedy Hall
- Entomology: Bobbie Peckansky, 3134 Comstock Hall
- Food Science: Janice Brown, 204 Warren Hall
- Horticulture units (Floriculture, Pomology, Vegetable Crops, Horticulture): Ken Mudge, 20 Plant Science Building
- International Agriculture and Rural Development: Terry Tucker, 422 Mann Library
- Landscape Architecture: Peter Trowbridge, 440 Kennedy Hall
- Natural Resources: M. E. Krasny, Farnow Hall
- Neurobiology and Behavior: C. D. Hopkins, Seeley-Mudd Hall
- Nutrition: M. N. Kazarinoff, Martha Van Rensselaer Hall
- Physiology: M. S. Robertson, Vet Research Tower
- Plant Biology: J. B. Nasrallah, Plant Science Building
- Plant Breeding: E. D. Earle, Bradford 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, Bradford Hall
- Statistics: M. Wells, 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 20 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 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 field.

Biological Engineering: James Bartsch, 314 Riley-Robb Hall


Animal Sciences: W. Bruce Currie, 434 Morrison Hall

Biological Sciences: Jeffrey Doyle, 216 Stimson Hall; Bonnie Comella, 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 Pick, 505 Bradford Hall

Earth and Atmospheric Sciences: Steven Colucci, 1116 Bradford Hall

Education: George Posner, 416 Kennedy Hall

Entomology: Bobbie Peckansky, 3134 Comstock Hall

Food Science: Janice Brown, 204 Warren Hall

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: Dekoris Bevins dbg1@cornell.edu
- Atmospheric Science: Pam Vitale pmv2@cornell.edu
- Communication: Linda Van Buskirk lvp1@cornell.edu
- Food Science: Janice Brown jmbl4@cornell.edu
- Information Science: Geri Gay gkg1@cornell.edu
- Natural Resources: Marian Hovencamp mnh@cornell.edu
- Nutrition and Health: Elise West aauds@cornell.edu
- Soil Science: Gary Fick gw2f@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)
   e. Minimum with letter grade: 100; minimum from College of Agriculture and Life Sciences: 60
   f. Minimum of 12 credits from another institution.
   g. 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. No new student may enroll in the first semester for more than 18 credits in addition to physical education.
   b. A minimum of seven semesters is required. 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.

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

Cumulative GPA. 2.00 or above must be maintained. Includes only grades earned at Cornell after matriculating into the college.

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

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 remedial in the 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 of introductory biology and 3 credits in chemistry or physics.

- Biology Sciences (except BIOG 200 and 499) unless permission of the director of undergraduate biology is obtained: BIOG 209, BIOG 498, and BIOSM 204
- CHEM
- PHYS
- AN SC 100, 215, 221, 280, 300, 301
- AEM 210 (310 if taken before fall 1997)
- ASTRO
- BEE 454, 456, 458, 459
- BTRY
- CSS 190, 260, 311, 312, 314, 315, 317, 366, 415, 455, 473, 483

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

- Freshman Seminars: COMM 117, 260, 263, 350, 352, 365
6. Physical Education
   a. Pass a required swim test, administered during orientation.
   b. 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 soon after being admitted to the college. The faculty adviser will help the student plan a program of study of courses appropriate to the degree programs offered by the college.
   b. Course enrollment each semester should be planned in consultation with the faculty adviser. Students pre-enroll for courses by computer through CoursEnroll, 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 and graduate study, should be made in consultation with the student’s faculty adviser. Support of the adviser is essential if a student petitions for an exception to any of the requirements of the college.

Progress toward the Degree
   a. The progress of each student toward meeting the degree requirements is recorded each fall term in the college registrar’s office on a Summary of Record form.
   b. Students who have been in residence for eight semesters and who have met the graduation requirements will be graduated. Students are entitled to attend for the full eight semesters even if they have completed 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.

Credit Earned While in High School
   Transfer credit will not be accepted for the Syracuse Project Advance Program and similar programs. If a student is enrolled in a college-university course during his/her high school years, transfer credit will be given only if certain criteria are met:
   1. Course must be a standard course taught by a post-secondary institution.
   2. High school must be a satellite location, one of several options available to all students taking the course.
   3. Course syllabus, text, examinations, and evaluation process must be the same for all students at all sites.
   4. Students must be enrolled for college credit and pay college tuition.
   5. Instructor must be a faculty member (includes adjuncts) at the offering college.

If one of these is not met, no transfer credit will be given. Written verification may be necessary.

CLEP Credit
   The College of Agriculture and Life Sciences awards CLEP (College-Level Examination Program) credit if a student achieves an acceptable score on the CLEP exam. Please contact the Registrar’s Office in 140 Roberts Hall for specific information about CLEP credit.

STUDENTS
   Undergraduate enrollment is approximately 3,015, with about 56 percent in the upper division. Each year about 850 students are graduated, while 635 freshmen and 250 new transfer students are enrolled. College faculty members serve as chairs of the Special Committees of roughly 1,014 graduate students.

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 53 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, www.cals.cornell.edu/admissions/).

Transfer Students
   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.

   Consideration is given to students who have demonstrated an interest in their proposed field of study by taking appropriate prerequisite subjects and courses within the area of study. Academic achievement at the college is also considered. Students are not allowed to transfer during their freshman year. In certain cases, a student may be referred 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 guidelines, students should contact the CALS Admissions Office.

Off-Campus Students
   Programs in which students study off campus but enroll for Cornell credit include SEA semester, 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 courses 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 would be 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 such as severe scheduling problems 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 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, activities pursued, and simple notification by student of intent to return), and restricted (length of leave and activities pursued may be specified, and a petition for reinstatement must be approved by the Petitions Committee).

A database is maintained by the Counseling and Advising Office to assist participation in pre-course enrollment 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 an 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 this represented approximately 20 percent of the college’s undergraduate population. Additionally, the office is charged with monitoring and programming for the Educational Opportunity Program (EOP) and Prehealth Collegiate Science and Arts Program (CSTEP). EOP and CSTEP are state-supported programs intended to assist New York State students who meet economic and 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 concerns of the minority student population include the University Career Center and the Office of Financial Aid. The director and 7 to 10 peer advisers 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 adviser and liaison 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 is a database of more than 300 college alumni who have offered to help students and alumni with their career development in a variety of ways. Job search talks on topics such as resume writing, cover letter writing, and interview skills are presented throughout the semester and are available on videotape. An active on-campus recruiting program brings more than 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 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 advanced 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.
ACADEMIC POLICIES AND PROCEDURES

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 conduct of classes with each other and help each other to master that content and distinguish those activities from course assignments that are meant to test what students can do independently
• state explicitly the procedures for use of materials taken from published sources and the methods appropriate to a discipline by which students must cite the source of such materials
• approve in advance, in consultation with other faculty members, which work submitted by a student and used by a faculty member to determine a grade in a course may be submitted by that student in a different course
• monitor the work and maintain such records as will support the crucial underpinning of all guidelines: the students’ submitted work must be their own and no one else’s

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

The 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 associate registrar are available to consult with students regarding the assignment of credit toward meeting distribution and elective requirements as listed on the Summary of Record form.

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 studying 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 to 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 committee, the progress 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 the Counseling and Advising Office, 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 so as to result, 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

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• cumulative GPA of at least 2.0
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 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 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 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 the area of interest and have been recommended by the honors committee of that area. Special requirements are given in the section on the Research Honors Program.

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 professional journal article in that area of research. Original honors research occasionally is 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.

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 an 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 and Society, Entomology, 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/ud/undergrad_research/) for information about identifying a research topic, conferring with faculty, and undergraduate funding opportunities.

College Requirements

An undergraduate wishing to enroll in the honors program must complete 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/res_oppor.htm. Applications for Biological Sciences students can be picked up at 200 Stimson Hall, and for Biology and Society students, at 275 Clark 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 application form is submitted to the program. The student may, if appropriate, submit a budget and a modest request for funds (up to $500) 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 web site 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 area recommends to the college registrar those students who qualify for honors. Only those who maintain a GPA of at least 3.0 will be graduated with “distinction in research.” At or near the completion of their research, students are required to give an oral presentation or poster session during 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/registrar/res_hon_main.htm

Animal Sciences

Faculty committee: W. B. Currie, chair; Y. R. Boisclair, S. M. Quirk, P. A. Johnson, R. E. Austic

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

Those students with majors in animal sciences who are interested in doing a research project should consult with their faculty advisers early in 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 early in the second semester of the junior year.
- Preregister during the spring semester for AS 495, Animal Sciences Honors Seminar, which is offered in the fall semester.
- 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 office of the committee chair, 434 Morrison Hall.

Biological Sciences

Students interested in the research honors program in the biological sciences should consult with their faculty advisers and with potential faculty research sponsors early in their junior year. See “Independent Research and Honors Program” in the Biological Sciences section of this catalog for complete details. Information on faculty research, applications, and program requirements may be obtained from the Office of Undergraduate Biology, 216 Simeon Hall.

Biology & Society

Faculty committee: D. Pimentel, chair

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

Biology & society students are considered for entry into the research honors program at the end of the second semester of the junior year. Application forms for the program are available in the biology & society office, 275 Clark Hall. To qualify for the biology & society research honors project, a student must have an overall Cornell cumulative GPA of at least 3.3, have formulated a research topic, and have found a project supervisor (with a Cornell academic appointment) and a biology & society faculty member willing to serve as his/her adviser. The director of undergraduate studies will appoint a third reader of the completed research thesis. Applications will be reviewed by a committee headed by the director of undergraduate studies, who will notify students directly of the outcome.

Students will be permitted to register for the research honors program only by permission of the biology & society program. Students must enroll for two semesters and may take three to five credits per semester up to a maximum of eight credits in B&SOC 498 and 499, Honors Project I and II. More information on the honors program is available in the biology & society office, 275 Clark Hall (255-6047).

Important Deadlines

(NOTE: If the following dates fall on a weekend, the deadline is the preceding Friday).
- Last week of second semester of the junior year. Application for honors program submitted to 275 Clark 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 physiologies and developmental patterns, and species with easily managed colony requirements and a wide range of behavioral traits provide the raw material for research 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 honors program must have completed at least 55 credits, at least 30 of the 55 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 are awarded only after satisfying requirements of ENTOM 497 should be discussed with the thesis adviser (see below). 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
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.

April 15: Draft due to readers. Describe and summarize the work within the range of formats used in the master's thesis program or professional journals in design or research. This version will be reviewed by the faculty supervisor and two ad hoc reviewers, and the student will be able to incorporate the committee's comments and suggestions into the final version which will be due the last day of classes. Referees prepare a recommendation to the honor's director 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.

Students should be aware that this requires a considerable time commitment, and they are responsible for meeting deadlines and being prepared for presentations and other meetings.

Natural Resources
Faculty director: J. B. Yavitt

The research honors program in natural resources provides an opportunity for undergraduates to pursue supervised independent research in the areas of applied ecology or resource policy and management. The subject matter and nature of the research experience may be quite varied. The guidance and supervision of a faculty member with substantial interest and expertise in the subject area is essential to the success of the project.

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

- Register for the research honors program in the junior year or earlier.
- Work with a faculty adviser to identify and formulate a research problem.
- If the faculty adviser is not in the Department of Natural Resources, select a co-adviser from the department to ensure that the research is consistent with the field.
- Describe and summarize the work in the format of a conventional master's thesis or scientific paper ready for publication in a scientific or policy journal. Submit a copy of the first week of April (senior year) to the honor's director. This version will be reviewed by two ad hoc reviewers, and the student will be able to incorporate their comments and suggestions into the final version, which will be due the last day of classes. About half of the theses have been published.
- 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.
- Students should be aware that this requires a considerable time commitment, and they are responsible for meeting deadlines and being prepared for presentations and other meetings.

Nutritional Sciences
Faculty committee: J. T. Brenna, C. Bisogni

The honors research program in the Division of Nutritional Sciences is a structured experience that involves (1) taking a course in research (NS 398), (2) conducting a research project through which the student becomes intellectually engaged in the whole research process, (3) completing a written thesis that reports the research, and (4) giving an oral presentation of the project at the Undergraduate Honors Symposium. Students must maintain a minimum grade-point average to graduate with honors in research.

The honors research program is an excellent opportunity for students who are highly interested in research and wish to commit substantial time and intellectual energy to a project that will span at least four semesters or more of their undergraduate experience. Honors students experience the excitement of designing a project to generate new knowledge on a topic that interests them and reporting the project findings. By working with faculty mentors and other researchers, they develop skills in research methods and data analysis. Students also learn that research projects are labor intensive and that writing research reports, such as the honors thesis, is
The research honors committee will review the report within one week and may accept 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 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: D. A. Scheufele

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 earlier, after evaluation of the student's written application, and on approval of a detailed thesis proposal. The application and proposal are submitted 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 two-fold. 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 to be answered 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 measurement 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 persons who are members of the Social Science Honors Committee. Students should 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 observed phenomenon 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. Three copies of the thesis must be submitted to the chair of the social science committee no later than three weeks before the last day of classes of the semester for which the degree is sought. A supporting letter from the faculty member supervising the work also must be submitted. The thesis will be independently reviewed and 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 55 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 and the College of Engineering in the junior and senior years. All BEE engineering students pay the engineering college tuition during the senior year and graduate from the College of Engineering. The B.S. degree is awarded in cooperation with the College of Engineering. The curriculum 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 (BSLA) and graduate levels (MLA I), as well as a second professional graduate degree program (MLA II). The curricula for both the undergraduate and graduate programs are accredited by the Landscape Architecture Accreditation Board, LAAB. The graduate program is cosponsored by the Department of Landscape Architecture in the College of Agriculture and Life Sciences and by the College of Architecture, Art, and Planning.

The Division of Nutritional Sciences is an intercollege unit affiliated with the College of Human Ecology, the College of Agriculture and Life Sciences. The nutrition, 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 relating 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 science, biological sciences, communication, food science, international agriculture, plant sciences, and rural sociology. Nutritional sciences courses count toward the undergraduate degree requirement fees for 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 life in the modern 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 areas among faculty active in the program include American Indian education, social and economic development, agriculture, environmental issues, history, sociology, language, literature, 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.

Agwō:ken, the American Indian Residence House, offers undergraduate students a living environment that promotes intercultural exchange.

The American Indian Program offers a concentration in American Indian Studies to undergraduate students in conjunction with their major defined elsewhere in the university. The concentration is earned upon completion of five courses: American Indian Studies 100 (Indian America to 1890) and American Indian Studies 175 (Contemporary American Indian Issues), plus three other courses selected from the American Indian Studies course listing, for a total of at least 15 credits. Students choosing a concentration in American Indian Studies must obtain approval of concentration materials from the AIP office in 450 Caldwell. AIP also offers a graduate minor.

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. Within this program, Cornell's strengths across a broad range of earth and environmental sciences have been brought together to provide students with the tools to engage in what will be the primary challenge of the twenty-first century.

The major is available to students in the College of Agriculture and Life Sciences as well as students in the Colleges of Arts and Sciences and, as an option, Engineering. The SES major has its home in the Department of Earth and Atmospheric Sciences, which spans all three colleges, but relies on the collaboration of several departments across the university.

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. Graduates of Cornell's SES program are well prepared for graduate studies in the earth and environmental sciences. The SES major also provides an excellent background for students wishing to pursue careers, with or without advanced study, in environmental law and policy, and environmental protection. SES is also a good major for students wishing to teach earth and environmental science at the high school level, perhaps in conjunction with Cornell's Teacher Education in Agriculture, Mathematics, and Science (TEAMS) program.

See the Science of Earth Systems listing in the section "Major Fields of Study" for complete information about the SES curriculum. For more information contact Professor Kerry H. Cook, Department of Earth and Atmospheric Sciences, khc5@cornell.edu, and visit the website: www.geo.cornell.edu/SES/

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 at www.cfe.cornell.edu/icet. See also the Interdisciplinary Centers, Programs, and Studies section at the front of this catalog.

The Cornell Institute for Resource Information Systems (CIRIS) 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 term 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. The opportunity to 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, conduct individual research projects, and work as externs. The Washington program offers two study options: (1) studies in public policy, and (2) studies in the American experience. Students take part in a public policy or humanities seminar, which requires them to serve as externs in federal agencies, congressional offices, or nongovernmental organizations and to carry out individual research projects under the supervision of Cornell faculty. The required externships and all course enrollments are arranged through, and approved by, 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, 255–4000, or visit the Cornell in Washington web site at cwi.cornell.edu.

SEA Semester
The Sea Education Association is a nonprofit educational institution offering ocean-focused academic programs for individuals who wish to live, work, and study at sea. Science, the humanities, and practical seamanship are integrated in small, personal classes. The 17-credit program is 12 weeks in length. Six weeks are spent in Woods Hole, and the following six weeks are spent on either one of SEA’s two sailing vessels: the SSV Robert Seamans or the SSV Corwith Cramer. For more information, 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 the 95-acre Appledore Island off the coast of Portsmouth, New Hampshire, in the Gulf of Maine. SML offers undergraduates and other interested adults a unique opportunity to study 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 pay and/or credit with a limit of up to three credits per internship and not 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 six-credit allotment includes transfer credit and credit from other internships in other colleges at Cornell. The six-credit limit does not apply to secondary, post-secondary, and Cooperative Extension teaching internships in the Department of Education. The awarding of credit will not be allowed in cases where a student brings to the college or to a professor a description of a past experience and requests credit. Note that a maximum of 15 (pro-rated for transfer students) of the 120 credits required for the degree may be taken in internships, independent study courses, and undergraduate research. For internships not governed by an established internship course, the student must enroll in a 497 course for the number of credits assigned. In order to ensure a fair and manageable system to deal with internships, the College of Agricultural and Life Sciences has set forth guidelines to ensure 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 appropriate internship adviser 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.

A multitude of opportunities to be engaged in research exists across the College of Agriculture and Life Sciences and the university. One option is that you may be able to work on a faculty member's research project for pay. Opportunities can be explored by contacting individual faculty members, department offices, the CALS Career Development Office, 177 Roberts Hall, or Cornell Career Services, 103 Barnes Hall. Another option is to receive credit through a 499 course within a department by conducting your own research project under a faculty mentor. More than 500 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 list of sources provides information about research and internships:

CALS Career Development Office: www.cals.cornell.edu/oap/careers/
CALS Undergraduate Research Opportunities: www.cals.cornell.edu/oap/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/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/
Cornell Undergraduate Research Board: www.sso.cornell.edu/curb/ (student organization to promote and facilitate undergraduate research)
Biological Sciences: www.bio.cornell.edu
International Exchange Programs in the College of Agriculture and Life Sciences

Any student whose grade-point average is 2.75 or above and has completed one year of continuous study in CALS may apply to a CALS international student exchange program. These undergraduate exchange opportunities are for CALS students only. For more information on programs and application process see the CALS Study Abroad Adviser in 140 Roberts Hall or visit the web site www.cals.cornell.edu/oap/advising/international/index.html.

Students who are interested in international study but not in one of the CALS programs must apply through Cornell Abroad in 474 Uris Hall. Please refer to the Cornell Abroad section of Courses of Study.

MAJOR FIELDS OF STUDY

The college curriculum consists of 21 major program areas that reflect the departmental academic effort in the college. Faculty curriculum committees in each area identify a sequence of courses appropriate to all students studying in that field. Courses of study are designed to provide systematic development of basic skills and concepts, as well as critical thinking. Opportunity for concentration in an area of particular interest is usually available.

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

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 Animal Science Department 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 accessible by 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, dairy, meat-animal, horse, feed, or meats industry. These are examples of the many opportunities 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, db1@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). There are three options for the B.S. in atmospheric science through the College of Agriculture and Life Sciences:

**Option A**

1. Mathematics, Computer Science, and Statistics:
   a. MATH 190/191, 192, 293; or MATH 111, 112, 213
   b. COM S 100 or EAS 150 or equivalent
   c. EAM (ARMS) 210 or equivalent
   d. MATH 294 (or MATH 221 and 222, without MATH 213) or EAS 435

2. Basic Physical Sciences:
   a. PHYS 207, 208, or PHYS 112, 213, 214
   b. CHEM 206, 207, or 211

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

1. Mathematics, Computer Science, and Statistics:
   - a. MATH 190/191, 192, 293, 294; or MATH 111, 112, 221, 222
   - b. COM S 100 or EAS 150 or equivalent
   - c. AEM 210 or equivalent
   - d. MATH 321, MATH 420, or T&AM 310

2. Basic Physical Sciences:
   - a. PHYS 112, 213, 214
   - b. CHEM 207 or 211

3. Atmospheric Science:
   - a. EAS 341, 342, 352, 451

**Option C**

1. Mathematics, Computer Science, and Statistics:
   - a. MATH 190/191, 192, 293; or MATH 111, 112, 213
   - b. COM S 100 or EAS 150 or equivalent
   - c. AEM 210 or equivalent

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

3. Atmospheric Science:
   - a. EAS 341, 342, 352, 451

4. Earth Sciences:
   - a. one semester of introductory astronomy
   - b. one semester of introductory geology
   - c. six additional semesters of earth science (astronomy, atmospheric science, geology)

Option A is intended to meet the needs of students whose primary interests are in forecasting and operational meteorology. Upon graduation, a student who has completed Option A will have satisfied both the curricular guidelines of the American Meteorological Society and the educational requirements of the National Weather Service for employment as a meteorologist. They will also be well qualified for positions in private-sector forecasting, environmental consulting firms, and broadcast meteorology. In addition, Option A provides good preparation for graduate work in atmospheric science and closely related fields.

Option B is designed to focus on preparation for graduate study in atmospheric science as well as other sciences, and includes somewhat stronger coursework in mathematics and physics than does Option A. The minimum course work in Option B does not satisfy the National Weather Service requirements or American Meteorological Society guidelines for employment in operational meteorology, but may be more appropriate for students with academic or research career goals. It can also be an attractive option for students transferring into the program as juniors.

Option C is intended for students who wish to become secondary school earth science teachers. It provides good preparation for graduate study in earth science education, and includes the minimum course work required for secondary earth science teaching certification in New York. It does not satisfy the National Weather Service or American Meteorological Society guidelines for employment as an operational meteorologist.

A student may minor in atmospheric science by completing any four of the following EAS courses: 131, 250, 268, 331, 334, 341, 342, 352, 343, 447, 451, 456, 457, 470, 651, 652 or 666.

**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. Most of the decisions we face today deal with the opportunities and problems that biology has put before us.

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

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

**Biological and Environmental Engineering**

The Department of 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 undergraduate engineering program in the Department of 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, which is awarded jointly by the College of Engineering and Life Sciences, and is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). All students in the jointly administered BEE major enroll in the College of Engineering and pay endowed tuition their last two semesters.

Two concentrations in Biological and Environmental Engineering are offered: biological engineering and environmental 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. Students select upper-level courses in the department in areas that include bioprocessing, soil and water management, biotechnology applications, bioinstrumentation, engineering aspects of animal physiology, environmental systems analysis, and waste treatment and disposal.

Students strengthen their programs by selecting additional courses in the College of Engineering. They may complete minors 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. Students in the engineering program may pursue minors and options in specialized areas as noted in the engineering section of this publication.

**Specific course requirements and other information for the Biological and Environmental Engineering joint program in the College of Engineering section of this publication.** Further information is available at the undergraduate program office, BEE Student Services, 207 Riley-Robb.

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 undergraduate students participate in honors programs, undergraduate teaching and research, internships, independent study, design teams, and study abroad. Students in the engineering program are also eligible to do Engineering Co-Op. Students completing the BEE major should have a strong aptitude for the sciences and mathematics and an interest in the complex social issues that surround technology.

Career opportunities cover the spectrum of private industry, public agencies, educational institutions, and graduate programs in engineering, science, medicine, law, and other fields. 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, 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 Credits
1. Calculus 8
2. Chemistry 7
3. Physics 8
4. Introductory biological sciences 6
5. Computer programming 4
6. Probability and statistics 3
7. Written and oral expression 9

B. Advanced and Applied Subjects
1. Five courses in the biological, environmental, or life sciences 15
2. Five engineering or technology courses at the 300 level or above; at least 9 credits in Biological and Environmental Engineering 15

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 online at www.bee.cornell.edu. Contact Professor Jim Hartsch 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 exposure to 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.

The Biology & Society field of study provides the skills and perspectives necessary to confront problems with biological, social, and ethical dimensions. In consultation with a faculty member, students are expected to select their courses in the field to meet their own goals and interests. For a description of the Biology & Society field of study, 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 leave 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 must have completed a year of college-level biology and must submit an application during their sophomore year. Students in the College of Agriculture and Life Sciences may be admitted directly into the field of study when they apply to the college, as with all students admitted prior to completing the biology prerequisite, the admission is provisional. It is the student's responsibility to assure that final acceptance is granted upon completion of the introductory biology sequence and the application form. Although only introductory biology is a prerequisite for acceptance, students will find it useful to have completed some of the other requirements (obtain course checklist in 306 Rockefeller Hall) by the end of their sophomore year. Students are considered on a case-by-case basis. Upper-division applicants should realize the difficulties of completing the Biology & Society requirements in less than two years. 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, one each during the fall and spring semesters. A faculty adviser is assigned on admittance to the field. Approximately 50 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:

- Introductory biology (101-104, 105-106, or 107-108 or a 5 in AP biology)
- 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 faculty is available in 306 Rockefeller Hall. Further information may be obtained by logging onto the departmental web site: www.sts.cornell.edu.

I. Basic Courses

(may not be used to fulfill major requirements)

A. First-Year Writing Seminars

Check the current FWS pamphlet for information.

B. S&TS 101 Science and Technology in the Public Arena

Fall. 3 credits. T. Gillespie. For description, see S&TS 101.

II. Foundation Courses

A. Ethics (select one)

B&SOC 205 Ethical Issues in Health and Medicine (also S&TS 205)

Fall. 4 credits. Limited to 150 students. S. Hilgarter. For description, see B&SOC 205 in Arts and Sciences.

B&SOC 206 Ethics and the Environment (also S&TS 206 and PHIL 246)

Spring. 4 credits. Limited to 100 students. N. Sethi. For description, see B&SOC 206 in Arts and Sciences.

B. Social Sciences/Humanities Foundation

(two courses, one from any two areas)

1. History of Science

S&TS 233 Agriculture, History, and Society: From Squanto to Biotechnology

Fall. 3 credits. M. Rossiter. For description, see S&TS 233.

S&TS 282 Science in Western Civilization (also HIST 282) #

Spring. 4 credits. P. Dear. For description, see HIST 282.

[S&TS 283 The Sciences in the Twentieth Century (also HIST 280)]

Fall. 4 credits. Staff. For description, see S&TS 283.

S&TS 287 Evolution (also BIOEE 207 and HIST 287)

Fall or summer. 3 credits. W. Provine. For description, see BIOEE 207.

S&TS 355 Computers: From Babbage to Gates

Spring. 4 credits. T. Gillespie. For description, see S&TS 355.
7. Plant Biology
BIOPL 241 Introductory Botany
Fall. 3 credits. K. J. Niklas.
For description, see BIOPL 241.

8. Physiology and Anatomy
BIOAP 311 Introductory Animal Physiology, Lectures (also VET MED 346)
Fall. 3 credits. E. Loew and staff.
For description and prerequisites, see BIOAP 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.

D. Biology Foundation (depth requirement): one course for which one of the above breadth requirement courses (2C) is a prerequisite:

E. Statistics (select one)
AEM 210 Introductory Statistics
Fall. 4 credits. C. van Es.
For description and prerequisites, see AEM (ARME) 210.

BTRY 301 Statistical Methods I
Fall. summer. 4 credits. Staff.
For description and prerequisites, see BTRY 301.

[CRP 223 Introduction to Statistical Reasoning for Urban and Regional Analysis
Fall. 3 credits. Staff.
For description, see CRP 223.]

ECON 319 Introduction to Statistics and Probability
Fall. 4 credits. Y. Hong.
For description and prerequisites, see ECON 319.

ILRST 210 Statistical Reasoning II
Fall, spring, summer. 3 credits.
P. Velleman, T. DiCiccio.
For description, see ILRST 210.

MATH 171 Statistical Theory and Application in the Real World
Fall, spring. 4 credits. Staff.
For description and prerequisites, see MATH 171.

PAM 210 Introduction to Statistics
Fall. spring. 4 credits. R. Swisher, K. Joyner.
For description, see PAM 210.

PSYCH 350 Statistics and Research Design
Fall. 4 credits. T. Gilovich.
For description, see PSYCH 350.

SOC 301 Evaluating Statistical Evidence (also R SOC 302)
Fall. 3 credits. M. Clarkberg.
For description, see SOC 301.

III. Core Courses

B&SOC 301 Life Sciences and Society (also S&TS 301)
Fall. 4 credits. Limited to 50 students.
M. Lynch.
For description and prerequisites, see B&SOC 301.

S&TS 286 Science and Human Nature (also PHIL 286)
Fall. 4 credits. R. Boyd.
For description, see PHIL 286.

V. Theme

A. Natural Sciences Issues/Biology Elective (two courses). Select from the following list of B&SOC approved Natural Sciences Issues courses or choose course(s) with introductory biology as a prerequisite.

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 and NS 347)
Spring. 3 credits. Offered alternate years.
For description and prerequisites, see HD 347.

[BIOEE 275 Human Biology and Evolution (also ANTHR 275 and NS 275)
Fall. 3 credits. J. Haas and K. Kennedy.
For description, see BIOEE 275.]

[BIOEE 474 Laboratory and Field Methods in Human Biology (also ANTHR 474)
Spring. 5 credits. K. Kennedy.
For description, see BIOEE 474.]

[BIOEE 673 Human Evolution: Concepts, History, and Theory (also ANTHR 673)
Fall. 3 credits. Offered alternate years.
K. Kennedy.
For description, see BIOEE 673.]

[BIOL 247 Ethnobiology
Fall. 3 credits. D. Bates.
For description, see BIOL 247.]

HD 266 Emotional Functions of the Brain
Fall. 3 credits. R. DePue.
For description and prerequisites, 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 433 Developmental Cognitive Neuroscience
Spring. 3 credits. E. Temple.
For description, see HD 433.

[HD 436 Language Development (also LING 436, PSYCH 436, and COGST 436)
Spring. 4 credits. B. Lust.
For description, see HD 436.]

NS 222 Maternal and Child Nutrition
Fall. 3 credits. Limited to 20. C. Garza and P. Brannon.
For description and prerequisites, see NS 222.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 4 credits. May be used to fulfill the Biology Depth requirement. 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
Fall. 4 credits. R. 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 220 The Human Brain and Mind
Fall. 3 credits.
For description, see HD 220.

HD 366 Psychobiology of Temperament and Personality
Fall. 3 credits. R. DePue.
For description and prerequisites, see HD 366.

R. Humanities/Social Sciences Elective (two courses)

Courses listed earlier as social science/humanities foundation courses (2D) are particularly appropriate as social science/humanities electives. A single course, however, cannot be used to meet both requirements. Additional courses that are recommended as social science or humanities electives are:

Examples of humanities/social sciences electives

AEM 464 Economics of Agricultural Development
Spring. 3 credits. R. Christy.
For description, see AEM 464.

[ANTHR 211 Nature and Culture @
Spring. 3 credits. Staff.
For description, see ANTHR 211.]

B&SOC 314 Environmental Governance (also S&TS 314 and NTRES 314)
Spring. 3 credits. S. Wolf.
For description, see NTRES 314.

HD 457 Health and Social Behavior (also SOC 457)
Fall. 3 credits. E. Werhington.
For description, see HD 457.

NS 450 Public Health Nutrition
Spring. 3 credits. K. Rasmussen, D. Pelletier.
For description, see NS 450.

NTRES 407 Religion, Ethics, and the Environment
Fall. 4 credits. R. Baer.
For description, see NTRES 407.

PAM 303 Ecology and Epidemiology of Health
Spring. 3 credits. E. Rodriguez.
For description, see PAM 303.
[HD 419] Midlife Development
Spring. 3 credits. S. Cornelius.
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 the instructor required for undergraduates.
K. Greene.
For description, see HD 660.

NTRES 411 Seminar in Environmental Ethics
Fall. 3 credits. R. Bailer.
For description, see NTRES 411.

PAM 552 Health Care Services: Consumer and Ethical Perspectives
Fall. 3-4 credits. If using this course as a senior seminar, Biology & Society majors must take it for 4 credits. Enrollment limited: preference given to PAM students.
A. Parrot.
For description and prerequisites, see PAM 552.

PAM 556 Managed Care
Spring. 3 credits. For undergraduate seniors only by permission of instructor.
J. Kuder.
For description and prerequisites, see PAM 556.

PAM 559 Epidemiology, Clinical Medicine, and Management Interface Issues
Spring. 3 credits. E. Rodriguez.
For description, see PAM 559.

[R SOC 410] Population and Environment
Spring. 3 credits. Staff.
For description, see R SOC 410.

[R SOC 438 Population and Development (also SOC 437)]
Fall. 3 credits. Staff.
For description, see R SOC 438.

[R SOC 495 Population, Environment, and Development in Sub-Saharan Africa]
Fall. 3 credits. P. Eloumdou-Enygue.
For description, see R SOC 495.

[S&T S 411] Knowledge, Technology, and Property
Spring. 4 credits. S. Hilgartner.
For description and prerequisites, see S&T S 411.

[S&T S 438] Minds, Machines, and Intelligence (also COGST 438)
Spring. 4 credits. Staff.
For description and prerequisites, see S&T S 438.

[S&T S 446] Biomedical Ethics
Spring. 4 credits. Staff.
For description, see S&T S 446.

S&T S 466 Public Communication of Science and Technology (also COMM 466)
Fall. 4 credits. Limited to 15 students.
B. Levinstein.
For description and prerequisites, see COMM 466.

[S&T S 490] Integrity of Scientific Practice
Spring. 4 credits. S. Hilgartner.
For description, see S&T S 490.
GRICULTURE AND LIFE SCIENCE 2003-2004

more central role in science, technology, business, and public policy. Increasingly, government, industry, and special interest groups rely on communication specialists to aid in managing information—collecting, sorting, interpreting or reinterpreting, summarizing, and making information understandable and accessible to the general public, to interest groups, and to decision-makers in organizations. Effective information management requires a thorough understanding of the communication process.

Students who graduate from this department have excellent speaking, writing, and listening skills. Communication majors are taught:

- Communication processes, such as how communication influences attitudes, opinions, and behaviors.
- How communication systems work in our society.
- How to apply their understanding of communication to solving problems in science, government, industry, health, and education.

The communication major is a program with a strong core of contemporary communication knowledge, theory, and practice. Required freshman courses 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. These courses also provide a unique opportunity to link practical application (such as writing and critical analysis) with up-to-date research and knowledge about communication.

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 three focus areas:

- Communication in the Life Sciences (studies of the impact of communication on environmental, health, science, and agricultural issues, and public perceptions of risk).
- Communication Planning and Evaluation (development of communication plans to solve problems for individuals or for organizations and evaluating the success of these plans).
- Communication and Information Technologies (principles of how we use communication technologies and how we are influenced by these technologies).

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 presentation 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 496 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, 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 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 school 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 facing modern agriculture 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 Environmental Science major that is now being planned.

**Education**

Building on strong academic disciplines and grounding in sociopolitical, psychological, ethical, and theoretical bases of educational practice, the department has two foci to meet societal demands for both formal and informal educational challenges: Professional development of mathematics, science, and agriculture and for leaders in nonformal educational settings. Curriculum and Instruction, which includes the Cornell Teacher Education Program, and Adult and Extension Education. These 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).** The College of Agriculture and Life Sciences has identified five "great challenges" to creating a livable world: environment, food, health, economy, and community. Responding to those challenges requires more than new knowledge and technology; it also requires sustained and expert practice in learning and education. The purpose of the AEE program is to facilitate learning in nonformal settings through participatory practices to link learning and education to the global challenge of facilitating sustainability.

The program prepares scholars and practitioners for adult and extension educational leadership and professional roles in domestic and international nonformal and community-based settings such as adult education, agricultural education, domestic extension and community development, and international agricultural education and development. As public universities focus a greater share of their research, teaching, and extension resources on critical environmental, economic, and social problems domestically and globally, the program provides opportunities for students to ask who benefits from such efforts and in what ways. Using a reflective practice approach to professional development, graduate preparation includes the study of ethical, political, empirical, and theoretical bases of educational endeavors; analyses of current and historical practices in adult education, extension, and international education; the integration of adult and extension practice with other disciplinary endeavors; and the practice of education in a global environment. Students may pursue the following graduate degrees in education: Master of Professional
The Cornell Teacher Education (CTE) program develops a solid mastery of their content areas and an understanding of the issues in education, and interact with and learn from each other. Each certification area contributes to the others in important ways. Understanding contemporary agriculture requires knowledge of the scientific bases for the changes in the way agriculture is practiced and is developing. Understanding science fully requires knowledge of how principles are applied in the world. Agriculture provides a salient field in which to apply science notions. Understanding the ways that mathematics is used to develop analytic systems, build arguments, and organize the world is essential to any modern scientific enterprise, whether basic or applied. Agriculture and science topics provide mathematics teachers practical examples they can use to help their future pupils develop understanding of abstract mathematical principles. CTE teachers are prepared as scholars of teaching and learning, able to help all their students achieve the scientific and quantitative literacy and ethical decision making needed for participation in a democracy.

Effective College Teaching Series. The Center for Learning and Teaching, under the auspices of the Department of Education, offers a series of courses, both credit and noncredit, for the improvement of teaching at Cornell, designed for Cornell faculty and graduate students who are either currently teaching or intending to teach. Contact the Center for Learning and Teaching, (607) 255-2959 or clt@cornell.edu for details.

Current offerings include:

EDUC 548 Effective College Teaching
Spring and one-week summer session. 1-3 credits. For faculty and graduate students who intend to pursue an academic career.

EDUC 578 ITADP Cross-Cultural Classroom Dynamics, Language and Teaching Practicum
Fall and spring. 2 credits. For international public education graduate students who have, or will have, teaching assistantships.

EDUC 579 ITADP Further Training for International Teaching Assistants
Fall and spring. A noncredit course offered for international teaching assistants who have completed EDUC 578, but who need or desire continued work in classroom instructional and communication skills.

Graduate Teaching Development Workshops
Offered early in each fall and spring semester, this day-long series offers an array of workshops in teaching effectiveness, from teacher-student interactions to developing a teaching portfolio. Noncredit, open to all Cornell faculty and graduate teaching assistants.

EDUC 620 Internship in Education
Fall and spring. 1 credit. For CALS graduate teaching assistants or CALS teaching personnel who wish to extend their work experience through reflective practice and consultation with an instructional support specialist. Prerequisite: the CALS Graduate Student Professional Development Workshop.

Entomology
The entomology curriculum provides students with a basic background in biological and 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, 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 advisers.

Educational Leadership
The Institute for Community College Development (ICCD), a partnership with the State University of New York (SUNY), Cornell University, and community colleges, is located in the School of Industrial and Labor Relations, Extension Division, and draws on faculty in the Department of Education with expertise in the personal and social competencies related to leadership. ICCD offers professional development for leaders in community colleges, a research program, and a course in leadership. Contact ICCD, (607) 255-2959 or iccd@cornell.edu, for more information.

Current Offerings Include:

Professional Development
The Administrative Leadership Program is designed for senior and mid-level administrators in academics, student affairs, and professional and foundation offices who are interested in current issues affecting community colleges and the way they operate their campuses. The three-day program is held during the summer at Cornell. The program includes opportunities for self-reflection and group problem-solving activities.

The Great Teachers Seminar and Successful Teaching Conference are designed for faculty interested in improving, learning about, and reflecting on their own theory and practice and on general principles of effective teaching and learning. The events are held in upstate New York in the spring and fall, respectively. Faculty from the Department of Education are frequent presenters.

The Presidents Leadership Conference is designed for current and future community college presidents who need information and ideas about leading a diverse, learning-centered campus that is connected to the local and global communities.

Research
ICCD’s research agenda is centered on leadership theory and practice, and on social and economic policies affecting education.

Education
EDUC 694 Analysis of Leadership Theories: Developing a Leadership Philosophy is a three-credit course offered in the fall term. It is designed for faculty and administrators in higher education, particularly in the community colleges.

Current Offerings Include:

EDUC 548 Effective College Teaching
Spring and one-week summer session. 1-3 credits. For faculty and graduate students who intend to pursue an academic career.

EDUC 578 ITADP Cross-Cultural Classroom Dynamics, Language and Teaching Practicum
Fall and spring. 2 credits. For international public education graduate students who have, or will have, teaching assistantships.

EDUC 579 ITADP Further Training for International Teaching Assistants
Fall and spring. A noncredit course offered for international teaching assistants who have completed EDUC 578, but who need or desire continued work in classroom instructional and communication skills.

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EDUC 620 Internship in Education
Fall and spring. 1 credit. For CALS graduate teaching assistants or CALS teaching personnel who wish to extend their work experience through reflective practice and consultation with an instructional support specialist. Prerequisite: the CALS Graduate Student Professional Development Workshop.
Specific requirements

Basic Sciences

One year of college mathematics, including at least one 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
BIOGD 281 (Genetics) or Plant Breeding 225 (Plant Genetics)
BIOEE 278 (Evolutionary Biology)
A choice of one: BIOEE 261 (Ecology and the Environment) or BIOHM 350 or 351 (Principles of Biochemistry)

Entomology
ENTOM 212 (Insect Biology)
A choice of two:
ENTOM 322 (Insect Morphology)
ENTOM 331 (Insect Systematics)
ENTOM 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 five specialization options in the major: (1) Basic Food Science; (2) Food Engineering; (3) Food Processing; (4) Food Operations and Management; or (5) Food Biotechnology. The first three options meet the current 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, sensory evaluation, storage, distribution, and safety of foods and food ingredients. Examples of food science core courses include 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 period of study. Several teaching faculty in the department also have active research programs and welcome participation by undergraduate students. Students may receive academic credit or wages for faculty-directed undergraduate research. Several food companies recruit on campus for their internship programs. These internships provide an excellent opportunity for students to gain hands-on experience in their chosen field of interest and to establish contacts for future employment. A modern food processing and development pilot plant, an operational dairy plant, and well-equipped laboratory facilities are available to support the teaching and research needs of undergraduates.

Enology and Viticulture

The College of Agriculture and Life Sciences announces its intent to introduce a curriculum in viticulture and enology within existing undergraduate B.S. degree programs in Plant Sciences and Food Science.

Students with primary interest in viticulture and secondary interest in enology (V/E) will 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 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 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 Plant Sciences (viticulture option) or Food Science (enology option) for specific course 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 interna-

tional agriculture. The courses in International Agriculture and Rural Development are designed to acquaint students with the socio-economic factors in agricultural development, the physical and biological nature of tropical crops and animals, and the various world areas for which study programs exist.

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 (INTAG) and eight credits in a modern foreign language are required. 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.

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

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

One semester of the Global Seminar, INTAG 480

Four semesters of foreign language instruction, or demonstrated language competency equivalent to that achieved by the end of the fourth semester of instruction at Cornell.

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 range from garden design, parks design, housing design, historic preservation, environmental rehabilitation, and urban design.

Landscape Architecture offers two professional degree alternatives: a four-year bachelor of science degree administered through the
College of Agriculture and Life Sciences and a three-year Master of Landscape Architecture degree administered through the Graduate School for those who have a four-year undergraduate degree in another field. Both of these degrees are accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects. The major in each degree is composed of core courses related to professional education in landscape architecture, a concentration in a subject related to the core courses, and free electives.

The department also offers a two-year Master of Landscape Architecture Advanced Degree Program administered through the Graduate School for those with accredited degrees in landscape architecture or architecture. The 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, site/landscape and art, or urban design.

In addition, an undergraduate concentration in the American Cultural Landscape 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 graduates 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 a supply and field trip fee, and all landscape architecture majors are required to pay an annual technology fee.)

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall Term</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>*LA 141, Grounding in Landscape Architecture</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>†Biological sciences elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>†Physical sciences elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>†Social sciences or humanities elective</td>
<td>3</td>
<td></td>
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<tr>
<td>†Written or oral expression elective</td>
<td>3</td>
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<tr>
<th>Spring Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>*LA 142, Grounding in Landscape Architecture</td>
<td>4</td>
</tr>
<tr>
<td>†Biological sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>†Social sciences or humanities elective</td>
<td>3</td>
</tr>
<tr>
<td>†Written or oral expression elective</td>
<td>3</td>
</tr>
<tr>
<td>†Physical sciences elective</td>
<td>3</td>
</tr>
</tbody>
</table>

| Summary of credit requirements | 58 |
| Specialization requirements | 58 |
| Distribution electives | 39 |
| †Free electives | 8 |

| **Concentration | 15 |

| Master of Landscape Architecture (M.L.A.) License Qualifying Degree |

Requirements of the three-year M.L.A. curriculum include 90 credits, six resident units of satisfactory completion of the core curriculum courses, and a thesis or a capstone studio. (Please note that each semester the studio classes require a supply and field trip fee, and all landscape architecture majors are required to pay an annual technology fee.)

<table>
<thead>
<tr>
<th>First Year</th>
<th>Fall Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>*LA 505, Graphic Communication I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>†Free electives</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

| *LA 501, Composition and Theory | 5 |
| †Historical studies | 3 |

| *LA 491, Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment | 4 |

<table>
<thead>
<tr>
<th>Spring Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*LA 202, Medium of the Landscape</td>
<td>5</td>
</tr>
<tr>
<td>*LA 315, Site Engineering I</td>
<td>3</td>
</tr>
</tbody>
</table>

| *LA 492, Creating the Urban Eden: Woody Plant Selection, Design and Landscape Establishment | 4 |
| †Written or oral expression elective | 3 |
| †Physical sciences elective | 3 |

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Fall Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*LA 301, Integrating Theory and Practice</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>*LA 316, Site Engineering II (second 7 weeks)</td>
<td>2</td>
<td></td>
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</tbody>
</table>

| †Historical studies | 3 |
| †Free electives | 2 |

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<thead>
<tr>
<th>Spring Term</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>*LA 302, Integrating Theory and Practice II</td>
<td>5</td>
</tr>
</tbody>
</table>

| †Historical studies | 3 |
| †LA 318, Site Construction | 5 |

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Fall Term</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>**Concentration</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>†Social sciences or humanities elective</td>
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<td>†Free elective</td>
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| (Optional landscape architecture study abroad semester in Denmark or Rome) | 11 |

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<thead>
<tr>
<th>Spring Term</th>
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<tbody>
<tr>
<td>*LA 402, Integrating Theory and Practice: Community Design Studio</td>
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| †LA 412, Professional Practice | 3 |
| †Free elective | 2 |

| Summary of credit requirements | 120 |
| Specialization requirements | 58 |
| Distribution electives | 39 |
| †Free electives | 8 |

| **Concentration | 15 |

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<tr>
<th>Second Year</th>
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<td>*LA 601, Integrating Theory and Practice</td>
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<td>*LA 616, Site Construction</td>
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| †Historical studies | 3 |
| **Concentration | 6 |

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<td>*LA 618, Site Construction</td>
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| †Historical studies | 3 |
| **Concentration | 3 |

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<tr>
<th>Third Year</th>
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<tr>
<td>†Free elective</td>
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| **Concentration | 4 |

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<td>*LA 701, Urban Design and Planning</td>
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| †Free elective | 3 |
| **Concentration | 4 |

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<td>*LA 701, Urban Design and Planning</td>
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| †Free elective | 3 |
| **Concentration | 4 |

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<th>Spring Term</th>
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<td>*LA 701, Urban Design and Planning</td>
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| †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 electives(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 course work as approved by the members of their graduate committee. For landscape architects, this must include at least two advanced studios, a graduate seminar, a concentration, and a thesis. For architects the curriculum requires three advanced studios, two courses in plants and planning 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 Concentration for Nonmajors

Students outside the professional program may choose the undergraduate concentration in the American Cultural Landscape to complement their major. The courses center on the landscape as an object, something to be studied for its own sake, and as a subject, as a means to understand society and its relationship to natural systems and diverse cultures. The cultural landscape includes its visible elements as well as perceptions and cultural ideas and values. The concentration consists of four courses, two required and two electives. Students may petition to substitute one course in the electives list. Direct inquiries to professors H. Gottfried or S. Baumberger.

Required.

Visual Studies (choose one):
ART 121 Introduction to Painting (3 cr)
ART 141 Introduction to Sculpture (3 cr)
ART 151 Introduction to Drawing (3 cr)
ART 158 Conceptual Drawing (3 cr)
ART 159 Life and Still-Life (3 cr)
ART 161 Photography I (3 cr)
DEA 101 Design I: Fundamentals (3 cr)

LA 141 Grounding in Landscape Architecture (3 cr)

The Landscape

*LA 282 The American Landscape (3 cr)

Electives (choose two):
ARCH 300 American Architecture and Building I (3 cr)
ARCH 391 American Architecture and Building II (3 cr)
*LA 260 Pre-Industrial Cities and Towns of North America (3 cr) offered alternate years
*LA 261 Urban Archaeology (3 cr)
*LA 262 Laboratory in Landscape Archaeology
*LA 263 American Indians, Planners, and Public Policy (3 cr)
LANAR 525 History of American Landscape Architecture (3 cr)
LANAR 569 Archeology in Preservation Planning and Design (3 cr) offered alternative years
+Distribution elective

Natural Resources

As the number of humans living on the Earth surpasses 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 undergraduate curriculum in natural resources provides students with the concepts and tools needed to understand the Earth's natural resources and ecological systems, and to participate in the development and management of the natural resources. The departmental program allows students flexibility to pursue a variety of paths to an integrated, broad-based understanding of relationships of organisms to their environments, and ways in which human actions affect, and are affected by, those relationships. Students are encouraged to understand the scientific, ethical, and societal basis for management and protection of natural resources and environments through the application of ecological principles and management. Many juniors and seniors choose to take one of several upper-division courses offered by the faculty to provide an in-depth understanding of key principles, concepts, and practices. They also have the opportunity to gain exposure to a wide variety of advanced courses offered by Natural Resources and other departments at Cornell, as well as to the University's many offerings that ground the student in a first-rate liberal arts education. Seniors are encouraged to take one of several upper-division courses in the department that provide an intensive experience in synthesis, integration, and critical thinking applied to current issues in the conservation and management of natural resources, ecological systems, or the environment. Many juniors and seniors also choose to conduct a research honors thesis.

Areas of Concentration

The concentration in Applied Ecology is designed as a foundation for those who wish to pursue careers or advanced study in science-based conservation or management of fish and wildlife populations and their habitats, conservation biology, control of invasive and overabundant species, wetland and landscape management, quantitative resource management, resource inventory and information management, global ecology, or applied ecology, and biogeochemistry of forests and wetlands. This concentration also may interest students seeking a biological based approach to environmental science or global studies. Students who select this concentration typically focus their course work in the areas of species biology and applied ecosystem ecology, including quantitative analysis of fish, wildlife, and plant populations, ecosystems, and landscapes. They complement their course work within the department with courses in other departments, such as Ecology and Evolutionary Biology, Microbiology, Geology, Crop and Soil Sciences, Atmospheric and Earth Sciences, Animal Sciences, and Plant Biology.

The concentration in Resource Policy and Management provides a foundation for students who wish to pursue careers or advanced study in the human dimensions or policy aspects of natural resource conservation and management. Students who select this
concentration typically focus on courses related to the development of environmental policy, management strategies for particular species or ecosystems, or programs in environmental communication and education. They complement their course work within the department with courses in other departments such as Government, Ecology and Evolutionary Biology, Communication, Applied Economics and Management, City and Regional Planning, and Policy Analysis and Management.

The concentration in Environmental Studies is intended for those who wish to obtain the broadest possible, yet rigorous, grounding in the wide range of subjects needed to understand interactions among human and the environment. The concentration's emphasis is on developing an ability to think critically about these interactions. As juniors and seniors, students who choose Environmental Studies design a cohesive sequence of five courses in the social sciences, natural sciences, and humanities related to environment. Together with their departmental adviser, they decide on an environmental theme that the student wishes to pursue. That theme should identify a specific set of interrelationships between humans and the environment that the student wishes to understand. For example, students could choose to explore themes such as evaluation of economic incentives for conservation or studying human views of the environment as expressed in literature or history. Many upper-division sequences of courses are acceptable if the student can formulate and defend a reasonable rationale for the choice of courses.

For details about the core curriculum in the Department of Natural Resources, consult our web site at www.dnr.cornell.edu. Information also is available in the department's Undergraduate Program Office in 12 Fernow Hall.

Research and Work Opportunities for Undergraduates

The department offers many opportunities for field-oriented studies, independent research, internships, and jobs. These opportunities include several field-based courses and access for research to the department's Arnot Teaching and Research Forest near Ithaca, the Little Moose Field Station in the Adirondacks, and the Center Field Station on Oneida Lake near Syracuse. Many other courses take place in numerous natural areas near campus. Students also may choose to do independent research or work during the summer at Brook Brook Forest in New Hampshire or New York's Adirondack Park, or in many types of forest, aquatic, and wetland ecosystems in New York and beyond where departmental faculty members have ongoing research projects.

Part-time jobs in research and extension programs of several faculty members offer students many opportunities for career-related work experience. A research honors program is available for qualified students. In addition, the department offers an internship program for students and encourages students to seek relevant work experience to complement their academic studies.

Nutrition, Food, and Agriculture

Nutritional sciences draw 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 of 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 together with specialists in areas such as agricultural economics, food production, and rural 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 Physiochemical Aspects of Foods, NS 531 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 Nutritional Sciences 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 participate 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-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. The nutritional sciences Learning Resource Center in MVR is used by students for study and small group discussion. The center contains class能使, audio-visual aids, and supplementary books and periodicals for independent study and special projects.

For additional information about the nutrition, food, and agriculture program, contact the Division of Nutritional Sciences Academic Affairs Office, 335 MVR, 607-255-2608, 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 to academically talented students. Please check www.nutrition.cornell.edu/undergrad/calsmin.html for details.

Plant Sciences

Plant Sciences is a multiprogram departmental program governed by faculty in the Departments of Crop and Soil Environmental Science, Plant Biology, Plant Breeding, and Plant Pathology. Students in the program share a common interest in learning in topics associated with plant growth and development in the broadest sense, and many have their sights set on careers in applied agricultural fields. In addition to the college distribution requirements, they 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 usually 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 General Plant Science without declaring a specialization. Those students have fewer required courses but are still expected to develop a strong background in plant science.

More than one hundred courses that deal directly with some aspect 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 undergraduate teaching and research experience, and 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 production or maintenance-related industry such as a lawn and tree care company, commercial greenhouse, nursery, orchard, vineyard or...
Prospective students should contact the undergraduate coordinators in either the Department of Plant Sciences (viticulture option) or Food Science (agribusiness 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 in the United States. 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 growing, maintaining, process, and market horticultural plants are in high 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 the minimum 40 credits of core courses for the Plant Science major, plus the following courses:

- HORT 101-Horticultural Science and Systems Management (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, weed science) beyond the 3-credit Plant Science core requirement (3 credits).

A dual concentration in Viticulture and Enology is also available. Students transferring into Cornell from other colleges can petition to waive or adjust these requirements, in consultation with their faculty advisers.

**Plant Biology** stresses a basic, rather than applied, understanding of how plants function, grow, and develop, as well as a study of their genome, evolution, and relationships to man. It provides undergraduates with a thorough preparation for graduate study in plant sciences. In consultation with an adviser, each student plans a curriculum with a concentration in basic sciences, supplemented by more advanced courses in plant biology.

Students specializing in Plant Biology within the Plant Science major should take a minimum of four courses beyond the core of Plant Science courses. Options include plant molecular biology, plant cell biology, biochemistry, ethnomedicine, and further courses in the function, growth, development, 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. Agriculturally important genes are identified, characterized, and deployed through combinations of molecular studies and sexual crosses. This area of study integrates genetic information with plant physiology/biochemistry, plant pathology, entomology, conservation biology, international agriculture, and related areas in order to create crops that meet the needs of modern society. In addition to the core plant science courses, students should take PBGR 201, 403, 404, and BIO1 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 disease—its causes and how they are identified, the molecular basis for pathogen specificity and resistance, and pest management. For most students, a concentration in plant pathology is an undergraduate requirement for graduate study in plant pathology or another field of plant science. However, study in plant pathology also prepares students for careers as technical representatives with agribusiness firms, Cooperative Extension educators, integrated pest management practitioners, state or federal plant pest regulatory agents, and laboratory technicians. Suggested courses beyond the plant science core include organic chemistry and biochemistry, calculus, introductory plant pathology, plant disease diagnosis, 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 local pest management careers in pest management, the specialization can also provide an adequate background for graduate work in entomology, plant pathology, or weed science.

**Rural 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, rural sociology students study these and other facets of social change in both domestic and international settings. The Rural 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 institutional, legal, and grass roots social movements through which people seek change in these dimensions.

Courses offered by the department cover topics such as: the impact of changes in agricultural systems on rural development; community and regional development; environmental sociology; rural industrialization and 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 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 develop a specialization with a domestic, international, or global emphasis by choosing appropriate elective courses. All students learn the theory and methodology of sociology and how to apply both to research and policy in their subject areas.

Majors in Rural Sociology are required to successfully complete seven core courses:
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 rigorous and objective 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 taught by professors 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 climate dynamics, biogeochemistry, environmental geology, ocean sciences, environmental biophysics, hydrological system, 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 are also highly valued by graduate programs in environmental law, public affairs, economics, and public policy.

In addition, the emphasis on basic science makes the SES major excellent preparation for medical school.

The requirements for the major are as follows:

1. Basic Math and Sciences

This part of the SES curriculum builds a strong and diverse knowledge of fundamental science and mathematics, providing the student with the basic tools needed in upper-level science classes.

- a. MATH 191 or 193, and MATH 192 (or MATH 111, 112)
- b. PHYS 207 and 208 (or PHYS 112, 213)
- c. CHEM 207 and 208
- d. BIOGD 101/103–102/104 (or 105–106) or BIOGD 109/110
- e. Three additional 3-4 credit courses in basic science and math, generally 100 and 200-level classes. At least one of the following courses must be included in the selection: GEOE 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 classes are based on the most modern views of the planet as an inter-active and ever-changing system, and each class crosses the traditional boundaries of disciplinary science.

- EAS 302 Evolution of the Earth System
- EAS 331/ASTRO 331 Climate Dynamics
- EAS 321/NATRES 321 Biogeochemistry

3. Concentration Courses

These courses build depth and provide the student with a specific expertise in some facets of Earth system science. The concentration should be selected before the junior year in consultation with an SES adviser whose interests match those of the student.

For more information contact Professor Kerry H. Cook, Department of Earth and Atmospheric Science, kkhc@cornell.edu, and visit the website: 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 sustain-able environment for their 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 strength 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 disciplinary and interdisciplinary 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 Conservation Biology
- 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 the 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 four 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.

Core courses are to provide integration (among areas, disciplines, methodologies, topics, and issues); systems emphasis; basic, rigorous, 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.

Earth Systems: CSS 365 Environmental Chemistry: Soil, Air, and Water
- Biotic Systems: BIOEE 261 Ecology and the Environment
- Economic Systems: AEM 250 Environmental and Resource Economics

Social Systems: R 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 Health

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.

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 advisor, 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 disciplines.

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 attitudes 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 concerns 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 course work in the major areas of study in the college—animal sciences, plant sciences, environment and technology, agronomic sciences, biological sciences, and social sciences. Advanced courses may be selected in these and other areas of individual interest or career aspirations. A course of study for a special program must be planned and approved by a college faculty advisor. Information on the options and names of faculty advisors prepared to advise in special programs are available in the Counseling and Advising Office, 140 Roberts Hall.

INTERDEPARTMENTAL/INTERCOLLEGE COURSES

American Indian Studies

American Indian Studies is the instructional component of the American Indian Program. It is a multidisciplinary program offering course work that enhances students' understanding of the unique heritage of North American Indians and their relationships to other peoples in the United States and Canada. Students address such challenging topics as the sovereignty rights of Indian nations and the contemporary relevance of Indian attitudes toward 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 peoples.

The American Indian Program offers a concentration in American Indian Studies to undergraduate students in conjunction with their majors defined elsewhere in the university. The concentration is earned upon completion of five courses: AIS 100 and AIS 175, 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 should obtain application materials from the AIP office in 450 Caldwell Hall.

AIP also offers a graduate minor. Students interested in choosing the minor should contact Professor Charles Geisler, Associate Director of Academic Development, American Indian Program, 255-1691.

AIS 100 Introduction to American Indian Studies
Fall. 3 credits. T R 1:25–2:40 plus sections. M. Tsosie.

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 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 R SOC 175)

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, economic, 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 trends 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 215 Beyond Tradition: Native American Art 1850-Present (also ART H 215)
Fall. 4 credits. T R 10:10-11:25. Limited to 60 students. K. Morris.
Explores both the formal and contextual aspects of Native American art, drawing on examples from the arts of the Far North, the Pacific Northwest coast, and the Great Plains. Lectures, slides, and readings will examine the myriad and complex pressures that have been brought to bear on these cultures over the past century and a half. Missionization, termination, the repeated interventions of the U.S. and Canadian governments, tourism, and the rise of the art market will be addressed, as will the nature of the artistic process and the changing role of the Native artist with respect to his/her community. Contemporary works, along with the writings of Native American historians, critics, and artists will be incorporated throughout the semester.

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 cultures from north of Mexico. Selected cultures 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 276 American Indian History 1500-1850 (also HIST 276)
4 credits. Staff.
A survey of North American history from the sixteenth to the mid-nineteenth century. Relations between Indian nations and with European colonies will be explored. Different cultural groups and cross-cultural encounters will be compared, with emphasis on resistance and adaptation to European colonialism. The formative years of U.S. Indian policy and the experiences of Indian people through the removal era will receive close attention.

AIS 277 American Indian History Since 1850 (also HIST 277)
4 credits. Staff.
A historical study of American Indians in the United States and Canada from the mid-nineteenth century to the present. The active and complex role played by Indian people in their responses to government policies and to socioeconomic changes will be emphasized. Challenges faced and initiatives taken by Indians will be traced from the early reservation years to the current era of self-determination. Cultural change and continuity within Indian communities will be closely examined.

AIS 311 Social Movements (also R SOC 311)
Spring. 3 credits. Prerequisites: R SOC 101 or an equivalent course or 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 processes to effect social change. Under what circumstances do movements emerge? How do global processes shape both domestic and transnational political mobilization? How do social 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 questions through an examination of indigenous movements in the United States, Canada, and Latin America.

AIS 361 Sociology of American Indians (also R SOC 361)
[AIS 367 American Indian Politics and Policy (also GOVT 357 and R SOC 367)]
[AIS 435/465 Indigenous Peoples and Globalization (also R SOC 435/465)]
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 decentralization of social and political arrangements coupled 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, traditions, knowledge, intellectual and cultural property, and indigenous struggles for recognition and self-determination.

AIS 450 Practicum in American Indian Studies

AIS 470 Reel/Real Indians: Art and Indigenous Identities in the 20th Century (also ART H 470, AM ST 472)
Spring. 4 credits. Not open to freshmen or sophomores, except by permission of the instructor. R 2:30-4:25. K. Morris.
For much of the 20th century, American Indian identities were shaped, at least in the public imagination, by John Wayne films, Edward Curtis photographs, tourist propaganda, and advertising imagery. In the past few decades, however, Native American artists and filmmakers have wrested their own image from these externalizing codes of representation. While exploring this history, this course introduces students to the more important texts regarding the gaze and identity formation theory. Those writings are used as the theoretical lens through which the works of contemporary indigenous artists such as Jimmie Durham, Shelley Niro, James Luna, Gerald McMaster, and Hachivi Edgar Heap of Birds are viewed. The course offers a unique opportunity to explore issues of race, ethnicity, and gender as seen through indigenous eyes. Self-representation in a variety of visual media, including painting and photography, film, performance, and the digital arts, are considered.

AIS 486 American Indian Women's Literature (also ENGL 486)
Fall. 4 credits. R 10:10-12:05. L. Donaldson.
This course explores the development of women's literature in a number of different American Indian cultures. We attend to native paradigms of cultural production such as women's songmaking, weaving, basket-making, 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 497 Independent Study
Fall or spring. 1-4 credits. Staff.
Topic and credit hours to be mutually arranged between faculty and student. The American Indian Program Office must approve Independent Study forms.

AIS 600 American Indian Studies (also R SOC 600)
4 credits. Staff.

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. 24).

NONDEPARTMENTAL COURSES

ALS 101 Transition and Success to 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 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 134 Emergency Medical Technician
Fall and spring. 3 credits each semester. Two-semester course. S-U grades optional. Prerequisite: none—but basic and advanced first aid recommended. Lec. M 1:30-5:00; lab, W 1:30-5:00.
D. A. Grossman, P. Rach, and A. Gantier.
E.M.T. 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
imobilization, medical antishock trousers, and defibrillation. Students will qualify for the New York State E.M.T. Certification Exam upon successful completion of the course. Please consult Course and Room Roster for the location of the lab and lecture classes.

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 New York Basic EMT, or have applied for reciprocity. Lec. T 1:25-4:25, lab. R 1:25-4:25, Sat 9:00-12:00. D. Grossman, P. Rach, D. Spaulding. Advanced Emergency Medical Training includes topics such as Emergency Pharmacology, Patient Assessment, Advanced Cardiac Life Support, Emergency Hypothermia Management and Basic Trauma Life Support. Classroom, lab, hospital, and field sessions are used to teach skills such as intubation, emergency IV access, electro-cardioversion and defibrillation, and patient assessment and pharmaceutical intervention. Extensive off-campus opportunities include field training and working with a faculty adviser and the Cornell infrastructure (generally campus life and/or facilities). Through class discussions, students learn how to make decisions 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 480 Global Seminar: Environment and Sustainable Food Systems (also EDUC 480 and INTAG 480)
Spring. 3 credits. Open to juniors, seniors, and graduate students. Letter grade.

ALS 481 Global Conflict and Terrorism
Fall. 2 credits. Prerequisite: permission of instructor. Lec. M 7:30-9:30. 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 leading the discussion and actively engaging the students.

ALS 494 Special Topics in Agriculture and Life Sciences
Fall or spring. 4 credits maximum. S-U grades optional. This course may be taken more than once. The college teaches "trial" or temporary coursework every semester and are advertised by the college 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. Pimentel. 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, 405, 404, 405, 605, 608, 708


Policy and international trade: 230, 335, 430, 431, 432, 433, 434, 630, 632, 633, 634, 730, 735


Environmental and resource economics: 250, 450, 451, 555, 652, 655, 750, 751

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

Consumer economics: 670

General, contemporary issues, research, and other: 101, 200, 380, 494, 497, 498, 499, 490, 694, 698, 699, 700, 800, 900, 901

AEM 101 Introduction to Applied Economics and Management
Fall. 1 credit. Required of and limited to freshmen in Applied Economics and Management. S-U grades only. D. A. Grossman.
This freshman transition course explores the major courses of study available to AEM students, including a discussion of "hot topics", research, and career field. Numerous AEM faculty members are guest presenters. 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 active group participation are required.

**AEM 200 Contemporary Controversies in the Global Economy**

Fall. 3 credits. Prerequisites: ECON 101 and COMM 201 completed or concurrent, ECON 102 and Freshman Writing Seminars recommended. Priority given to sophomores with prerequisites (or taking COMM 201 concurrently) and juniors in AEM. C. Barrett.

Aims to stimulate critical thinking and cogent writing and speaking about contemporary controversies such as technology and its impact in the international press and among key private and public sector decision-makers. Students read and discuss competing arguments about current issues such as patenting and pricing of pharmaceuticals, controls on commercial and humanitarian distribution of genetically modified foods in food aid, and immigration restrictions. Students write a series of short briefing papers and give regular oral briefs, which are evaluated for quality of communication and content.

**AEM 210 Introductory Statistics**

Fall. 3 credits. Prerequisite: EDUC 115 or equivalent level of algebra. 2 evening prelims. C. van Es.

An introduction to statistical methods. Topics covered include the descriptive analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, and correlation analysis. Applications from business, economics, and the biological sciences are used to illustrate the methods covered in the course.

**AEM 220 Introduction to Business Management**

Spring. 3 credits. Enrollment limited to AEM majors and those in the process of transferring to the major. Preference given to other CALS majors. Additional enrollment as capacity permits, with permission of the instructor. 2 evening prelims. P. D. Perez.

This course provides an overview of management and business. Human resources, marketing, finance, and strategy concerns are addressed with consideration paid to current issues such as technology and its impact on operations, globalization, ethics, quality, and entrepreneurship. Guest speakers are an important part of the course.

**AEM 221 Financial Accounting**

Fall. 3 credits. Not open to freshmen. Priority given to CALS majors. 2 evening prelims and a comprehensive final, weekly homework assignments, and one project using an electronic spreadsheet.

S. F. Melendy.

A comprehensive introduction to financial accounting concepts and techniques, intended to provide a basic understanding of the accounting cycle, elements of financial statements, underlying theory of GAAP, and financial statement interpretation. Coverage of topics includes methods of recording inventory, receivables, depreciation, bonds, and equity.

**AEM 222 Business Management Case Analysis**

Spring. 1 credit. Prerequisites: concurrent enrollment in AEM 220. Required of and limited to AEM majors in AEM 220; others admitted by permission of instructor. D. J. Perosio.

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. All AEM majors registered in AEM 220 are required to take AEM 222. 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 being 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. A. Grossman.

This course provides a one-semester introduction to international economics 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 instability in international capital markets are discussed throughout. This course is designed as a less technical introduction to concepts developed at a more advanced level in ECON 490 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. Prerequisites: concurrent enrollment in AEM 240. Required of and limited to AEM majors enrolled in AEM 240; others by permission of instructor. D. J. Perosio.

The course offers students, working in teams, the opportunity for an intense, hands-on application of business case scenarios. Students develop marketing plans 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 not-for-profit organization. All AEM majors registered in AEM 240 are required to take AEM 241. Additional students are accommodated on a space available basis with permission of the instructor. Assignments are closely coordinated with both the content and sequencing of material being presented in AEM 240.

**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 Farm Business Management**

Fall. 4 credits. Not open to freshmen. This course is a prerequisite for AEM 405 and 427. On days farms are visited the section period is 1:25-3:00. Limit 35.

An intensive study of planning, directing, organizing, and controlling a farm business, with emphasis on the tools of managerial analysis and decision making. Topics include financial statements, business analysis, budgeting, and acquisition, organization, and management of capital, labor, land, buildings, and machinery.

**AEM 320 Business Law I (also NBA 560)**

Fall and summer. 3 credits. Limited to juniors, seniors, and graduate students. 1 evening prelim. D. A. Grossman.

Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business. Emphasis is on the law pertaining to contracts, sales, agency, and property.

**AEM 321 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, such as employment discrimination, debtor/creditor relations, product liability, unfair competition, e-commerce law, and international business law.

**AEM 322 Technology, Information, and Business Strategy**

Spring. 3 credits. Prerequisites: AEM 220 and ECON 101. A. Leiponen.

This course explores the impact of new technologies on business processes and industries. We focus particularly on the effects of information and communication technologies (ICT). The objective is to understand the nature of information as an economic good, business opportunities and challenges created by ICT, and organizational constraints involved in exploiting these opportunities.

**AEM 323 Managerial Accounting**

Spring. 3 credits. Priority given to CALS majors. Prerequisite: AEM 221 or equivalent. 2 evening prelims, a third exam, weekly homework, and one project using an electronic spreadsheet.

S. F. Melendy.

An introduction to cost accounting that emphasizes the application of accounting concepts to managerial control and decision making. Major topics include product costing,
standard costing, cost behavior, cost allocation, budgeting, variance analysis, and accounting systems in the manufacturing environment. Use of electronic spreadsheets is required.

AEM 324 Finance Management
Fall. 4 credits. Priority given to CALS majors. Prerequisites: AEM 210, AEM 220, and AEM 221 or equivalents. 3 evening prelims. R. Curtis.

This course focuses on the mathematics of finance, the economics of managerial decisions, corporate financial policy, risk management, and capital budgeting. Topics include the time value of money, capital budgeting decisions, financing alternatives, the cost of capital, and the capital structure decision. Distribution policy, mergers and acquisitions and restructuring, options, forward and futures contracts, market efficiency, and market anomalies, strategies of successful investors, and personal finance.

AEM 325 Personal Enterprise and Small Business Management
Spring. 4 credits. Limited to juniors and seniors. Prerequisites: AEM 220 and 221 or permission of instructor. Absolutely no add or drop after second class meeting. Term project work will amount to approximately $100 per team. D. Streeter.

Course is focused on the activities involved in planning a small business, including the exploration of strategic dimensions, performance of marketing research, and planning of financial aspects related to the new company. Lectures and hands-on clinics include visits by real world entrepreneurs who discuss the start-up process and the challenges of managing growth in a small business. Term project is the development of a business plan, completed in teams of no fewer than three students.

AEM 326 Human Resource Management in Small Businesses
Fall. 3 credits. Limited to juniors and seniors. Prerequisites: AEM 220 or AEM 302 or equivalent. S-U grades optional. 1 evening prelim. Staff.

An introduction to the management of human resources in small businesses. The focus is on developing the capabilities of all small business personnel. Topics include people-oriented management, vision and mission, organizational change, coaching, performance evaluation, recruitment, selection, compensation, training, empowerment, team building, leadership, and conflict resolution. Student involvement and active learning experiences are emphasized.

AEM 327 Technological Change and Innovation Strategy
Fall. 3 credits. Prerequisites: AEM 220 and ECON 101. A. Leiponen.

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 328 Innovation and Dynamic Management (also H ADM 449)
Spring. 3 credits. Limited to juniors and seniors. Staff.

For description, see H ADM 449.

AEM 329 International Agribusiness Study Trip
Fall. 2 credits. Prerequisites: AEM 220 or AEM 302, and AEM 240. Open by application. Students must complete the spring semester before the course is offered. A co-payment of $800 is required for the field study. B. A. Gloy and L. W. Tauer.

Provides students interested in agribusiness management an exposure to the managerial practices essential to the success of agriculture, agribusiness, and food companies competing in the global marketplace. The course involves a two-week international field study trip that takes place after the final exam period of the spring semester before the course is offered. The course meets for a few sessions in advance of the field study trip. A paper analyzing an aspect of the field study is required. Applications for the field study are due prior to March 1 of the spring semester before the course is offered. Approximately 12 students are selected with preference given to sophomores and juniors in CALS.

AEM 335 International Technology Marketing of Biotechnology
Spring. 3 credits. Prerequisites: ECON 101 and BWM 320 or equivalents. S-U grades optional. W. H. Leiponen.

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, industry structure, labeling uses and regulations, public perceptions, patents, trade, and international conventions. The class is of interest to students of biotechnology, public policy, economics, and international technology marketing.

AEM 340 Futures and Options Trading
Spring. 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. S-U grades optional. Not open to spring 2004. 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 investor interested in the hedge. Financial and speculative 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 344 Consumer Behavior
Fall. 3 credits. Prerequisites: AEM 210 and AEM 240 or equivalents. Limited to 45 juniors and seniors. Priority given to CALS students. Not offered fall 2003. 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. Class discussions, lectures, experiential exercises, and group 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 and seniors. Prerequisites: ECON 101 or equivalent. S-U grades optional. A. Novakovic.

An introduction to dairy markets and policy. Major topics include: milk pricing, marketing channels, dairy trends and demographics, world trade for dairy products, and policy issues. Class participation is expected as topics and new ideas are explored.

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 AEM section of this catalog. Provides qualified students an opportunity to conduct original and independent research. 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. Knoebel.

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. E. L. LaDue.

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. E. L. LaDue.

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
Spring. 3 credits. Prerequisite: preference given to AEM majors. AEM 210 or equivalent. 2 evening prelims. C. van Es.

This course focuses on techniques used to analyze data from marketing research, business, and economics. Topics studied are: survey sampling procedures, contingency table analysis, time series and forecasting, and experimental design and ANOVA. A brief introduction to nonparametric methods is also included. The course involves a research project designed to give experience in collecting and interpreting data.

AEM 411 Introduction to Econometrics
Fall. 3 credits. Prerequisite: AEM 210 and either ECON 313 or ECON 205, or equivalents. D. Just.
The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. As real-world problems are 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
Fall. 3 credits. Prerequisite: ECON 313 or equivalent. C. Gomes.
This is a course in applied mathematical programming. Emphasis is on formulation 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
Fall. 3 credits. Prerequisites: ECON 313 or equivalent. C. Gomes.
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, status quo bias, hyperbolic discounting, bias in assessing risks, and so on. Students have the opportunity to evaluate their own decision-making.

AEM 415 Price Analysis (also ECON 415)
Fall. 3 credits. Prerequisites: ECON 210 or equivalent.
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 econometric consequences of pricing decisions are included.

AEM 416 Consumer Demographics and Market Analysis (also R SOC 331)
Fall. 3 credits. Prerequisite: ECON 210 or equivalent. W. Brown.
For description, see R SOC 331.

AEM 417 Decision Models for Small and Large Businesses
Spring. 3 credits. Limited to juniors and seniors. Preference given to AEM majors. Prerequisites: AEM 210 or equivalent.
In weeks labs are held, there will be no Friday lecture. C. L. van Es.
The course focuses on economic and statistical models of decision analysis and their application 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 portray 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.

[AE]M 419 Strategic Thinking
Fall. 3 credits. Prerequisite: intermediate microeconomics (PAM 200 or ECON 313).
The art of thinking strategically puts you at the center of your competition. 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 subjective nature of the course is to facilitate students' ability to think strategically on firm level issues (e.g. pricing, advertising wars, product differentiation, entry deterrence), and strategic policy interaction in international economic relations (e.g. trade wars, arms race).

AEM 420 Investments
Fall. 3 credits. Prerequisites: AEM 210 or equivalent and AEM 524. Recommended: ECON 313 and a calculus course.
Preference given to students in AEM S-U grades optional. H. Dauk.
This course covers theories and empirical data in the field of financial investments. Descriptions of investment 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.
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. Grassman.
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 423 Risk Management in Business
Fall. 3 credits. Prerequisites: AEM 210 and AEM 324 or equivalents. L. Tauer.
A comprehensive approach to risk management in the business firm. Discusses what risks exist in the business and whether the business or stakeholders should shoulder those risks. If the business eliminates or manages those risks, how can it best accomplish that task? Discusses the appropriate tools to engage in risk management effectively and how to implement those tools.

AEM 424 Management Strategy
Fall and spring. 3 credits. Limited to AEM seniors in Business. 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 MBA 300 and permission of instructor. Term project work 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 to an existing business and the witnessing of the results of firm-level decision making. Student teams meet with the business owners and course staff at arranged times during the semester.

[AE]M 426 Cooperative Management and Strategies
Spring. 3 credits. Recommended: AEM 220 or equivalent. Estimated cost of field trip, $60. 2-day field trip required. Not offered spring 2004. B. L. Anderson.
Investigates the unique aspects of cooperative, membership, and not-for-profit organizations. Issues are approached from the point of view of management, the board of directors, and members. Topics include characteristics of various types of business organizations, cooperative principles, legislation, and taxation as well as the unique nature of strategies, management, marketing, and social and ethical responsibilities. Priority focus is on operating cooperatives in agriculture, although alternative types of cooperative organizations are discussed, such as credit unions, insurance cooperatives, employment and ownership plans, housing cooperatives, flexible manufacturing networks, consumer cooperatives, and membership organizations.

AEM 427 Agribusiness Strategy
Fall. 3 credits. Prerequisites: AEM 220 or AEM 302. 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, organizational design and structure, 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. Preference given to students in AEM. D. T.-C. Ng.

This course is about the analysis of 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 assumptions, 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 429 International Finance**

Spring. 3 credits. Prerequisites: AEM 210 and AEM 324. Preference given to students in AEM. 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 250. Optional section TBA. N. H. Chau.

This course covers 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 Food and Agricultural Policies**

Spring. 3 credits. Prerequisite: intermediate microeconomics. S-U grades optional. A. Novakovic.

The course deals broadly with food and agricultural policies, including price support and storage or reserve policies, agricultural protection, soil conservation programs, the structure of agriculture, domestic food subsidy programs, environmental issues, and food safety. The importance of international trade and agricultural policies in other countries is emphasized.

**AEM 432 Business and Governments in a Global Marketplace**

Fall. 3 credits. Prerequisite: intermediate microeconomics. C. K. Ranney.

The government agency and the individual business enterprise are two of the most powerful institutions in modern society. The aim of this course is to look at the economic interfaces between government and business. The shifting and evolving relationships between the two entities exert great influence on the changing performance of the economy and on the lives of citizens. These relationships range from cooperative to competitive, from friendly to hostile. It is an uneasy relationship, each side possessing basic powers and yet each having an important need for the other. In the United States, the result is a mixed economy in which the public and the private sectors interact in many ways. Government exercises a variety of important powers in dealing with the individual private enterprise, ranging from taxation to regulation. Business, in turn, relies on constitutional protections as well as on public support of its basic role in creating income, employment, and material standards of living. In a dynamic and increasingly globalized economy the business-government relationship is constantly changing and the line between public and private sectors frequently shifts. Future managers will be constantly called upon to relate to government-business interfaces.

**AEM 433 Devolution, Privatization, and the New Public Management**

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 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 foreign markets is appraised and assessment of the political, legal, cultural, and economic forces is conducted. Case studies of companies are analyzed and discussed.

**AEM 434 Food-Industry Strategy**

Fall. 4 credits. Limited to AEM juniors and seniors in Business or Food Industry Management and graduate students. Prerequisite: AEM 240 or 448 or permission of instructor. G. A. German.

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 section.

**AEM 446 Food Marketing Colloquium**

Fall. 1 credit. Limited to juniors and seniors with extensive course work in food industry management and marketing. 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 447 Food Marketing Colloquium**

Spring. 1 credit. Limited to juniors and seniors with extensive course work in food industry management and marketing. 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. Hägen.

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 these strategies. The course includes case analysis and discussion.

**AEM 450 Resource Economics**

Fall. 3 credits. Prerequisites: MATH 111, ECON 313, and a familiarity with EXCEL.

This course covers resource economics topics such as the determination of the price and supply of resource and its application to public policy. The main focus is on the principles of economic growth and growth policies, especially with respect to energy and environmental resources.

**AEM 451 Environmental Economics**

Spring. 3 credits. Prerequisites: ECON 313, and a familiarity with EXCEL.

This course examines 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 failures, externalities, benefit-cost analysis, and the use of nonmarket valuation techniques. Property rights/institutional perspectives and ecological economic concepts are also examined.

**AEM 452 Resource Economics**

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 examines 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, externalities, 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)
Spring. 3 credits. Prerequisites: ECON 101-102, or permission of instructor. R. D. Christy.
This course is designed to provide an understanding of the economics of the agricultural sector in low-income countries. In addition, more general 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. 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 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.
Used for special projects designed by faculty members.

AEM 498 Supervised Teaching Experience
Fall or spring. 1-4 credits. Total of 4 credits maximum during undergraduate program. Students must register with an Independent Study form (available in the Undergraduate Program Office in Warren Hall). Staff.
Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty. Students are expected to 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 499 Undergraduate Research
Fall, spring, or summer. 1-4 credits.
Limited to students with GPAs of at least 2.7. Students must register with an Independent Study form (available in the Undergraduate Program Office in Warren Hall). S-U grades optional. Staff.
Permits outstanding undergraduates to carry out independent study of suitable problems under appropriate supervision. Students cannot receive both pay and credit for the same hours of work.

AEM 555 Environmental Management and Policy
Fall. 3 credits. Prerequisite: ECON 101 and 102 or equivalents and calculus. L. D. Chapman.
This seminar introduces to familiarize students with the rapidly evolving state of the art in the analysis and management of environmental policy and practice in enterprise. Although focused on the private sector, some attention is given to public enterprises.

AEM 605 Agricultural Finance
Fall. 3 credits. Prerequisite: AEM 324 or 405 or equivalent. 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. Recommended: 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; tests of efficiency and productivity are discussed. Production response over time and under risk is introduced.

AEM 610 Econometrics I
Spring. 3 credits. Prerequisites: statistical methods at the level of ILRST 311 or ECON 619. Undergraduates must have permission of H. Darouk. This course, together with AEM 711, provides a graduate sequence in applied econometrics that is suitable for M.S. and Ph.D. students. AEM 610 covers linear regression models and the associated estimation and testing procedures. Models from demand and production theory are used as illustrations.

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 411. D. Just.
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 economic research.

AEM 630 Policy Analysis: Welfare Theory, Agriculture, and Trade (also ECON 430)
Spring. 4 credits. Prerequisites: AEM 608 or IAM 608, 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 or nonmarket allocation. Basic concepts covered include measurement of welfare change, including the compensation principle, consumer and producer surplus, willingness-to-pay measures, externalities, and the general theory of second-best optimal. 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.
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 microeconomics 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. 3 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. Not taught fall 2003. 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 9-14 (starts Mar. 11). 2 credits. Prerequisites: AEM 411 and 415 or equivalents. Recommended: AEM 640. Staff.
This course is about markets for agricultural commodity futures contracts. Emphasis is placed on models of price behavior on futures markets including relationships among cash and futures prices. These principles provide a foundation for a discussion of hedging, speculation, and public-policy issues.

AEM 651 Environmental and Resource Economics
Spring. 4 credits. Limited to graduate students. W. D. Schulze.
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 cost—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 credits. Limited to graduate students. AEM 660 or 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 is open 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. C. K. Ranney. 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 312 and 2 semesters of calculus. S-U grades optional. C. K. Ranney. 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 with 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. 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, 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 608, 710, or equivalents; ECON 609 is highly recommended. Offered alternate years. Not offered 2003–2004. R. N. Boisvert. Covers theoretical and mathematical developments in production economics, with emphasis on estimation production relationships, scale economics, 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 711 Econometrics II] Fall. 3 credits. Prerequisite: AEM 610 or equivalent. T. D. Mount. Coverage beyond AEM 610 of dynamic models, including single equation ARIMA, vector ARIMA, Kalman filtering, structural dynamic models, and regime switching. Topics covered include endogeneity, stability, causality, and cointegration.

[AEM 712 Quantitative Methods I] Fall. 4 credits. Prerequisite: some formal training in matrix algebra. A course at the level of BTRY 417 is highly recommended. R. N. Boisvert. 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 in social accounting matrices and computable general equilibrium models are discussed. Applications are made to agricultural, resource, and regional economic problems.

[AEM 713 Quantitative Methods II] Spring. 3 credits. Prerequisite: ECON 609. S-U grades optional. J. M. Conrad. This course is concerned with the analysis and optimization of dynamic systems. Course objectives are to (1) present the basic theory of dynamical systems and dynamic optimization, (2) introduce associated methods of optimization and numerical analysis, (3) review some applications of dynamic analysis from various subfields in economics, and thereby (4) equip students with basic theory and methods to perform applied research on dynamic allocation problems.

[AEM 714 Experimental Economics] Fall. 4 credits. Prerequisite: ECON 609. Offered 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 provision. 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 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 2004. D. R. Lee. This course examines selected topics in the professional literature on international trade policy, focusing on agricultural trade and related topics, including trade liberalization, trade and environmental linkages, technological change and trade policy, and agricultural trade and development.
This course focuses on models of individual, product/factor markets analysis. Empirical household analysis, reciprocity networks, and agricultural land, labor and financial economies. Topics covered include: receive 1 credit. Students who in addition actively participate by offering proposals, papers, and preliminary thesis faculty instructor present draft research results for group review and discussion.

AEM 900 Graduate-Level Thesis Research
Fall or spring. 1-9 credits. Prerequisite: permission of graduate committee chair. S-U grades only. Graduate faculty. For students admitted specifically to a master's program. For students in a Ph.D. program only before the "A" exam has been passed.

AEM 901 Doctoral-Level Thesis Research
Fall or spring. 1-9 credits. Prerequisite: permission of graduate committee chair. S-U grades only. Graduate faculty. For students admitted to candidacy after the "A" exam has been passed.

ANIMAL SCIENCE

AN SC 100 Domestic Animal Biology I
Fall, 4 credits. S-U grades optional. Lecs, M W F 9:05; lab, T W R or F 1-2:25. W. R. Butler and staff. 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 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 T W R or F 1-2:25. A. W. Bell and staff. 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

AN SC 214 Nutrition of Exotic Animals

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. Lec, M 2:30-4:25. J. Parks and D. Muscarella. Natural history, care, management, health, and breeding of exotic avian species with emphasis on psittacines (parrots and related species) and raptors (birds of prey). Includes lectures, demonstrations, and local field trips.

AN SC 216 Nutrition of the Cat
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. J. 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
Fall, spring 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. sceu.cornell.edu/DL/html/caninegeneti cs.html. E. J. Pollak and P. A. Ottenacu.
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 grade optional. Lecs, T R 10:10-11:25; lab, M W 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. Lec, T R 11:15-12:05. 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; labs, R 1:25-4:25; H. F. Hinta.
Selection, management, feeding, breeding, and training of light horses.

[AN SC 280 Molecular Biology in Agriculture and Medicine]
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. Laboratory demonstrations are used to support some lectures.

AN SC 290 Meat Science (also FOOD 290)
Fall. 2 or 3 credits. Lecs, T R 11:15; lab, M W 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 sexual development. An 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 F or R 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 behavior of production species (cattle, sheep, horses, swine, poultry) and 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.

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. Ottenacu.
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]
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
Application of scientific principles to practical herd management with components of reproduction, milking, housing, records, and production economics. Laboratories emphasize 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 only. Lecs, W F 10:10-11:25. T. L. Batchelder and L. E. Chase.
Application of scientific principles to practical herd nutrition relating to herd production and feeding management. Laboratory emphasizes practical applications and field trips.

AN SC 360 Beef Cattle
Emphasis is on the management of reproduction, nutrition, and selection in beef cattle enterprises. A cattle growth model is studied. Laboratories acquaint students with management skills through computerized simulations and working directly with cattle. Students spend several days during the semester feeding and caring for cows and their newborn calves.

AN SC 365 Equine Nutrition
Fall. 3 credits. Prerequisites: AN SC 100, 212, and 265 or equivalent. S-U grades optional. Lec, M W F 9:05-9:55. H. F. Hinta.
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 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 F 11:15. R. E. Austic and D. E. Bautch. 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 incriminate 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 10:12; lab, M 1:25–4:25. 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. Nutritional 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 farm studies. 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 crop and manure nutrient management planning; no prerequisites listed. Module 2 is optional (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 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. Van Amburgh and Q. M. Kettenring. This course provides students with an understanding of the concepts underlying whole farm nutrient management planning to improve profitability 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 plan to meet environmental regulations. Students develop components of a CNMP for a case study farm, using the Cornell University Nutrient Management Planning System (cuNMPs) and other tools. All students enrolled learn the concepts and develop 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 while learning 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. Lecs and disc, R 1:25–3:00. Weeks 1–8. L. O. Tedeschi and D. G. Fox. Course lectures and discussions explore contemporary issues affecting animal agriculture, including competition with humans for food resources, biotechnology, impact of consumption of animal products on human health, and impact of livestock farms on environmental/community problems, including odor, pathogens, and excess nutrients effects on water quality. May not be repeated for credit.

AN SC 414 Ethics and Animal Science
Fall. 2 credits. Enrollment limited to juniors, seniors, and graduate students only. Lecs, M 12:20; disc, W 12:20–1:10. D. J. Cherney. Exploration of the place of humans in the biological world, origins of ethics and morality, speciation, 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 are used to evaluate the performance of each student.

AN SC 420 Quantitative Animal Genetics
Spring. 2 credits. S-U grades only. Prerequisite: AN SC 221 or equivalent. Limited to 50 students. Lecs, M 12:20; sec, M 200–4:25. E. 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
Fall. 2 credits. Limited to 50 students. Prerequisite: AN SC 300 or equivalent. Offered alternate years. Next offered fall 2003, 2005, not offered fall 2004. 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 and new 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. Lecs, 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  
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 "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 495 Introduction to Research  
Fall. 1 credit. S-U grades only. Required of students undertaking Honors in Animal Science. Open to Honors students in other programs and those planning to pursue research, by permission of the instructor.  
An exposure to the world of scientific research including: identifying problems; devising hypotheses and realistic research plans; evaluating scientific writings and other forms of communication; finding and managing reference materials, examining the cost of research and opportunities for funding; discussing the obligations imposed on investigators by society and a host of regulatory agencies, along with responsibilities and freedom in science; and considering ethical issues that affect scientists. Students make oral presentations and prepare brief items of technical writing.

AN SC 496 Internship in Animal Science  
Fall or spring. 1-3 credits; limited to 6 credits maximum during undergraduate career. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Staff.  
A cooperative program with a cooperating organization (e.g., farm, agribusiness, pharmaceutical company, zoo, educational institution). Internships must be approved in advance by the student's academic adviser and must provide an acceptable, professionally supervised experience of 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 students in animal sciences. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Staff. May include individual tutorial study or a lecture topic offered 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 with 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 to regularly 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. Open only 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 with 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 601 Amino Acids (also NS 601)  
R. E. Austic.  
A course stressing the dynamic aspects of protein digestion and absorption, amino acid transport and amino acid and nitrogen metabolism, and their relationships to the nutritional requirements for amino acids.

AN SC 603 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also NS 603)  
Emphasizes metabolism, gene regulation, functional genomics, and genetic defects of mineral nutrition. Team-taught lectures span 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 604 Vitamins (also NS 604)  
Fall. 2 credits. Lec, T R 10:10. Staff.  
For description, see NS 604.

AN SC 606 Ruminant Nutrition: Microbial Ecology and Forage Chemistry  
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 Seminar: Endo/Reprod Biology  
Fall and spring. 1 credit. Prerequisites: permission of instructor. Registration limited to graduate students. S-U grades only. Lect, W 4:40. 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)  
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. 4 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 2004, 2006; not offered spring 2005. Lec, T 11:15; labs, T and R 1:25-4:25. Y. Boisclair and S. Quirk.  
A laboratory course designed for students with 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., subcelling, 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. Offered alternate years. Next offered spring 2004, 2006; not offered spring 2005.

R. L. Quaas.

This course covers statistical methods used in a variety of problems in the quantitative genetics of animal populations. The initial focus is 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 (FOOD 351)

Agriculture in the Developing Nations (INTAG 602)

Lipids (NS 602)

Basic Immunology, Lectures (BIOG 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. Graduating seniors are guaranteed admittance. All students, including those pre-enrolled (and graduating seniors), must attend the first lecture to guarantee admittance and to select a laboratory section. Lec, fall: T R 12:20-1:30, spring: M W 12:30-1:10, 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 related to the student's major is required. These packages such as desktop publishing, multimedia, 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, health hazards of computing, and software privacy.

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, oxy-acetylene 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 W or 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 Computing

An introduction to computer programming and concepts of problem analysis, algorithm development, and data structure in an engineering context. The structured programming language, JAVA, is used, implemented on interactive personal computers, and applied to problems of interest in biological and environmental engineering. No previous programming experience is assumed.

BEE 152 Computer Applications for Engineers
Spring. 1-3 credits variable (three 1-credit modules). A student can take any one, any two, or all three modules. Prerequisites: BEE 151 or equivalent computer programming course and 1 semester of calculus for the Matlab module. No prerequisites for the other two modules. Letter grades only. Lec, T 2:30-3:20, sec, R 1:25-2:15; lab, R 2:30-4:25. P. E. Hillman.

Major application packages useful to engineering and science students are covered in three modules. The first module introduces Matlab and explores the problem-solving capabilities of Matlab through examples. The second module investigates the data processing and graphing capabilities of spreadsheets. The third module uses presentation graphics to create an effective professional presentation.

Module 01 Matlab (weeks 1 to 5 of the spring semester)
Covers matrix/vector manipulation, basic math functions, graphing of 2-D and 3-D plots, file I/O, string and numerical manipulation, problem solving of linear and nonlinear algebraic functions and ordinary differential equations, integration, curve fitting, and data analysis and statistics. In spring semester.

Module 02 Spreadsheets (weeks 6 to 10 of the spring semester)
Covers use of a spreadsheet application such as Microsoft Excel to include built-in functions, lookup tables, graphs, Visual Basic macros, what-if analysis, and advantages and disadvantages compared to a programming language. Grading based on completion of lab assignments, lecture quizzes, and lecture attendance.

Module 03 Presentation Tools for the Professional Engineer (weeks 11 to 14 of the spring semester)
Covers the use of a presentation graphics application such as Microsoft PowerPoint to create slides for an oral presentation of engineering projects for professional presentations. Special attention is given to the execution of quality presentations. Grading based on lab assignments, lecture quizzes, lecture participation, and an oral PowerPoint presentation and written report submitted as the final exam.
**BEE 200 The BEE Experience**
Spring. 1 credit. Letter only. Prerequisite: nonmajors by permission of instructor. Lect, T 1:25-2:19, J. A. Bartsch.
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 offices, and students. Students develop their undergraduate course plans, complete a web search assignment to locate internships, and select future courses to meet their academic objectives and career goals.

**BEE 222 Bioengineering Thermodynamics and Kinetics**
Spring. 3 credits. Prerequisites: MATH 192, BIO SCI 110; PHYS 213 and one course in chemistry completed or concurrent. Lect, M W 9:00-9:50; lab, R 8:00 or 9:05; R. Lt. Seymour.
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**
Spring. 3 credits. Prerequisite: MATH 293 completed or concurrent. Lect, T R 10:10-11:25, 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 science. The students will be introduced to the basic chemistry, ecology, biology, ethics, and environmental legislation relevant to the particular environmental problem. BEE engineering 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**
Spring. 3 credits. Prerequisite: MATH 293 completed or concurrent. Lect, T R 8:40-9:55, A. Baeumner.
Focuses on the integration of biological principles with engineering, math, and physical principles. Students learn how to formulate courses for chemical 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 engineering 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; lab 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**
Introduction to energy systems with emphasis on quantifying costs and designing 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 301)**
Fall. 4 credits. 4 classes each week (lecture-recitation-project work). Lect, M W F 8:00-8:50; lab, R 8:00 or 9:05, L. D. Albright.
An introduction to the fundamentals of marine navigation emphasizing piloting and celestial navigation procedures. The course covers coordinate systems, chart projections, navigational aids, instruments, 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). Prerequisite: BEE 110 or permission of instructor. Lect, F 2:30-4:20, T. J. Cook.
Principles and practices extending 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, surfacing, tungsten (TIG) and metallic (MIG) inert gas welding, plasma-arc and oxy cutting of metals are covered. Planning, development, and fabrication of a metal construction project is required for the two-credit option.

**BEE 325 Environmental Management**
Fall. 3 credits. Lect, T R 2:55-4:10, W. J. Jewell.
Explores the decline in environmental quality caused by human activities and the limits of science and technology solutions. Understanding complex issues such as global warming and their 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 294 and fluid mechanics (co-registration permissible). Lect, M W F 11:15-12:05; disc, W 2:30-3:20. 2 evening prelims. K. G. Gebremedhin.
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**
Spring. 3 credits. Prerequisites: biochemistry or AEP 252 or permission of instructor. Lect, T R 2:55-4:10, D. Luo.
Biological engineering at the molecular and cellular level focuses on living 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 and analytical measurement as well as ethics in molecular and cellular bioengineering with emphasis on integration of molecular and cellular biology with engineering.

**BEE 365 Properties of Biological Materials**
Spring. 3 credits. Prerequisites: ENGRD 202 (coregistration permissible). Lect, T R 12:20-1:10; lab W 2:30-4:25, R 2:30-4:25 or F 2:30-4:25, J. A. Bartsch.
Mechanics and structural properties of biological materials. Mechanical testing of animal, plant, and food products. Laboratory exercises in quasi-static 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 371 Hydrology and the Environment**
Spring. 3 credits. Prerequisite: one course in calculus. 2 lecs, 1 lab. Lects, T R 9:05-9:55; lab, F 2:30-4:25, M. T. Walter, T. S. Steenhuis.
Introduction to hydrology: the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evaportranspiration, ground water, surface runoff, river meandering, floods, and droughts. Case studies, short field trips, and laboratories foster an understanding of concepts and principles of hydrologic processes.

**BEE 411 Biomass Processing: Modeling and Analysis**
Spring. 3 credits. Prerequisites: BEE 250; BEE 350 (or any course in heat and mass transport), BIOM 351, 332, or BIOM 290. Lect, M W F 9:05-9:55, L. P. Walker.
This course is designed to introduce students to how basic concepts from physical chemistry, enzyme and microbial kinetics, and transport phenomena are used to model biomass conversion and degradation processes. Examples of different agricultural and environmental processes are used to explore model development, solutions, and validation. Strong emphasis on the use of differential equations to model process dynamics.
BEE 427 Water Sampling and Measurement
Fall. 3 credits. Prerequisites: fluids or a hydrology course and MATH 191. Lec. T 9:05-9:55, lab. T 1:25-4:25. L. D. Geohring and T. S. Steenhuis.

Get your feet wet and your hands busy with 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 it includes sampling techniques of soils, sediment, and biological waste products. 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 1:25-4:25. M. B. Timmons.

An in-depth treatment of the principles of aquaculture: fish biology, waste treatment, engineering health, nutrition, processing, and so on. This course is intended to build upon the undergraduate's previous course background and interests. Includes supervised "hands-on" laboratory experiences.

BEE 450 Bioinstrumentation

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.

BEE 453 Computer-Aided Engineering: Applications to Biomedical Processes (also MAE 453)
Spring. 3 credits. Prerequisite: heat and mass transfer (BEE 350 or equivalent). Lec. M, W, Th, F; disc/lab. F 11:15. A. K. Datta.

Introduction to simulation-based design as an alternative to prototype-based design. Analysis and optimization of complex real-life processes using an industry-standard physics-based computational software on a supercomputer or on high-end personal computers. Biomedical processes and industrial food processing applications of heat and mass transfer are covered. Computational topics include the finite element method, pre- and post-processing, and pitfalls of using computational software. Students choose their own term project, which is the major component of the course (no final exam). The course satisfies the BEE capstone design requirement. 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 systematics as applied to cardiovascular and respiratory systems, bioenergetics, and bird flight. Laboratories involve 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. S-U or letter grade optional. Lec. T R 11:15-12:05; disc. W 2:30-3:20. J. R. Cooke and K. J. Niklas.

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

BEE 459 Biosensors and Bioanalytical Techniques
Spring. 4 credits. Prerequisites: biochemistry and permission of instructor. Lec. 11:40-12:55, lab. M 1:25-4:25 and 7:30-10:30. A. J. Baumer.

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. Undergraduate students work together in teams of 2-4 students. This course satisfies the BEE capstone design requirement and the BEE laboratory experience requirement for engineering students.

BEE 464 Biosorption Processes
Fall. 3 credits. Prerequisites: intro biochemistry and physics, MATH 112 or 192, BEE 260 or equivalent, or permission of instructor. Lec. M W F 12:20-1:10. J. B. Hunter.

Biosorption is the science and engineering of fractionating and purifying biological materials. Topics include: living and non-living, antimicrobial, antibiotics, biocides, and even foods. The course covers separation methods used in the biotechnology industry, principles governing these methods, approaches to improving biosorption performance, and the special challenges of scale-up. Centrifugation, filtration, extraction, membrane methods, ion exchange, chromatography, electrophoresis will be supplemented with student presentations. Intended for senior engineering students in engineering, chemistry, biology, and food science.

BEE 471 Geohydrology (also CEE 431 and EAS 448)
Fall. 3 credits. Prerequisites: MATH 294 and ENGR 202. 2 lecs, 1 disc, lecture, field trip. W. B. Brutsaert, L. M. Cathles, J.-Y. Parlange, T. S. Steenhuis.

Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydrodynamics, soil water, and solute transport.

BEE 473 Watershed Engineering
Fall. 3 credits. Prerequisite: fluid mechanics or hydrology. Lecs. T R 10:10-11:00; disc. R 12:55-1:45. M. F. Walter.

Engineering principles are applied to the design of management strategies aimed at 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 final writing requirement when co-registered in BEE 493.

BEE 474 Drainage and Irrigation Design

This course will focus on design of drainage and irrigation systems for agriculture and nonagricultural purposes. The course will also briefly cover design for rural water supply and sanitation systems. Emphasis is placed on problem solving with actual situations used whenever possible. One major design project is required of each student. 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 1:10-2:55. D. A. Haith.

Planning and design of processes and facilities for management of municipal solid wastes. Source characterization and reduction, collection and transport systems, waste-to-energy combustion, sanitary landfills, composting, recycling and materials recovery facilities, and hazardous waste management. Emphasis is on quantitative analyses.

BEE 476 Solid Waste Engineering

Planning and design of processes and facilities for management of municipal solid wastes. Source characterization and reduction, collection and transport systems, waste-to-energy combustion, sanitary landfills, composting, recycling and materials recovery facilities, and hazardous waste management. Emphasis is on quantitative analyses.

BEE 478 Ecological Engineering
Spring. 3 credits. Prerequisite: junior-level environmental quality engineering course or equivalent. Lecs. T R 2:30-3:45. W. J. Jewell.

Ecological engineering is the language of sustainable living. Waste management with natural systems, the most advanced form of this new engineering direction, includes constructed wetlands, hydroponic applications of plants in resource-recovery waste management systems, soil restoration, phytoremediation, and bioremediation of toxic. Biomass refineries to create energy-independent communities, sustainable drinking water systems, carbon sequestration, and zero polluting farms are future sustainable.
living topics that also solve some of society's larger problems. 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.

**BEE 481 LRFD-Based Engineering of Wood Structures (also CEE 481)**
Spring. 3 credits. Prerequisite: ENG 202. Lec, M W F 2:20-3:10 (Holister Hall).
Two evening prelms. K. G. Gebremedhin.
Computer-aided and manual computation procedures of Load and Resistance Factor Design (LRFD)-based engineering of wood structures. Topics include national design codes and standards; estimation of design loads (dead, live, wind, snow, and seismic loads); determination of factored resistance and stiffness values; mechanical properties of wood and wood products; designs of beams, columns, trusses, frames, arches, bridges, and diaphragms; and connections and special wood structural members and systems. Engineering design judgment is also discussed as an integral component of the quantitative design procedure. BEE students who wish to take the course to satisfy the BEE capstone design requirement must co-register in BEE 496 for one credit hour.

**BEE 484 Metabolic Engineering**
Spring. 3 credits. Prerequisite: biochemistry or permission of instructor. S-U grades optional. Lec, T R 10:10-11:25.
R. M. Spanswick.
The principles of metabolic engineering as they relate to the regulation of metabolic pathways, including membrane transport, are considered in terms of enzyme kinetics and metabolic control analysis. Case studies, reflecting the interests of the instructor, emphasizes examples involving higher plants. Each student is expected to investigate one topic in depth and make a short class presentation.

**BEE 489 Engineering Entrepreneurship, Management, and Ethics**
The course focuses on engineering economics, engineering management and professional ethics, and associated ethical issues. 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. 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 T W 7:30-9:25 (5 evenings in first half). 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 during the fall semester 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. 3-4 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. 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: S-U.
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 credit. Corequisite: students must co-register in one of the approved upper level capstone courses (BEE 473, 478, 481). Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.
Involves capstone design experience, including a technical project incorporating analysis, design, evaluation, synthesis, and a written and oral report of the end-product. This course must be taken in conjunction with one of the following approved BEE courses (BEE 473, 478, 481).

**BEE 497 Individual Study in Biological and Environmental Engineering**
Fall and spring. 1-4 credits. S-U option. Prerequisite: 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 with 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. 1-4 credits. Prerequisite: written permission of instructor. Students must register with 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, discusses objectives and techniques with the faculty member in charge of the course.

**BEE 499 Undergraduate Research**
Fall and spring. 1-4 credits. Prerequisites: 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 with 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 and 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 501-502 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. 3-6 credits. Prerequisite: admission to the M.Eng. degree program. BEE graduate faculty.
Comprehensive design projects dealing with existing engineering problems in the field. Emphasis is on the formulation of alternative design proposals that include consideration of economics, nontechnical factors, engineering analysis, and complete design for the best design solution. Projects are supervised by faculty members on an individual basis. There, however, is a formal orientation during the first four weeks of the semester. A formal report and public presentation of the results of the design projects is required for completion of the course(s). A minimum of 3 to a maximum of 12 credits of 551-552 is required for the Master of Engineering degree. Students should register for 551 their first semester and complete any additional design project credits with 552. If more than six design project credit hours 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 BIOPH 651)**
Fall. 2 credits. Lec, T R 10:10-11:00. R. M. Spanswick.
Topics include water relations of plant cells and tissues using water potential terminology; permeability of plant cells to water and the role of aquaporins; transport of water through whole plants, including transpiration, stomatal physiology, and the modifications due to plant communities; water status and plant growth in relation to water stress.

**BEE 649 Solute Transport in Plants (also BIOPH 649)**
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; cotransport 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 200 or BIOMI 398 or BIOMI 331 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 bioremediation 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 the instructor. Lect R 12:20–1:10; lab 2:00–4:25. D. J. Aanesland.
Application of instrumentation concepts and systems to the measurement of environmental, biological, and chemical phenomena. The construction and characterization of electronic sensors and transducers is emphasized. Imaging processing techniques are introduced. A final project is required.

BEE 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisite: MATH 293 or equivalent. Lects, R 2:30–4:30. J-Y. Parlange.
Thermodynamics and its applications to problems in engineering and agriculture. Topics include basic concepts (equilibrium, entropy, pressure, 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: biochemistry and permission of instructor. Lect, T R 8:40–9:55; lab, M 1:25–4:25 and 7:30–10:30 PM. A. J. Baesemann.
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 agriculture, 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. Lect, R 3:35–5:45 (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 633—a complementary, but not identical, course.

BEE 672 Drainage
The theory of water and solute flow in aquifers, hill slopes, and the vadose zone as it relates to artificial drainage is discussed. Drainage design as it relates to agricultural land, landslides, and land and adverse drainage sites is critically reviewed. The importance of preferential flow and matrix flow on water quality of drainage water is examined. Laboratories are used for hands-on experience with measuring soil parameters and artificial drainage design. This course satisfies the capstone design experience requirement.

BEE 673 Sustainable Development Seminar (also MBA 573)
Spring. 1–3 credits. Prerequisites: upper division undergraduate and graduate students or permission of instructor. Lect, F 1:30–3:30. N. R. Scott.
Sustainable development is the most beneficial concept to come out of the environmental movement in years. The concept of a sustainable world, however, is not a constant. There are many problems, including economics, environment, and political, social, scientific, and technological developments. This seminar explores topics such as energy, agricultural and food systems, green buildings and environmental design, corporate sustainability, and other contemporary issues.

BEE 678 Nonpoint Source Models
Spring, 3 credits. Prerequisites: computer programming and calculus. Lects, T R 8:40–9:55. D. A. Haith.
Development and programming of simulation models for management of water pollutants from runoff and percolation. Emphasis is on prediction of water and chemical inputs to surface waters and groundwater. Applications include watershed hydrology and sediment yield, urban and rural runoff, irrigation, waste disposal sites, and pesticides, nutrients, and salts in drainage.

BEE 685 Biological Engineering Analysis
Spring. 4 credits. Prerequisite: T&M 310 or permission of instructor. Lects, 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. Lect, R 12:20–1:10; disc, R 1:25–2:15. B. Ahner.
Environmental sustainable alternatives for our energy and chemical needs are critical. This seminar series explores challenges facing the development of industries that use biologically derived materials to produce useful chemicals and energy for society. Topics include natural products from biological systems, conversion of biomass to fuel and other commodities, and the use of biological systems for environmental bioremediation.

BEE 694 Graduate Special Topics in Agricultural and Biological Engineering Seminar
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 VTMED 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 common 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.

BEE 750 Orientation to Graduate Study
Fall. 1 credit. Limited to new graduate students. S-U grades only. Lects, first 7 weeks, M 3:35–4:25. D. J. Aanesland.
An introduction to ABEN research policies, programs, methodology, critiques, and degree candidates' responsibilities and opportunities.

BEE 754 Watershed Management
Spring. 2–3 credits. Prerequisite: graduate standing or permission of instructor. 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
Fall. 3 credits. Prerequisites: BEE 360 or permission of instructor. Lect, T, W, TH 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. TBA. Staff. Study of research or design procedures related to selected topics in irrigation, drainage, erosion control, hydrology, and water quality.

BEE 781 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 785 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 in order to improve communication between engineers and biologists.

BEE 787 Industrial Ecology of Agriculturally Based BioIndustries
Spring. 3 credits. Prerequisites: 1 year 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 900 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.

BIOMETRICS AND STATISTICS

M. Wells, chair, C. Bustamante, C. Castillo-Chavez, R. Lloyd, R. Nielsen, S. J. Schwager, R. Strawderman

The Department of Biostatistics 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 BTRY 301)
Fall. 4 credits. Lec, T R 10:10–11:25; lab, M or W 1:25–2:15, or 2:30–3:20, or 3:35–4:25. 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.

Spring. 4 credits. Prerequisites: BTRY 301 or BTRY 601. Lec, T R 10:10–11:25; lab times TBA. 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 multifactor 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 302, or equivalent. Lec, T R 10:10–11:25; lab, F 1:25–2:15. 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 400 Biometry Seminar (also STBTRY 400)
Fall and spring. 1 credit. S-U grades only. Prerequisite: BTRY 302, or 409, or 602 or permission of instructor. Sec, R 3:35–4:25. Students attend a weekly seminar, the Biometrics Unit Discussion Series. Can be taken concurrently with BTRY 600 only with permission of instructor. Students can only take this course twice.

BTRY 408 Theory and Probability (also STBTRY 408)
Fall. 4 credits. Prerequisites: MATH 111, 112, 213, 231, or equivalents. Lec, M W F 10:10–11:00, Sec, M 3:35–5:00. An introduction to probability theory, axiomatic foundations; combinatorics and equally likely events; conditional probability and independence, discrete and continuous random variables, their distributions and moments; generating functions; transformations, extensions to problems involving two or more random variables; random samples. Can serve as either one-semester introduction or a foundation for a course in statistical theory. 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, at least one introductory course in statistics. Lec, M W F 10:10–11:00, Sec, M 3:35–5:00. An introduction to classical theory of parametric statistical inference. 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 412 Matrix Computation
Fall. 4 credits. Prerequisite: calculus. Lecs, M W F 9:05–9:55, Sec, M 10:25–11:25, T 10:10–11:00. An introduction to computational linear algebra. The course introduces key notions and algorithms for solving systems of linear equations (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. Lec, T R 11:40–12:55; sec, F 12:20–1:10. 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 682. 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)
Spring. 2–3 credits. Prerequisites or corequisites: BTRY 302 or BTRY 602 and BTRY 409 and permission of instructor. S-U grades optional. W 1:25–2:15. Participation in the Department of Biological Statistics and Computational Biology consulting service: faculty-supervised statistical consulting with research projects from other disciplines. Discussion sessions are held for joint consideration of literature and selected consultations encountered during previous weeks.

BIOLICAL SCIENCES

The program of study in biology is coordinated by the Office of Undergraduate Biology. For course descriptions, see the section on Biological Sciences.

BIOLOGICAL & SOCIETY

The undergraduate major field of study in biology and society is offered through the Department of Science and Technology Studies. For a full description of courses that fulfill field requirements, see the Biology & Society listing under the College of Arts and Sciences in this publication.
BIOMETRY AND STATISTICS 75

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 with 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 with 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 must register with an Independent Study form (available in 140 Roberts Hall).

BTRY 600 Statistics Seminar (also STBTRY 600)
Fall and spring. 1 credit. S-U grades only. Prerequisite or corequisite: BTRY 409 or permission of instructor. Sem 3:35–4:25.

BTRY 601 Statistical Methods I (also STBTRY 601)
Fall and summer. 4 credits. Limited to graduate students; others by permission of the instructor. Lecs, M W F 12:20–1:10; sec, M or T 2:30–4:00 or 7:30–9:00 P.M. or T 10:10–11:40.
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, comparisons among population means, analysis of categorical data, and correlation and regression analysis. Interactive computing is introduced through MINITAB statistical software. Emphasis is on basic principles and criteria for selection of statistical techniques.

BTRY 602 Statistical Methods II (also STBTRY 602)
Spring. 4 credits. Limited to graduate students; others by permission of instructor. Prerequisite: BTRY 601 or equivalent. Lecs, M W F 11:15–12:05; sec, M 1:00–2:45 or 7:30–9:25 P.M. or T 1:00–2:45.
A continuation of BTRY 601. Emphasis is on the use of multiple regression analysis, analysis of variance and related techniques to analyze data in a variety of situations. Topics include an introduction to data collection techniques; least squares estimation; multiple regression; model selection techniques; detection of influential points; goodness-of-fit criteria; principles of experimental design; analysis of variance for a number of designs, including multi-way factorial, nested, and split plot designs; comparing two or more regression lines; and analysis of covariance. Emphasis is on appropriate design of studies prior to data collection, and the appropriate application and interpretation of statistical techniques. For practical applications, computing is done with the MINITAB and SAS statistical packages.

BTRY 603 Statistical Methods III (also STBTRY 603)
Spring. 3 credits. Prerequisite: BTRY 601 and 602 or permission of instructor.
Offered alternate years. Lecs T R 8:40–9:55. Categorical data analysis, including logistic regression, loglinear models, stratified tables, matched pairs analysis, polytomous response and ordinal data. Applications in biomedical and social sciences.

BTRY 604 Statistical Methods IV: Applied Design (also STBTRY 604)
Spring. 4 credits. Prerequisites: BTRY 601 and 602 or permission of instructor.
Offered alternate years. Lecs M W F 12:20–1:10; lab T 2:30–4:25.
Applications of experimental design including such advanced designs as split plots, incomplete blocks, and Latin squares. Use of the computer for both design and analysis is stressed, with emphasis on solutions of real data problems.

BTRY 652 Computationally Intensive Statistical Inference (also STBTRY 652)
Spring. 4 credits. Prerequisites: BTRY 421 and BTRY 409 or equivalent. Offered alternate years. Lecs, M W F 2:30–3:20.
Modern applications in statistics often require intensive computation not handled by "off-the-shelf" software. This course covers topics in statistical computing including numerical optimization and finding zeros (likelihood and related techniques including generalized estimating equations and robust estimation), kernel density estimation, refitting models (randomization and bootstrap tests and confidence intervals), and statistical simulation (random number generation, heuristic search methods, Bayesian estimation, and Monte Carlo Markov Chain methods). Detailed biological examples are discussed. 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)
This course is a discussion group focusing on statistical problems 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)
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 689 Graduate Special Topics in Biometry and Statistics (also STBTRY 689)
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.

BTRY 717 Linear and Generalized Linear Models (also STBTRY 717)
Spring. 3 credits. S-U grades optional. Prerequisites: BTRY 409, BTRY 417, 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 non-normally distributed data. Also covers the use of random effects to accommodate correlation 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 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. 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, evolutionary relationships across species. 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. We pair students/faculty from biology backgrounds with students from math, computer science, and statistics for paper preparation. Students submit the salient questions addressed by the paper, the research methods used and the results obtained. At the end of the presentation, questions should be listed on an overhead slide to initiate discussion in the group.

BTRY 795 Statistical Consulting (also STBTRY 795)
Fall and spring. 2–3 credits. Prerequisites or corequisites: BTRY 602 and BTRY 609 and permission of instructor. S-U grades optional. Lec, W 1:25–2:15.
Participants 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 2 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.

**COMM 101**
An overview of current knowledge about mediated communication, contemporary social issues. 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, J. Marston, T. Russo, and staff.

**COMM 203 Argumentation and Debate**

**COMM 230 Visual Communication**

**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. Conover.

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 272 Principles of Public Relations and Advertising**
Summer. 3 credits. Not open to freshmen. Staff.

**COMM 282 Communication Industry Research**
Fall. 3 credits. Not open to freshmen. T R 2:55-4:10. L. VanBuskirk.

**COMM 284 Sex, Gender, and Communication**
Fall. 3 credits. Not open to freshmen. T R 2:55-4:10. L. VanBuskirk.

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&T S 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 labor strikes 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 Speaking
The study and practice of written and oral communication skills used in formal and informal organizations, including interviews, informative and persuasive speeches, reports, and discussions. Students exercise and enhance the organizational, analytical, and presentational skills needed in particular settings suited to their own business and professional careers.

COMM 303 Speech and Debate Practicum
Fall and spring. 2 credits. Limited to 10–15 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 CEDA (Cross Examination Debate Association) debate, Lincoln Douglas debate, or individual speaking events. The class is divided into four groups according to level of experience; therefore, it may be repeated to a maximum of eight credits.

COMM 345 Human-Computer Interaction Design
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&T S 349)
Commonplace notions of communication and media regularly overlook the role of the material technologies. Yet, how and why we communicate the shapes we design; those technologies shape 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 12:50–1:45, spring: lec, T R 8–9:55; lab, R 12:20–2:15. S. Conroe.
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&T S 352)
Fall. 3 credits. Not open to freshmen. Limited to 24 students. Prerequisite: 1 college-level writing course. Lec, M W 9:05–10:00; lab, W 12:20–2:15. B. Lewenstein.
How to write about science, technology, and medicine for the mass media. Discussion topics include accuracy, simplicity, comprehensiveness, risk communication, and the history and social structure of science. Writing assignments focus on writing news and feature stories for newspapers and magazines, with excursions into newsletters, radio, TV, and other media.

COMM 353 Science Writing Practicum
Spring. 1 credit. Prerequisite: COMM 260, COMM/S&T S 352, ENG 350, or permission of the instructor. Offered 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
Spring. 3 credits. Prerequisites: COMM 282 or equivalent social research course (may be taken concurrently). T R 11:40–12:55. Staff.
This course provides a theoretical and practical overview of the audiences, messages, and evaluation of political and other types of communication campaigns. Emphasis is placed on political campaigns, but principles of campaign planning and evaluation relevant to other kinds of messages are covered. Topics include campaign tactics and audience responses, audience segmentation, message construction, political advertising, agenda-setting, framing and framing in political campaigns, interrelationships between issues, framing of issues versus content of issues, attitude-change, and audience behaviors. Common methods of data collections (focus groups, experiments, surveys, etc.) and analysis of campaign-related data sources are included.

COMM 382 Advanced Communication Research
Fall. 3 credits. Prerequisites: COMM 120, 282, may be restricted to honors students. TBA. Staff.
This course provides an advanced approach to data analysis and methods of data collection in communication research. It is intended for seniors who intend to complete an honors project or other advanced research. Every week we examine one or two research situations in greater detail, analyze specific problems connected to the method used, and discuss strategies for data analysis and presentation. This provides all students who graduate with distinction in research—indeed of their specific thesis topic—with a more in-depth understanding of the methods used in communication research and how they are applied to concrete projects.

COMM 398 Issues in Teaching Communication
Fall and spring. 1 credit. Prerequisite: must be past or current undergraduate teaching assistant for COMM 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. Integration of theory into actual education efforts is challenging for professional educators. Novice teachers are not aware of their common experiences, much less of a theoretical component to education. In discussions of actual teaching experiences, literature reviews, research reports, textbook chapters, curriculum, and evaluation tools, students examine new ideas and practices. The primary goal of the seminar is to enrich and deepen the novice teaching experience.

COMM 405 Community Service Practicum
Fall and spring. 2 credits. May be repeated for credit. Limited to 10–15 Program in Speech and Debate members; permission of instructor required. 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

COMM 418 Communication and Persuasion
Spring. 3 credits. Limited to juniors and seniors only. Prerequisite: COMM 282 or equivalent social science research methods course; and COMM 116 and 120 or introductory psychology or social psychology. T R 10:10–11:40. Staff. Focus is 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. Lectures concurrent with COMM 618; graduate students should enroll in COMM 618.

COMM 420 Public Opinion and Social Processes
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 closer look at what we mean by "measuring" public opinion. Are we talking about merely summing across individual opinions, or are there more subtle dynamics of public opinion that go beyond what individuals in a society think? Based on this more theoretical work, 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 even-numbered years.  
J. Shanahan.  
Students investigate how values, attitudes, social structures, 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 persuade and inform, 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 HDPS or COMM 120 or COMM 116. Lec, M W F 12:20-1:10. Sec 01: T 11:15-12:05; Sec 02: W 1:25-2:15; Sec 03: W 2:30-3:20; Sec 04: R 1:25-2:15. M. Shapiro.  
A survey of knowledge about 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 424 Communication in the Developing Nations**  
Fall. 3 credits. Limited to juniors and seniors. Lec, T 1:25-2:35; lab T 2:35-4:25. R. Colle.  
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. Lectures concurrent with COMM 624; graduate students should enroll in COMM 624.  

**COMM 428 Communication Law**  
Spring. 3 credits. Limited to junior, senior, and graduate students; others by permission of the instructor. Lec, M W F 11:15-12:20. D. Grossman.  
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**  
Fall. 3 credits. T R 10:10-11:25. G. Gay.  
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. J. Walther.  
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**  
Fall. 3 credits. T R 11:40-12:55. J. Hancock.  
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 466 Public Communication of Science and Technology (also S&T 466)**  
Fall. 3 credits. Limited to 15 students. Prerequisite: COMM 352 or 350, or ENGR 350, or permission of instructor. Offered even-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 new 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 on academic basis and determined by the interest of the faculty. Lec. M W 2:55-4:10. G. Gay.  
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 $150.00 charged.  

**COMM 490 Independent Honors Research in Social Science**  
Fall or spring. 1-6 credits. Limited to undergraduates who have met the requirements for the honors program. M 2:55-4:10. D. Schaeufele.  
Students who have successfully completed 382 who have met the requirements for the honors program. TBA. D. Schaeufele.  
Students who have successfully completed 382 will register for no more than 3 credits. Students who have not completed an advanced research methods course may register for up to 6 credit hours.  

**COMM 496 Risk Communication**  
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 of risk communication. Lectures concurrent with COMM 686; graduate students should enroll in COMM 686.  

**COMM 499 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 499 Communication Internship**  
2 credits (sec. 1) or 1 credit (sec. 2). 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 two-day 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 if necessary. 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 intern 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.  

**COMM 499 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 with 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. Attempts to implement this knowledge in a practical application are desirable.  

**COMM 499 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 undergraduates desiring classroom teaching experience. Prerequisite: 3.0 cumulative average (3.2 if teaching assistant for a skill development course) and permission of the faculty member who will supervise the work and assign the grade. Students must register
with an Independent Study form (available in J40 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 with an Independent Study form (available in J40 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 510 Organizational Communication: Theory and Practice
Not offered 2003–2004.]

COMM 540 Impact of Information Technology
Spring. 3 credits. Prerequisite: permission of instructor. Letter grade only. TR 1:25–2:40. G. Gay. 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 442; graduate students should enroll in COMM 638.

COMM 620 Public Opinion and Social Processes
Fall. 3 credits. TR 10:10–11:25. D. Scheufele. The course provides an overview of the theoretical and applied literature related to the concept "public opinion." Students investigate how public opinion is perceived and acted upon by society. Relationships between public opinion, communication, and social psychological variables are examined. Public opinion is studied using current theoretical and practical applications. Analysis and interpretation of public opinion polls and trends in public opinion on specific issues. Lectures concurrent with COMM 420; graduate students should enroll in COMM 620.

COMM 621 Advanced Communication and the Environment
Spring. 3 credits. TR 10:10–11:25. Offered even-numbered years. J. Shanahan. 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 622 Advanced Psychology of Television (and Beyond)
Fall. 3 credits. Prerequisites: graduate student status and permission of instructor. TBA. M. Shapiro. A survey of knowledge about how people mentally process television and other audio-visual 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. R. D. Colle. 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
Fall. 3 credits. Prerequisites: graduate standing or permission of instructor. TR 10:10–11:25. G. Gay. 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 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 645 CMC Graduate Seminar
Spring. 3 credits. Prerequisites: graduate standing or permission of instructor. J. Walther. Graduate-level readings and research supplementing COMM 445. Through close reading and research in communication and technology, and through participation in projects using these technologies, students enhance experimental, 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. TR 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 676 Communication Planning for Social and Behavioral Change

COMM 680 Studies in Communication
Fall. 3 credits. Limited to graduate students in communication; others by permission of instructor. M W 5:40–6:55 and additional meetings TBA. M. Shapiro. Development of, and contemporary issues in, communication theory. Discussion includes the interaction between communication and society, social groupings, and mental processing.

COMM 682 Methods of Communication Research
Spring. 3 credits. Lect. M W F 12:20. D. Scheufele. 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 683 Qualitative Research Methods in Communication
Not offered 2003–2004.]

COMM 686 Risk Communication
Spring. 3 credits. TR 1:25–2:15; lab R 2:30–4:25. C. Scherer. 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. Lectures concurrent with COMM 480; graduate students should enroll in COMM 680.
COMM 691 Seminar: Topics in Communication
Fall and spring. No credit. S-U grades only. Staff.
Some week 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 and peers.

COMM 694 Special Topics in Communication
Fall, spring, or summer. 1-3 credits variable. S-U grades optional. Prerequisite: permission of instructor. Staff. Study of topics in communication not otherwise provided by a department course and determined by the interest of the faculty and students.

[COMM 781 Seminar in Psychology of Communication
Spring. 3 credits. Letter grade. Prerequisite: COMM 680 and 681 or equivalent graduate level theory in psychology or social psychology. Offered odd-numbered years. Not offered 2003-2004. M. Shapiro. Discussion and analysis of selected current issues in the psychology of communication. Students discuss and synthesize current research and theory in the mental processing of communication.]

COMM 794 Seminar in Communication Issues
Fall, spring, or summer. 1-3 credits. Letter grade only. Prerequisite: permission of instructor. Small group study of topical issue(s) 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: appropriate communication graduate course work or permission of instructor. Small group or individual research based on original, empirical, data-based designs regarding topical issues in communication not otherwise examined in a graduate field course.

COMM 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 Master of Science (Communication) students.

COMM 901 Doctoral-Level Dissertation Research
Fall or spring. 1-9 credits. May be repeated for a maximum of 9 credits. S-U grades only. Prerequisites: completion of "A" exam, permission of committee chair. Dissertation research for doctoral 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, 691, 820, 920, 921


All following Crop and Soil Science courses prefixes were previously listed as SCAS.

General Courses

CSS 190 Sustainable Agriculture (also HORT 190)

This course is designed to be an enjoyable introduction to basic food production resources (soils, crops, 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 descriptive climatology. Written assignments are prepared for the web. 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. 1-3 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 begins. Courses offered under this number will be approved by the department 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 with 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. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. 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. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. 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 Bradfield. Next offered spring 2005. 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. Lec, T 3:30-4:30. Staff. Seminar cover current research and selected topics in the crop and soil sciences and related fields.

Crop Science

CSS 311 Grains and Nutriceuticals
Fall. 4 credits. Prerequisite: CSS 260 or BIOLP 241. Lecs, M W F 10:10; lab, M 1:25-4:25. 1 or 2 field trips during lab periods (until 5 P.M. or on weekends). R. L. Obendorf. Globally, six seed crops provide 75 percent of the caloric and protein needs of mankind by direct consumption or indirectly through animal and microbial products. Seed crops for starch, protein, oil, fiber, sugar, nutriceutical, pharmaceutical, and industrial uses are emphasized, including adaptation, growth and development, environmental stress, optimization of yield and quality, and genetic improvement in the context of food systems for improved health. Laboratory uses living plants, extensive crop garden, and computer simulation.
CSS 312 Forage Crops
Spring. 4 credits. Prerequisites: introductory course in crop science or biology or permission of instructor. Lec, T R 10:10-11:15; Lab, M or W 1:25-2:25. Next offered spring 2005. G. W. Fick.
The production and management of crops used for livestock feed are considered in terms of establishment, growth, maintenance, harvesting, and preservation. Forage grasses, 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 Economic Impacts (also INTAG 314)
Fall. 3 credits. Prerequisite: introductory course in crop science or soil science or biology or permission of instructor. Lec, T R 9:25-10:40; E. C. Fernandes.
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. Lec, 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) chemistry of herbicides in relation to effects on plant growth and the environment; and (c) current management strategies that are relevant to both crop and noncrop ecosystems. Hands-on laboratory sessions cover weed identification and ecology, and herbicide selectivity and symptomology.

CSS 317 Seed Science and Technology (also HORT 317)
Fall. 3 credits. Prerequisite: BIOL 241 or equivalent. Lec, 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 415 Principles and Practices of Agroforestry (also NTRES 415 and HORT 415)
Fall. 3 credits. Prerequisites: senior or graduate standing or permission of instructor. Lec, M W F 10:10-11:00. Optional laboratory. CSS (SCAS) 416 (also NTRES 416 and HORT 416). E. Fernandes, K. Mudge, L. Buck, J. Lassoie.
An introduction to modern and traditional agroforestry systems that involves spatial or temporal integration of multiple woody plants (trees and/or shrubs) with annual or perennial crops and/or with livestock. Interactions between woody and nonwoody components of agroforestry systems are considered. Concepts and theories of site and species selection will be presented. Selected topics that will be examined include: agroforestry practice. Sessions include field trips to local practitioners as well as working demonstration farms and forests, case study design and analysis, use of computer-based sources of information, and practical skills with woody plants including identification, propagation, planting, pruning, and measurement.

CSS 416 Principles and Practices of Agroforestry—Laboratory (also NTRES 416 and HORT 416)
Fall. 1 credit. Prerequisite: CSS 415 and/or HORT 415. K. Mudge, E. Fernandes, L. Buck, J. Lassoie.
An integrated set of laboratory and field exercises designed to develop competency in diagnostic and management techniques applied to agroforestry practice. Sessions include field trips to local practitioners as well as working demonstration farms and forests, case study design and analysis, use of computer-based sources of information, and practical skills with woody plants including identification, propagation, planting, pruning, and measurement.

CSS 444 Integrated Pest Management (also ENTOM 444)
Fall. 4 credits. Prerequisites: BIOEE 261, ENTOM 212 or 241, and PL PA 241 or their equivalents or permission of instructor. Lec, M W F 9:05; labs, M 1:25-4:25.
J. E. Losey and A. Ditommaso.
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 lecture and demonstrate pest monitoring techniques and the application of computer technology to management problems.

CSS 445 Mineral Nutrition of Crops and Landscape Plants (also HORT 455)
Spring. 3 credits. Prerequisite: CSS 260 and BIOL 242, or equivalent. Lec, M W F 9:05; lab, R 1:30-4:00. Offered alternate 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 will understand the principles of mineral nutrition in crop plants, and are able to diagnose deficiencies by symptoms and tissue tests and devise organic and conventional nutrient management schemes 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. Lec, 1 hour TBA; lab, W 1:25-4:25, first class meeting R. 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, BIOPL 242 or 341, or permission of instructor. Offered even years. Lec, T R 10:10-11:25. Next offered 2004. 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 Physiology and Biotechnology
Spring. 3 credits. Prerequisite: plant physiology. M W F 11:20-12:00. T. L. Setter.
A study of environmental constraints on crop-plant productivity from an eco-physiological perspective. 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: plant physiology. M W F 12:20-1:00. T. L. Setter.
A study of environmental constraints on crop-plant productivity from an eco-physiological perspective. 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 642 Plant Mineral Nutrition (also BIO PL 642)
Spring. 3 credits. Prerequisite: BIO PL 341 or equivalent. Lec, M W F 10:10-11:00. Offered alternate years. L. V. Kochian, R. M. Welch.
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 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 specifically in a master's program.

**CSS 921 Doctoral-Level Dissertation 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 397)**
Fall. 3 credits. Prerequisite: BIOMI 261 or BIOMI 290 or CSS (SCAS) 260 or permission of instructor. Lecs, M W F 10:10–11:00. W. C. Gihorn. 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 pollutant chemicals, wastewater treatment, and environmental biotechnology.

**CSS 410 Environmental Impact of Agricultural Biotechnology**
Spring. 3 credits. Prerequisite: BIO G 109 or equivalent. Lecs, M W 1:25–2:15; 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. Lecs, 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 (SCAS) 411 or permission of instructor. Lecs, 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 465 Global Positioning System**
Fall and spring. 1 credit. Prerequisite: CSS 411 or CSS 420, or equivalent, or consent of instructor. Lecs, F 9:05–12:05. 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 Sciences**
Fall. 4 credits. Prerequisite: CSS 260 or equivalent. Limited to seniors. Lecs, 1st meeting F 1:25; lab, at least one 4-hour afternoon per week plus additional time as needed. P. Baveye. Capstone experience for seniors, centering on the interdisciplinary analysis of a specific problem (e.g., heavy metal contamination of Cornell orchard in fall 2003), with a number of faculty members serving as technical resources and guidance 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 Sciences II**
Spring. 4 credits. Prerequisite: CSS 485. Limited to seniors. Lecs, TBA; lab, at least one 4-hour afternoon per week plus additional time as needed. P. Baveye. 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 will be 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 2004, heavy metals in Cornell orchard).

**CSS 620 Spatial Modeling and Analysis**
Spring. 3 credits. Prerequisites: CSS (SCAS) 420, CSS (SCAS) 461, or permission of instructor. Lecs, 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. Lecs, M W F 12:20–1:15; lab, F 12:20–1:25, 1:25–2:30, 2:30–4:25. 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-Airshome System (also EAS 675)**
Spring. 3 credits. Prerequisite: CSS (SCAS) 483 or equivalent. Offered alternate years. Lecs, T R 8:40–9:55. S. J. Riva. 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 formulation 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 covered 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. Graduated 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. Graduated faculty. Limited to students in a Ph.D. program only before the "A" exam has been passed.

**CSS 961 Doctoral-Level Dissertation Research in Environmental Information Science**
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduated faculty. Limited to students admitted to candidacy after the "A" exam has been passed.
CSS 362 Soil Morphology
Fall. 1 credit. Undergraduates only. Recommended for sophomores and juniors. All-day field trip required. R 1:25-4:25. Staff. The principles for field identification of soil properties, profiles, and landscapes are presented. Soil pits are examined, described, classified, and interpreted in the field.

CSS 363 Soil Genesis, Classification, and Survey
Fall. 4 credits. Prerequisite: CSS (SCAS) 260. S-U grades optional. Lecs, T R 11:40-12:55, lab, R 2:30-4:30. Offered alternate years. H. M. van Es. Introduces students to the principles of soil and water interaction and to the effects of human intervention on these processes. Aspects of soil and water management, including hydrology, 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 365 Environmental Chemistry: Soil, Air, and Water
Spring. 3 credits. Prerequisites: CHEM 207-208. Lecs, M W F 10:10-11:00. M. B. McBride. 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 (SCAS) 260 or permission of instructor. Lecs, T R 8:40-9:55. S. Riha. 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 where 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. 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. 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 herb nutrient management planning. AN SC 411 required. Lec, T R 11:15 and lab T 1:25-4:25 for both modules, with work on case studies outside of lab. D. G. Fox and Q. M. Ketterings. This course provides students with an understanding of the concepts underlying whole farm nutrient management planning to improve profitability 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 plan 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 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 learning the knowledge and skills necessary to integrate crop production and herd feeding management for reducing nutrient imports on farms.

CSS 466 Soil Ecology (also HORT 466)
Spring. 4 credits, with laboratory. Prerequisite: CSS (SCAS) 260 or biology or 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. 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 serves as the basis for comparing soil community structure and function across a variety of ecosystems. The class investigates the consequences of anthropogenic activities from local soil management to global change on soil biodiversity and the health of ecosystems. Field trips around Ithaca are arranged. Offered alternate years.

CSS 471 Properties and Appraisal of Soils of the Tropics
Spring. 3 credits. Prerequisites: CSS (SCAS) 260 or equivalent. S-U grades optional. No audits accepted. Lecs, T R 12:20; disc, W 1:25-3:25. Offered alternate years. A. VanWambeke. The course examines the conditions in which soils form, and considers ecological, geological, and vegetational factors that produce the diversity that exists among them. The major kinds of soils are recognized, their management described, and methods to alleviate the constraints to crop production and soil conservation in the environment are examined. Topics include the identification of soils, and their functions in sustaining traditional farming systems and advanced technological packages. The course pursues these themes by reviewing the most recent sources of information generated in tropical countries and published in Latin-American, French, and English journals. The last part of the course gives special attention to soil-affecting factors, i.e., cultivation, cropping systems, and the characteristics of acid-sulfate soils. Lectures include slides of soils, landscapes, and cropping systems. The course is available on a compact disk in Mann Library.

CSS 472 Nutrient Management and Research in Agro-Ecosystems
Spring. 4 credits. Prerequisite: CSS 260 or permission of instructor. Lecs, T R 8:40-9:55, lab, R 1:25-4:25. J. Lehmans. 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 where 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. Lee and L. R. During the first 6 weeks of class, the Thursday meetings may run to 5:30 because of field trips to R: 2:30-5:30. Not offered fall 2003. 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-microbe relations, plant-herbivore interactions, biological pest control, and evolutionary processes in agriculture. Case
I studies from both the tropics and the temperate zone are used to illustrate systems. Energy budgets, soil heat flow, water movement, and unsaturated soils, evapotranspiration, 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. Offered alternate years.
TBA. 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 (SCAS) 361 or permission of instructor. M W F 11:15-12:05. Staff.

CSS 666 Applied Plant/Microbe Interactions
Fall. 4 credits. Prerequisite: CSS 366 or equivalent, or permission of instructor. Lec. M T W Th 1:25-2:25, lab. F 1:25-4:25. Offered alternate years. J. E. Thies.
Discussions on current research into applied plant/microbe interactions including: molecular signaling between plants and microbes involved in symbiotic, associative, or pathogenic interactions; and new methodologies for understanding the role(s) soil microorganisms play in plant production. In the lab, students undertake an individual research project matched to their interests in which they employ current methods. Project results are presented as a final poster.

CSS 667 Advanced Soil Physics
Spring. 3 credits. Prerequisites: one year of college physics and CSS (SCAS) 483 or permission of instructor. S-U grades optional. Offered alternate years. M W F 11:15-12:05. P. C. Baveye.
A detailed study of measurement processes and of the hydrostatics of aqueous solutions in soils and porous media, with emphasis on fundamental principles. Examination of the molecular aspects of water-solid interactions, including shrink-swell phenomena and the properties of absorbed water. Analysis of equilibrium water adsorption from thermodynamical and mechanistic (molecular) standpoint. Also covered are mechanical and thermodynamical analysis of the equilibrium status of aqueous solutions in deformable soils. Formal lectures are complemented by tutorial sessions.

CSS 669 Organic Matter—Soils, Sediments, and Waters
Spring. 3 credits. Prerequisites: CSS (SCAS) 260 or 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: 1 year of physical chemistry or permission of instructor. Lec. 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. 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
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 which concludes 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 NTRES 696 and INTAG 696)
A variety of speakers present seminars on organic inputs in the tropics and agroforestry. Students are required to prepare 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.

EARTH AND ATMOSPHERIC SCIENCES

EAS 101 Introductory Geological Sciences
Spring. 3 credits. 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 fuel 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. Lec. 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; precedents for ongoing global change; and dinosaurs, mass extinctions, and human ancestry. Includes laboratories on reconstructing geological history and mapping current geography and fossil-collecting field trips.

EAS 107 How the Earth Works
Spring or summer. 1 credit. M 12:20-1:10.
J. L. Cisne.
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. L. Losh.
Provides an introduction to physical geology and earth systems science and explores the scientific basis for informed decision making regarding many timely environmental issues including global warming; water pollution and use; geologic hazards such as floods, earthquakes, and volcanoes; fossil fuel distribution and use; and land use.

EAS 109 Dinosaurs
Fall. 1 credit. Lec. 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.
J. M. Bird.
Acquaints the nonscientist with Earth, its major features, how the Earth has evolved, Earth system science, and building 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 fuel-minerals cycle.

**EAS 122 Earthquake! (also ENGR 122)**
Spring. 3 credits. Lecs T R 1:25–2:40.
L. D. Brown.
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 131 Basic Principles of Meteorology**
Fall. 3 credits. Lecs, 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 circulation; air masses, fronts, and cyclones; and 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. S-U grades optional. T W or R 1:25–4:25 or M W 7:00–9:30 P.M. M. W. Wysocki.
Laboratory course covering topics presented in EAS 131.

**EAS 150 Introduction to Fortran Programming**
Fall. 3 credits. Lecs, T R 12:20–1:10; lab T 1:25.
M. W. Wysocki.
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 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: C. H. Greene, W. M. White; summer: B. C. Monger.
A survey of the physics, chemistry, biology, and geology of the oceans for both science and non-science majors. Topics include: seawater spreading and plate tectonics, marine sedimentation, chemistry of seawater, ocean currents and circulation, the oceans and climate change, ocean ecology, and coastal processes.

**EAS 155 The Sea: An Introduction to Oceanography, Laboratory (also BIOEE 155)**
Spring. 1 credit. Prerequisite: concurrent enrollment in EAS/BIOEE 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.
Laboratory course covering topics presented in EAS/BIOEE 154.

**EAS 200 Art, Archaeology, and Analysis (also ENGRD 198, MS&E 285)**
Spring. 3 credits. Lecs M W F 11:15–12:05.
R. W. Kay.
An interdepartmental 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 211)**
Fall. 3 credits. Prerequisites: PHYS 112 or 207. Lecs T R 10:10–11:00, lab R 2:00–4:25 or W 7:30–9:30. L. M. Cathles.
This course covers: formation of the solar system; accretion of the Earth; the rock cycle: radioactive isotopes and the geologic 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), and oil and mineral resources.

**EAS 210 Introduction to Field Methods in Geological Sciences**
1 lab, Saturday field trips. 3 credits. Prerequisite: EAS 101 (or 201) or permission of instructor. R. Allmendinger.
Considers the 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 the Adirondack Mountains.

**EAS 213 Marine and Coastal Geology**
Summer. 4 credits. Prerequisite: Staff.
A special two-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island near Portsmouth, New Hampshire. Estimated cost for 2003 (including tuition, room, board, and all required field trips) is $12,200. For more details and an application, contact the SML office, G14 Stimson Hall, or visit www.sml.cornell.edu.

**EAS 250 Meteorological Observations and Instruments**
Spring. 3 credits. Prerequisite: EAS 131.
Lecs, M W 12:20; lab, R 1:25.
M. W. Wysocki.
This course covers methods and principles of meteorological measurements and observations, weather, atmosphere, and remote systems. Also covered are: instrument sitting, mounting, and protection; instrument response characteristics, calibration, and standardization; and recorders and data logging systems. Laboratory exercises are in observation and data analysis. The course is intended to serve as preparation for Observers Examination. Lab fee $50.

**EAS 260 Soil Science (also CSS 260)**
Fall. 4 credits. S-U grades optional. Lecs, M W F 9:05; lab, M T or W 1:25. S. J. Riha.
Designed for students interested in a comprehensive introduction to soil science from both an environmental and plant management perspective, this course is divided into three units. A unit on soil information introduces students to soil characteristics, testing, mapping, classification, GIS, and land evaluation. A soil management unit addresses fertility, pest management, water, and microclimate, as well as erosion, conservation, pollution, and soil health. The unit on the soil as an ecosystem considers topics such as biodiversity, soils as sinks and sources of greenhouse gases, and the impact of soils on land use. Labs are initially field-oriented with an emphasis on learning practical skills needed to evaluate and manage soils. Subsequent labs focus on accessing, interpreting, and applying soil information.

**EAS 268 Climate and Global Warming**
Spring. 3 credits. Prerequisite: basic college math; S-U grades optional. Lecs. M W F 9:05. A. T. DeGaetano.
Students from a range of disciplines become familiarized with some 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. Atmospheric 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 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**
Spring. 4 credits. Prerequisites: 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: 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. 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 8:00–9:55, lab, M T 2:00–4:25.
B. L. Ikels.
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
examination of landforms of the Finger Lakes area and computer analysis of satellite images and Digital Elevation Models of examples from around the globe. Two Saturday field trips.

**EAS 321 Introduction to Biogeochemical Cycles (also NTRES 321)**

Fall. 4 credits. Prerequisites: CHEM 207. MATH 112, plus a course in biology and/or geology. Lecs T R 12:20-1:10, disc W or R 2:00-4:25. L. A. Derry, 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, bio-active metals, the use of isotopic tracers, and carbon models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

**EAS 326 Structural Geology**

Spring. 4 credits. Prerequisite: MATH 112, EAS 101 or 201, 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, folding, and structural families.

**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 F 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. 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: 1 year of calculus and 1 semester of physics. M W F 10:10-11:00. M. W. Wysocki. Introduction to the thermodynamics and hydrostatics of the atmosphere and to the methods of description and quantitative analysis used in meteorology. Topics 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: 1 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 350 Dynamics of Marine Ecosystems**

Fall. 3 credits. Prerequisites: one year of calculus and a semester of oceanography (i.e., EAS 154), or instructor's permission. Lecs, T R 1:25-2:40. C. H. Greene. 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; glacial cycles of ocean production; climate variability and the role of the ocean in global climate change; the El Niño/Southern Oscillation; ecosystem dynamics of the open ocean and coastal environments.

**EAS 352 Synoptic Meteorology**

Spring. 3 credits. Prerequisite: EAS 341 and EAS 342. Lecs, T R 9:05, lab, M 1:25. M. W. Wysocki. Weather map analysis 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 midlatitude synoptic scale weather systems, such as cyclones, anticyclones, jet streams, fronts, and waves.

**EAS 355 Mineralogy**

Fall. 4 credits. Prerequisite: EAS 101 or 201 and CHEM 207 or permission of instructor. Lecs M W F 11:15-12:05, lab T 2:00-4:25. S. Mahlburg Kay. Examination of minerals by hand-specimen 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**


**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 geologic history from stratigraphic evidence; and organization of strata in stratigraphic sequences.

**EAS 388 Geophysics and Geotectonics**

Spring. 4 credits. Prerequisites: MATH 192 (or 112) and PHY 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 417 Field Mapping in Argentina**

Summer. 3 credits. Prerequisites: EAS 210 and 326. 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 Precordillera (San Juan River section), intensely deformed Precambrian metamorphic rocks of the Pampas Ranges (Pampa Geologic), and shallow-level silicic intrusives (Cerro Blancou-Ullun).

**EAS 444 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 geological investigations. Covers survey design, acquisition, analysis, processing, and interpretation in both 2-D and 3-D. Includes discussion of related techniques such as seismic refraction analysis, tomographic inversion, vertical seismic profiling, shear wave exploration, and ground penetrating radar. Lab is keyed to state-of-the-art seismic processing, modeling, and interpretation software from LandMark.

**EAS 435 Statistical Methods in Meteorology and Climatology**

Fall. 3 credits. Prerequisite: 1 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 meteorological data including probability distributions and correlation 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 437 Geophysical Field Methods (also ARKEO 437)**

Fall. 3 credits. Prerequisites: PHY 213 or 208, or permission of instructor. 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 447 Physical Meteorology**

Fall. 3 credits. Prerequisite: 1 year each of calculus and physics. M W F 9:05-9:55. Offered alternate years. 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
Fall. 3 credits. Prerequisites: EAS 341 and 342. Lecs, T R 9:05; lab, M 1:25-3:20. S. J. Colucci. Structure and dynamics of mid-latitude weather systems, such as cyclones, anticyclones, and waves, with consideration of processes that contribute to temperature changes and precipitation. Laboratory sessions involve real-time weather forecasting and the computer application of a numerical model of the atmosphere to study selected mid-latitude weather events.

EAS 452 Advanced Petrology
Fall. 3 credits. Prerequisite: EAS 356. Offered alternate years. 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 453 Geochemistry
Fall. 4 credits. Prerequisites: CHEM 207 and MATH 192 or equivalent. Recommended: EAS 356. Lecs T R 8:40-9:55, lab TDA. Offered alternate years. W. M. White. The Earth from a chemical perspective. Covers: the formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and solar system; trace-element geochemistry; isotope geochemistry; geochemical thermodynamics and kinetics; chemical evolution of the crust, mantle, and core; weathering and the chemistry of natural waters; chemistry of rivers and the oceans; hydrothermal systems; and ore deposition.

EAS 454 Mesoscale Meteorology
Spring. 3 credits. Prerequisites: EAS 341 and 342 or permission of instructor. T R 11:40-12:55. Offered alternate years. S. J. Colucci. 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 455 Volcanology

EAS 456 Marine Ecology (also BIOEE 462)
Spring. 3 credits. Limited to 75 students. Prerequisite: BIOEE 261. Offered alternate years. Not offered 2003-2004. C. D. Harrell and C. H. Greene. Lectures and discussion focus on current research in both 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, and ecosystem perspectives and evolutionary biology. Examples are drawn from all types of marine habitats, including polar seas, temperate coastal waters, and tropical coral reefs.

EAS 457 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 multi-scale weather systems. Students participate in weekly forecast discussions, write daily forecasts which include a synoptic discussion, quantitative precipitation prediction, and severe weather outlook for the forecast region, and lead class discussion on assigned readings.

EAS 458 Sedimentary Basins: Tectonics and Mechanisms
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. Not offered 2003-2004. 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 459 Advanced Stratigraphy
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. 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 beyond deposits 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 460 Environmental Biophysics (also CSS 483)
Spring. 3 credits. Prerequisite: EAS/CSS 260 or equivalent, or permission of instructor. M W F 11:15. Offered alternate years. Not offered 2003-2004. 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, 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 problem sets.

EAS 461 Intro to Radar Remote Sensing (also ECE 487)
Fall. 3 credits. Prerequisite: PHYS 208 or 213 or equivalent, or permission of instructor. Lees, M W F 9:05-9:55. 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 radars developed for weather, mapping, and other 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
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backgrounds will be able to take the course. Emphasis placed on radar applications in geophysics, meteorology and atmospheric sciences, and astronomy and space sciences. Radar remote sensing of the Earth from spacecraft receives special attention.

EAS 491-492 Undergraduate Research Fall, spring. 1 to 4 credits. Staff. Introduction to the techniques and philosophy of research in the earth 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 494 Special Topics in Atmospheric Science (undergraduate level) Fall or spring. 1-3 credits. Staff. The department teaches "trial" courses under this number. Offerings vary by semester, and are advertised by the department before the semester starts. The same course is not offered more than twice.

EAS 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. Students must register with an Independent Study Form. Staff. The student assists in teaching an EAS course appropriate to his/her previous training. The student participates in 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 for 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 geohydrologic analysis 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 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 325 and permission of instructor. Offered alternate years. Not offered 2003-2004. 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 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, or strike-slip provinces. Covers techniques of balanced cross sections.

EAS 629 Geology of Orogenic Belts Spring. 3 credits. Prerequisite: permission of instructor. J. M. Bird. A seminar course in which students study specific geologic topics of an orogenic belt selected for study during the term.

EAS 634 Advanced Geophysics I: Fractals and Chaos in Geology and Geophysics Fall. 3 credits. Prerequisite: EAS 388 or permission of instructor. Not offered 2003-2004. Course covers: definitions of fractal sets and statistical fractals, scale invariance, self-affine fractals, multifractals; applications to fragmentation, seismicity and tectonics, petroleum distribution and reserves, ore grade and tonnage, drainage networks and landforms, and floods and droughts. Definitions of self-organized criticality, renormalization groups, diffusion limited aggregation and percolation clusters, wavelet transforms, applications to mantle convection, the Earth's dynamic, and distributed seismicity.


EAS 641 Analysis of Biogeochemical Systems Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years. Not offered 2003-2004. L. A. Derry. Covers dynamics of biogeochemical systems; kinetic treatment of biogeochemical cycles; box models, residence time, response time, analytical and numerical solutions of model systems; Eigen-analysis of linear systems; feedback and nonlinear cases, problems of uncertainties in natural systems; modeling software such as Stella II and Matlab; and applications to current research of participants or from recent literature.

EAS 651 Atmospheric Physics (also ASTRO 651) Fall. 3 credits. Prerequisites: a good background in undergraduate calculus and physics is required. Offered alternate years. Not offered 2003-2004. K. H. Cook, P. J. Gierasch, S. J. Colucci. A survey of the fundamental physical processes in atmospheres. Topics include thermodynamics of atmospheric gases, most 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 Sally.

EAS 652 Advanced Atmospheric Dynamics (also ASTRO 652) Spring. 3 credits. Prerequisites: EAS 341 and 342 or permission of instructor. Offered alternate years. Not offered 2003-2004. S. J. Colucci and P. J. Gierasch. Course covers quasigeostrophic theory, atmospheric waves, hydrodynamic instability, 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 656 Isotope Geochemistry Spring. 3 credits. Open to undergraduates. Prerequisite: EAS 455 or permission of instructor. Offered alternate years. Not offered 2003-2004. 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 3He and 32Cl. 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 666 Applied Multivariate Statistics Spring. Prerequisites: multivariable calculus, matrix algebra, two previous courses in statistics. Offered alternate years. Not offered 2003-2004. T R 10:10-11:25. D. S. Wilks. Statistical techniques for multivariable data. Topics include multivariate exploratory data analysis, the multivariate normal distribution, parametric and non-parametric inferences 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 767 Modeling the Soil-Plant-Air System (also CSS 675)
Spring. 3 credits. Prerequisite: EAS/CSS 463 or equivalent. T R 8:40-9:55. Offered alternate years. 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 682 Special Topics in Atmospheric Science
Fall or spring. 1–6 credits. S-U grades. 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 685 Computer Methods in Geologic Sciences
Fall, spring. 3 credits. L. Brown and B. L. Isacks.
Independent research projects using modern computer resources in the Department of Earth and Atmospheric Sciences. Possibilities include: image and seismic processing, seismic and geomechanical modeling, GIS, use of interpretation 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. Lyons.

EAS 722 Advanced Topics in Structural Geology
R. W. Allmendinger.

EAS 731 Plate Tectonics and Geology
J. M. Bird.

EAS 751 Petrology and Geochemistry
R. W. Kay.

EAS 755 Advanced Topics in Petrology and Tectonics
J. M. Bird.

EAS 757 Current Research in Petrology
S. Mahlung 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. Cisne.

EAS 775 Advanced Topics in Oceanography
Spring. C. H. Greene.

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 Seminar
L. D. Brown.

EAS 793 Andes-Himalaya Seminar

EAS 795 Low Temperature Geochemistry
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
L. M. Cathles and T. S. Steenhuis.

EAS 850 Master's-Level Thesis Research in Atmospheric Science
Fall or spring. Credit by arrangement. S-U grades optional. 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 only before the "A" exam has been passed.

EAS 851 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.

EDUCATION

EDUC 100 Multiculturalism in Education and Society
Fall or spring. 3 credits. S-U option available. Prerequisite: introductory psychology. W 2:00-4:25 plus time TBA. Not offered 2003–2004. Staff.

EDUC 115 Introductory College Mathematics
Spring. 4 credits. M W F 11:15 or 12:20. S. Piliero.

EDUC 120 Education for Empowerment

EDUC 121 Developing Critical Thinking Abilities
Spring. 3 credits. W 8:00 or 9:05. S. K. Kroma.

EDUC 151 Engaging Diversity: Multicultural Issues in Education and Society
Fall or spring. 3 credits. S-U grades optional. Lec., T R 1:25–2:40. 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 210 Psychology of Learning and Memory
Fall. 3 credits. Prerequisite: introductory psychology. W 2:00–4:25 plus times TBA. Not offered 2003–2004. Staff.

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 times TBA. Not offered 2003–2004. Staff.

"English Only" official language policy? Should Kwanza be celebrated as a public holiday? These are some of the many questions that challenge the notion of "cultural unity" one expressed as the "melting pot." In this course students develop writing skills as they explore discourse on the forces responsible for our cultural diversity and the changing perspectives on our "cultural unity." Through writing activities, students learn to critically examine the historical, political, and legal contexts of this diversity and define their own views on the competing public positions that multicultural education issues arouse.
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
Fall and spring. 3 or 4 credits. Limited to 25 students. S-U grades optional. T 2:30-4:25 A. Watt

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 a fourth credit, students agree to provide additional service through CLASP.

EDUC 240 The Art of Teaching
Fall and spring. 3 credits. Fall: M 12:20-4:15, F 12:20-2:15 or 2:30-4:25; Spring: M 8:00-9:55 or 12:20-2:15 or T 2:30-4:25 or W 12:20-2:15 or 2:30-4:25. Staff

This course is designed for all students interested in finding out more about teaching. Students engage in field experiences to find out what teaching involves. Possible field experiences range from preschool to adult education, from traditional school subject matters to recreational and vocational areas, and from school-based to nonformal situations. Class work builds on those experiences and provides skills and concepts to make the field experiences more profitable.

EDUC 317 Psychology of Adolescence
Spring. 3 credits. Prerequisite: introductory psychology. S-U grades optional. T R 11:15-12:05; F morning section TBA. 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 adolescence, 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 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. Staff

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 in schools. Content includes classroom and youth leadership in secondary agricultural education programs. Participants are required to participate in field experiences at arranged times.

EDUC 335 Youth Organizations
Spring. 3 credits. T R 10:10-11:25; lab TBA. Staff

Visionary, creative, and competent leaders are essential for youth organizations. Class participants learn how to facilitate both youth and adult volunteer leadership development. They examine factors affecting membership, purposes, design, operation, and administration of youth organizations. The course provides students with in-depth learning-by-doing experience of how youth organizations function. Field experience with a recognized youth organization is required.

EDUC 380 Independent Honors Research in Social Science
Fall or spring. 3 credits. Limited to students who have met requirements for the honors program. S-U grades optional. A maximum of 6 credits may be earned in the honors program. Staff

EDUC 401 Our Physical Environment
Fall. 3 credits. Prerequisite: permission of instructor. Charge for laboratory supplies, approximately $7. T 1:25-4:25. V. N. Rockcastle

A practical, relatively nonmathematical study of some basic relationships and physical interactions in the environment, with emphasis on physics and earth science. Attention is paid to analysis for understanding and techniques for teaching. An individual research project is included. Useful for teachers, environmental educators, and those for whom physical science seems difficult or uninviting.

EDUC 404 Learning and Teaching I
Fall 4 credits. Prerequisite: admission to Cornell Teacher Education Program, or permission of instructor. Letter grade. Lee, M W 7:30-8:45 p.m.; lab, 4 hours fieldwork TBA. Staff

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 examining key disciplinary topics, which requires rethinking disciplinary knowledge, assessment of learning, and motivation. Required fieldwork (4 hours weekly) focuses on learners' understandings and classroom structures.

EDUC 405 Learning and Teaching in Agriculture, Mathematics, and Science
Spring. 4 credits. Prerequisite: EDUC 404 or permission of instructor. Letter grade. Lee, M W 7:30-8:45 p.m.; lab, 4 hours fieldwork TBA. Staff

Students analyze the art and science of teaching agriculture, mathematics, and 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. There are 40 hours of field-work required.

EDUC 411 Educational Psychology
Fall. 3 credits. Prerequisite: PSYCH 101 or permission of instructor. S-U grades optional. Lee, T R 11:15-12:05; disc, F TBA. D. E. Schrader

This course applies psychological concepts to educational settings with a focus on understanding the interaction between people, context, and knowledge in school and other learning environments. It examines education as a social, moral, and interpersonal enterprise that respects differences between individuals. This course is designed to foster effective teaching and learning across the life span, but has a focus on secondary education.

EDUC 413 Psychology of Human Interaction

Designed to develop skills for, and understanding of, effective interpersonal communication and interaction. Appropriate for students in the helping professions, education, and areas involving management of human resources.

EDUC 420 Field Experience
Fall or spring. 1–4 credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade. Staff

Students may engage in planned, supervised, professional, or professional practice in an educational enterprise. Each student prepares a plan of action including rationale, purposes, and procedures and arranges with a faculty member to supervise and evaluate their field experience.

EDUC 441 Language, Literacy, and Schooling
Spring. 3 or 4 credits. M W 2:55-4:10; lab, TBA. S. Kromu

This course is a foundation for literacy activities in secondary education. It examines current research, policy, and practice relating to the acquisition of first and second languages, the dynamics of literacy in school contexts, and the development of academic language proficiency. For the fourth credit hour, students spend two out-of-class hours a week on individual project activities.

EDUC 445 Curriculum Design Workshop
Summer. 3 credits. Staff

A general practical approach to course planning. Readings, group discussions, workshops, and individual conferences centering on each student's project. This project consists of designing a course in a subject area for an age level and an institutional setting of the student's choosing.

EDUC 448 Instruction for Students with Disabilities
Summer. 3 credits. Staff

This course provides preservice middle and secondary school teachers a comprehensive overview of disability law, functional limitations caused by disabling conditions, and classroom strategies to provide academic accommodations/adjustments to meet the
EDUC 450 Education Technology
Staff.
The use of intelligent tools changes how and what teachers teach. This course addresses applications and implications of technology in the educational setting. Students work with a variety of educational technologies including distance and distributed learning and investigate how technology can be used to facilitate the teaching of disciplinary knowledge and manage student data.

EDUC 451 Multicultural Issues in Education
This course explores issues pertaining to teaching and learning in multicultural classrooms in American schools. It examines events that have shaped contemporary American society, the educational policies and practices that affect cultural diversity that have emerged, and the teacher's role in dealing with cross-cultural issues in the classroom.

EDUC 452 Multicultural Issues in Secondary Education
Fall. 1 credit. Prerequisites: EDUC 451 and permission of instructor. Letter grade. S. K. Kroma.
Students spend two out-of-class hours a week in a classroom setting in the Ithaca school community and write a project on culturally responsive teaching based on their experience.

EDUC 459 Education in Africa and the Diaspora (also AS&RC 459)
Fall. 3 credits (4 in CA&S). T 10:10-12:35. 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 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 instructing in Nigeria and science education in Nigeria, Ujamaa and education for self-reliance in Tanzania, television as a medium of instruction and technological innovation in Côte d'Ivoire, classroom action research in Lesotho, and higher education and distance learning in South Africa.

EDUC 463 Policies, Practices, and Critical Issues of Distance Learning in Developing Countries
Spring. 3 credits optional. T 2:00-4:25. N. Assié-Lumumba.
Distance learning is being 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 471 Social and Political Context of American Education
Investigation of goals, roles, and outcomes of schooling in American society and the policy environment in which schools operate. We analyze the behavior and impact of educational organizations (at local, state, and national levels) as they attempt to address societal problems and interpret and respond to changes in policy. The course includes current, historical, urban, and rural issues and problems.

EDUC 473 Philosophies of Education
This course provides historical and conceptual frameworks for students to develop theoretical perspectives on education and to analyze and critique arguments in contemporary educational debates. Focusing on the formal education system and reform movements in the United States, this course addresses moral, social, and political philosophies as they relate to educational decision-making practice.

EDUC 477 Law and Educational Policy
A study of recent federal court decisions concerning education. Emphasis is on examining legal issues against a background of related educational issues and in terms of the consequences for legal decisions for the development and operation of educational institutions.

EDUC 480 Global Seminar: Environment and Sustainable Food Systems (also ALS 480 and INTAQ 480)
Spring. 1-3 credits. Prerequisite: juniors, seniors, and graduate students. Letter grade. Lec, R 8:00-9:55 a.m.; lab 3:35-4:25, one additional hour unscheduled. J. Lassie, L. Buck, D. Miller.
For description, see ALS 480.

EDUC 483 Comparative Studies in Adult Education
Focuses on the variety 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 adult-education 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 494 Special Topics in Education
Fall or spring. 4 credits maximum. S-U grades optional. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department before the semester starts. Courses offered under this number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.

EDUC 495 Senior Seminar
Spring. 2 credits. Education majors or permission of instructors. S-U only. TBA. Undergraduate coordinator for the department. Not offered 2003-2004.
This seminar focuses in depth on two or three significant educational issues, which may vary from year-to-year depending on the interests and background of students and faculty. The seminar attempts to help students relate the knowledge gained in their particular concentrations to a set of broad issues in education. While education faculty is involved in selecting the issues and providing guidance for the seminar, students are expected to provide the initiative and leadership in the classroom.

EDUC 497 Individual Study In Education
Fall or spring. 1-3 credits. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.
A student may, with approval of a faculty adviser, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of educational interest.

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 with an Independent Study form (available in 140 Roberts Hall). Staff.
Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and to 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. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with GPAs of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.
Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.
EDUC 502 Education and Development in Africa (also AS&RC 502)
Spring. 3 credits (4 in CASS). S-U grades optional. Discussion TBA. Staff.
This course introduces the students to the theory and practice of education in Africa.

EDUC 503 Professional Seminar in Education
Fall, spring, or summer. 1–4 credits (1 credit each seminar). S-U grades optional. Discussion TBA. Staff.
This course is designed to develop the students' professional portfolio.

EDUC 523 Food and Fiber Across the Curriculum
Summer. 0–3 credits. S-U grades optional. Discussion TBA. Staff.
This course examines the importance of food and fiber systems in various cultures.

EDUC 549 Effective College Teaching:
Fall and spring. 2 credits. S-U grades optional. Staff.
This course is designed to help participants become more effective college teachers.

EDUC 578 Further Training for International Teaching Assistants
Fall, spring, summer. 1–6 credits. S-U grades optional. S. C. Piliero, A. Solomon, and D. J. Trumbull.
This course is designed to provide further training for international teaching assistants.

EDUC 602 Teaching Agriculture, Science/Mathematics: Methods, Materials, Practice
Fall or spring. 9 credits. Prerequisite: course in educational psychology. S-U grades optional. M T W R F 9:00–3:00. Staff.
This course is designed to help participants become more effective college teachers.

EDUC 609 Methods for Interpretive Research
Spring. 3 credits. Prerequisite: course in research methods or permission of instructor. T R 2:55–4:10. D. J. Trumbull.
This course is designed to help participants become more effective college teachers.

EDUC 611 Educational Psychology
This course is designed to help participants become more effective college teachers.

EDUC 614 Gender, Context, and Epistemological Development (also FGSS 625)
This course is designed to help participants become more effective college teachers.

EDUC 615 Self and Interpersonal Development and Education (also FGSS 625)
This course is designed to help participants become more effective college teachers.

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.
This course is designed to help participants become more effective college teachers.

EDUC 623 Secondary Agriculture, Science, and Mathematics Teaching Practicum
Fall or spring. 6 credits. Prerequisite: permission of instructor. S-U grades optional. S. C. Piliero, A. Solomon, and D. J. Trumbull.
This course is designed to help participants become more effective college teachers.

EDUC 632 Communication and Intercultural Competence
This course is designed to help participants become more effective college teachers.

EDUC 633 Further Training in the Teaching of Science/Mathematics
This course is designed to help participants become more effective college teachers.

EDUC 634 Teaching and Learning: Theory and Practice
This course is designed to help participants become more effective college teachers.

EDUC 635 Community and School Mathematics/Science: Theory and Practice
This course is designed to help participants become more effective college teachers.

EDUC 636 Theories of Science Learning: Theory and Practice
This course is designed to help participants become more effective college teachers.

EDUC 637 Perspectives on Mathematics Teaching and Learning
This course is designed to help participants become more effective college teachers.

EDUC 638 Science and Mathematics: Theory and Practice
This course is designed to help participants become more effective college teachers.
[EDUC 621 Work-Experience Coordinator Certification Course I
Summer. 3 credits. S-U grades optional. Not offered 2003-2004. Staff. The first of a two-course sequence designed to develop the competencies needed for certification as a coordinator of diversified cooperative work experience programs. The course focuses on the history and philosophy, types, operation, evaluation of work experience programs including articulation with JPTA and VESID. Field interviews are required. A prerequisite for Course II, EDUC 622.]

[EDUC 622 Work-Experience Coordinator Certification Course II
Summer. 3 credits. Prerequisite: EDUC 621 Work-Experience Certification Course I. Not offered 2003-2004. Staff. The second course for certification as a diversified cooperative 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 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 agricultural, extension, and adult education. A comprehensive and informal instruction is 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
Spring. 3 credits. S-U grades optional. Lec, R 2:00-5:00. W. C. Keeler. 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
Fall. 2 credits. Prerequisite: open to undergraduates with permission of instructor. S-U grades optional. T 12:20-2:15. Not offered 2003-2004. Staff. 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 on curriculum and the basic elements of any curriculum are discussed.

EDUC 651 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, learning 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
Spring. 3 credits. S-U grades optional. Lec, M 1:55-4:25. J. W. Sipple. For individuals interested in the role of schools in society and in organizational behavior and public policy. This seminar investigates the sociological functions of schooling, including the stability of school organization given the long history of policy initiatives directed at schools. The focus is American K-12 public education, though issues of pre-K, private, and post-secondary education are covered.

EDUC 680 Foundations of Extension Adult Education
Fall. 3 credits. Limited to 20 students. S-U grades optional. R 3:35-6:00. A. Wilson. 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. Development of conceptual, historical, 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. An examination of the concept of community, changes in community, life, the analysis of community, alternative strategies for community development, patterns of response to community by universities, colleges, schools, Cooperative Extension, and government service agencies; and such functional dimensions of community education programming as participatory decision making, volunteers, leadership development, council formation and function, interagency coordination, and change-agents roles.

EDUC 685 Training and Development: Theory and Practice (also INTAG 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 700 Directed Readings
Fall or spring. Variable, 6 credits. Limited to graduate students with permission of instructor. S-U grades optional. Staff. For study that predominantly involves library research and independent study.

EDUC 701 Empirical Research
Fall or spring. Variable, 6 credits. Limited to graduate students with permission of instructor. S-U grades optional. Staff. For study that primarily involves collection and analysis of research data.

EDUC 702 Practicum
Fall or spring. Variable, 6 credits. Limited to graduate students with permission of instructor. S-U grades optional. Staff. For study that predominantly involves field experience in community settings.

EDUC 703 Teaching 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 instruction. Does not apply to work for which students receive financial compensation.

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. 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 discusses current topics in moral development research as related to the educational process. Topics include the question of the development of moral reasoning, gender differences, the relationship between moral judgment and moral action, questions related to moral education in secondary schools and university settings, and professional ethics in educational settings. This course takes a life-span perspective; however, special emphasis is placed on development from adolescence through adulthood.

EDUC 718 Adult Learning and Development
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. W 2:00–4:25. Not offered 2004. A. Wilson
Deals with adult development and learning behavior from points of view of educational psychology and adult education. Inferences are drawn from theory and research to the practice of adult continuing education. Appropriate for graduate students in educational psychology, extension and continuing education, and community service education, and for others interested in adult learning and development.

EDUC 730 Seminar in Agricultural Extension, and Adult Education
Spring. 3 credits. S-U grades optional. R 8:00–9:55. S. Peters
Emphasis is on current problems and research in agriculture, extension, and adult education. 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 of the local and global contexts. The analysis focuses on policies, organization, and the functioning of education in industrial, new/emerging economies and developing countries. Specific case studies are drawn from different countries.

EDUC 783 Farmer-Centered Research and Extension (also INTAG 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 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.

EDUC 800 Master’s-Level Thesis Research
Fall or spring. Credit: TBA. S-U grades optional. Fall 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

EDUC 260, 264, 394, 400, 483, 490, 685.

ENTOM 210 Alien Empire: Bizarre Biology of Bugs
Spring. 2 credits. Limited to 100 students. S-U grades optional. Lecs, T R 9:05; optional field trips, required lab demonstrations. Offered alternate years. B. N. Danforth
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 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, ecology, 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, predatory behavior, ornate lifestyles, social spiders, and potential use in IPM.

ENTOM 241 Applied Entomology
Spring. 3 credits. Limited to 18 students. Prerequisites: BIO G 101–102 (may be taken concurrently) or equivalent. Lecs, T R 10:10; lab/disc, T 12:20–3:15. W. M. Tingey
Introduction to major pest species and tactics for their management. Discussions of insect pest management requirements on farms, gardens, forests, and urban environments, along with descriptions of control methods, materials, and equipment.

ENTOM 260 Introductory Beekeeping
Fall. 2 credits. Lecs, T R 11:15. N. W. Calderone
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, behavior, division of labor, and evolution of social behavior are reviewed. Lectures on pollination of agricultural crops, honey and beeswax, 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.
N. W. Calderone. This course consists of 14 laboratory sessions that acquaint students with practical methods of colony management. Laboratories involve hands-on work with honey bee colonies and equipment. Some of the 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
Spring. 2 credits. S-U grades optional. Lecs, T R 1:25-2:15; lab demonstration; optional field trip. Offered alternate years. Not offered spring 2004; next offered spring 2005. A. E. Hajek. 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 parasitoids, predators, pathogens, and competitors as well as plant breeding to control pests from microbes to weeds to invertebrates and vertebrates. This course is intended for students curious about safely controlling pests.

ENTOM 322 Comparative Insect Morphology
Spring. 5 credits. Prerequisite: ENTOM 212 or 241. Lecs, M W T F 9:05; labs, M W 1:25-4:25. Offered alternate years. Not offered spring 2004; next offered spring 2005. 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 325 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. Not offered spring 2004; next offered spring 2005. L. S. Rayor. Insects form diverse organisms on earth, with equally diverse behavior. This course explores the behavior of insects, ranging from the individual sensory and physiological mechanisms that are the basis of insect behavior, to the behavioral dynamics of foraging, courtship, parental care, and social behavior. Topics include insect learning, perceptual abilities, host finding strategies, predation, pollination, and examination of current issues in insect behavior.

ENTOM 331 Introductory Insect Systematics
Spring. 4 credits. Prerequisite: ENTOM 212. Lecs, T R 12:20; labs, T R 1:25-4:25. Lab fee $50. Offered alternate years. Q. D. Wheeler. An introduction to the classification, evolutionary history, and distribution of insects. Laboratory practice in the identification of orders, families, and representatives of a number of families. An independent project involving description of one or more larval stages is required. See instructor before course to best satisfy this requirement.

ENTOM 333 Maggots, Grubs, and Cutworms: Larval Insect Biology
Spring. 5 credits. Prerequisite: ENTOM 212 and permission of instructor. S-U grades optional. Lecs, T R 11:15; labs T R 1:25-4:25. Offered alternate years. Not offered fall 2003; next offered fall 2004. J. K. Liebold. This course introduces insect larval biology, anatomy, and ecological and phylogenetic relationships. The laboratory includes field sampling, preparation of specimens for descriptive study, identification of unknowns, and discussions. An independent project involving description of one or more larval stages is required. See instructor before course to best satisfy this requirement.

ENTOM 344 Insect Conservation Biology
Spring. 5 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. J. E. Losey. Provides an in-depth look at the concepts and issues surrounding 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 the ecological services (i.e., pollination, decomposition, pest suppression, insectivore food sources).

ENTOM 352 Medical and Veterinary Entomology
Fall. 3 credits. Prerequisites: BIO G 101-102 or permission of instructor. S-U grades optional. Lecs, T R 10:10-11:25. Offered alternate years. Not offered fall 2003; next offered fall 2004. L. C. Harrington. Diseases resulting from arthropod-borne pathogens (such as malaria, dengue, and yellow fever) cause considerable human and animal suffering and death worldwide. This course explores the impact of vector-borne disease and provides a comparative 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 and pests. The laboratory includes field trips, collection, and identification of arthropods of medical/ veterinary importance, 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 students are encouraged to enroll.

ENTOM 370 Pesticides, the Environment, and Human Health (also TOX 370)
Fall. 2 credits. Prerequisites: BIO G 101-102 or equivalent. Lab, T R 9:05. Offered alternate years. Not offered fall 2003; next offered fall 2004. J. G. Scott. A survey of the different types of pesticides, their uses, properties, and effects on the environment. Discussion of the role of risk benefits, regulation, politics, and current controversies associated with pesticide use and genetically modified crops.

ENTOM 394 Circadian Rhythms (also BIOGD 394 and BIONB 394)
Fall. 4 credits. Prerequisite: ENTOM 212, or BIOGD 281, or BIONB 221 or 222, or permission of instructor. S-U grades optional. Lec, W 7:30-9:10 p.m. Offered alternate years. J. Ewer. This course explores the neural, endocrine, and molecular mechanisms by which organisms "keep time," and how their clocks are synchronized with the planet's 24 hour light and temperature cycles. The course leans heavily on the knowledge obtained from the analysis of rhythms in insects, especially Drosophila, but also includes an in-depth analysis of circadian rhythms in plants, fungi, and some other organisms, from cyanobacteria to mammals.

ENTOM 400 Insect Development (also BIOGD 402)
Spring. 4 credits. Prerequisite: ENTOM 212 or BIOGD 281 or permission of instructor. S-U grades optional. Lecs, M W 11:15; lab, M 12:20-2:20; disc, F 11:15-12:05. Offered alternate years. J. Ewer. 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 Ticks and Shrews (also PL PA 443)
Fall. 4 credits. Prerequisites: ENTOM 212 or equivalent and PL PA 241 or equivalent. S-U grades optional. Evening prelims. Lecs, M W F 11:15; lab, F 1:25-4:25. Offered alternate years. Not offered fall 2003; next offered fall 2004. P. A. Weston and G. W. Hudler. For students preparing for careers in horticulture, urban forestry, pest management, and natural history and recreational nature 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: BIOEE 261, ENTOM 212 or 241, and PL PA 241 or their equivalents or permission of instructor. Lecs, M W F 9:05; labs, M 1:25-4:25. J. E. Losey and A. Ditommaso.
Lectures integrate the principles of pest control, ecology, and economics in the management of pests across multiple systems. Laboratories consist of exercises to reinforce techniques and the application of computer technology to management problems.

**ENTOM 452 Herbivores and Plants: Chemical Ecology and Coevolution** (also BIOEE 452)

Spring. 3 credits. Prerequisites: 1 year of introductory biology. BIOEE 261, CHEM 257 or 357/358 and 251 or 301; or permission of instructor. Lecs, M W F 11:15. Offered alternate years. Not offered spring 2004; next offered spring 2005. P.

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)

Fall. 3 credits. Prerequisite: a course in systematics or permission of instructor. S-U grades optional. Lecs, T R 10:10, lab T 1:25–4:25. Offered alternate years. J. K. Liebherr and M. Luckow.

A survey of techniques in historical biogeography, and the development of modern biogeographic theory in the context of classical, ecological, and phylogenetic 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, T R 9:05; labs, M W F 11:15. Offered alternate years. Not offered fall 2003; next offered fall 2004. 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 NYTRES 456)

Spring. 4 credits. Limited to 60 students. Recommended. BIOEE 261, S-U grades optional. Lecs, T R 9:05; labs, T W or R 1:25–4:25. Offered alternate years. B. L. Peckarsky.

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. Lab: field projects include descriptive and experimental techniques, hypothesis testing and writing of scientific papers related to environmental assessment.

**ENTOM 463 Invertebrate Pathology**

Spring. 4 credits. Prerequisites: one year of introductory biology. S-U grades optional. Lecs, M W F 9:05; lab, W 1:25–4:25. Offered alternate years. A. F. Hajek

Lecture presents principles of pathology as applied to invertebrates. Topics explored include noninfectious and infectious diseases caused by viruses, bacteria, fungi, protozoa, and nematodes, epizoitology of insect diseases, and use of pathogens for control. Laboratory involves a diversity of pathogens and hosts using techniques such as microinjection, electrophoresis, immunosaic, density gradient centrifugation, soil extraction, and computer simulation.

**ENTOM 470 Ecological Genetics**

**ENTOM 471 Freshwater Invertebrate Biology and Biomonitoring** (available in 140 Roberts Hall).


Lecture explores the morphology, physiology, behavior, feeding ecology, and evolution of macroscopic freshwater invertebrates with an emphasis on contrasting the attributes of aquatic and terrestrial insects. Laboratory involves field collections and identification of invertebrates and stresses the use of taxonomic keys. Students prepare a collection of freshwater invertebrates or conduct a project using freshwater invertebrates to biomonitor stream habitat quality.

**ENTOM 477 Biological Control**

Fall. 3 credits. Prerequisites: ENTOM 212, BIOEE 261, and permission of instructor. Lecs, T R 9:05; lab, T 1:25–4:15. Offered alternate years. J. Nyrop and A. Hajek.

Lectures present case studies exploring classical biological control, augmentation and conservation, and applications of strategies to control arthropod pests and weeds. Labs focus on selected concepts in more depth using live organisms.

**ENTOM 483 Insect Physiology**

Fall. 5 credits. Prerequisite: ENTOM 212 or permission of instructor. Lecs, M W F 11:15; lab W 1:25–4:25 and a disc, TBA. Offered alternate years. Not offered fall 2003; next offered fall 2004. C. Gilbert.

An introduction to the often unique ways in which insects have met their basic needs. Each organ system is examined with emphasis on basic principles and specific examples. Students are also introduced to some common methods used in physiological research and to the critical reading of scientific literature.

**ENTOM 490 Toxicology of Insecticides** (also TOX 490)


The history, metabolism, and mechanism of action of genetically modified, synthetic, and naturally occurring insecticides. Insecticide resistance, resistance management, and new approaches to insect control with genetically modified organisms are discussed.

**ENTOM 494 Special Topics in Entomology**

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 to be offered more than twice under this number.

**ENTOM 497 Individual Study in Entomology**

Fall or spring. Credit TBA. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.

Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

**ENTOM 631 Systematics of the Coleoptera**

**ENTOM 632 Advanced Coleopterology**

**ENTOM 634 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 biometrics of selected taxa, with accompanying laboratory studies on identification and comparative morphology. Collections sometimes required.

**ENTOM 635 Insect Molecular Systematics**

Spring. 2 credits. Prerequisite: permission of instructor. Offered alternate years. B. N. Danforth.

Analysis of DNA sequence variation can provide a powerful tool for resolving problems in insect systematics, from species level taxonomic decisions to higher level (ordinal) relationships. This course introduces students, through readings of the primary literature, to the basic methods of insect molecular systematics, including DNA extraction, gel electrophoresis, PCR, DNA purification, and DNA sequencing (manual and automated). Results are analyzed using available computer programs. Students are encouraged to collect preliminary data for thesis or post-doctoral research.

**ENTOM 644 Advanced IPM: Theory and Implementation**


This advanced course in integrated pest management (IPM) consists of a rotating series of four-week interactive modules on specialized topics. Topics range from basic ecology and genetics of pests and their natural enemies to...
specific strategies for pest management implementation. The course is designed to provide advanced IPM instruction for graduate and upper-level undergraduate students with intermediate backgrounds in IPM. In special cases, students with little or no background in IPM seeking intensive instruction on a specialized topic may enroll with permission of the instructor. 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 NY—A. Agnello, G. English-Loeb; Entomology (Geneva); Plant Resistance—W. Tingley: 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 NY—P. Kaufman and D. Rutz: Entomology (Ithaca); Chemical Conversations and Integrated Pest Management—C. Lin: Entomology (Geneva).

ENTOM 652 Seminar in Medical Entomology
Fall. 1 credit. Prerequisite: permission of instructor or ENTM 352. Disc, TBA. L. C. Harrington. Addresses a variety of topics in the field of medical entomology. The course consists of weekly discussions of key papers on topics chosen by participating students and faculty.

ENTOM 662 Insect Behavior Seminar
Spring. 2 credits. Prerequisites: permission of instructor and ENTM 212 and BIONB 221 or equivalents. S-U grades optional. Offered alternate years. Hours TBA. C. Gilbert.

[ENTOM 685 Seminar in Insect Physiology
Spring. 1 credit. S-U grades optional. Prerequisite: permission of instructor. Hours TBA. Offered alternate years. Not offered spring 2004, next offered spring 2005. 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. Lec 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 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.

Jugatae Seminar
Fall and spring. A seminar conducted by Jugatae, the entomology club of Cornell University, to discuss topics of interest to its members and guests. All interested undergraduate and graduate students are encouraged to attend.

FLORICULTURE AND ORNAMENTAL HORTICULTURE
See Horticulture.

FREEHAND DRAWING AND SCIENTIFIC ILLUSTRATION
Freehand Drawing and Scientific Illustration courses are offered through the Department of Horticulture and are described in the section "Freehand Drawing and Scientific Illustration."

FOOD SCIENCE

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.

FOOD 101 Science and Technology of Foods
Fall. 1 credit. S-U grades only. M T 1:25-2:15. J. H. Hotchkiss and staff. This course explores the application of science and technology to foods. Lectures will elucidate the role of engineering, biotechnology, chemistry, biochemistry, nutrition, toxicology, and microbiology in supplying the world with safe and nutritious food. An overview of food science as a discipline and career choice is given.

FOOD 102 Exploring Food Processing
Spring. 1 credit. S-U grades only. F 12:20, 5 field trips; one on F 12:30-4:00, four on F 12:30-5:30. D. P. Brown. A series of seminars on current technological and regulatory developments in food science. Field trips to five commercial food manufacturing/processing plants are used to illustrate the application of current technologies. A course project, using the Food Science Alumni Network, is required.

FOOD 150 Food Choices and Issues
Spring. 2 credits. S-U grades optional. T R 12:20-1:10. R. H. Liu and D. D. Miller. This course provides Cornell students with the knowledge needed to make healthy food choices. Topics include the U.S. food system; relationships between diet and health; food processing, food safety, and discussion of contemporary issues relating to food quality, safety, and nutrition. Students assess the nutritional quality of their personal diets and learn how to make changes to improve their diets.

FOOD 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 fermentations; 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.

FOOD 210 Food Analysis
Spring. 3 credits. Prerequisite: CHEM 208 or equivalent. Enrollment limited to 24 students. Lecs, W F 1:25-2:15, lab, M 12:20-3:20. R. H. Liu and J. M. Brown. 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 spectroscopy are discussed.

FOOD 250 Kosher and Halal Food Regulations
Spring. 2 credits. Sophomore standing and above. S-U grades optional. Lec M T 7:30-9:25 p.m. J. M. Reginstein. A comprehensive introduction to kosher and halal foods in the American food industry with
some coverage of home practices. The kosher food law's origin, and their application in modern food processing are examined. The nature of the kosher supervision industry in America is described. Kosher food 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.

**FOOD 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 marketing 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.

**FOOD 321 Food Engineering Principles**
Fall. 3 credits. Prerequisites: FOOD 200 and introductory physics. Letter grades only. M W F 9:05-9:55. S. S. H. Rizvi.

Introduces the engineering principles underlying food processes and equipment. Topics covered include thermodynamics, mass and energy balance, fluid mechanics, heat and mass transport, and refrigeration and psychrometrics.

**FOOD 351 Milk Quality**
Fall. 1 credit. Prerequisite: AN SCI 250 or equivalent or permission of instructor. Letter grades only. F 12:20. M. Wiedmann.

This course focuses on the effects of on-farm and after-harvest 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.

**FOOD 394 Applied Food Microbiology (also BIOMI 394)**

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.

**FOOD 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.

**FOOD 396 Food Safety Assurance**
Spring. 2 credits. Prerequisite: MICRO 290 or permission of instructor. T R 9:05-9:55. Offered alternate years. Next offered spring 2005, not offered 2004.
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 exercises are used to demonstrate and apply the key principles that are discussed.

**FOOD 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.

**FOOD 401 Concepts of Product Development**
J. H. Hotchkiss.

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, market research, and patents.

**FOOD 405 Managing Food Waste without Trashin the Environment**

A look at the various waste streams generated in food, agricultural, and environmental processes. Some aspects of ethnic foods may also be considered.

**FOOD 406 Dairy and Food Fermentations**

This is a lecture course covering the basic principles of fermentation, the microbiology of food fermentations (including the physiology and genetics of fermentative microorganisms), starter cultures and their preparations and applications as well as specific examples of food fermentations. Selected textbook readings are supplemented with papers from peer-reviewed journals. Significant parts of class focus on discussion and critical analysis of the assigned reading materials.

**FOOD 410 Sensory Evaluation of Food**

Topics include sensory evaluation methods used to test the flavor, appearance, and texture of foods by quantitative 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 date collection and analysis. Undergraduate Food Science majors are required to take both the lecture and the laboratory.

**FOOD 415 Principles of Food Packaging**

The chemical and physical properties and manufacture of the basic materials used to construct packaging are discussed. The influence of packaging on shelf life is presented. Emphasis is placed on newer packaging technologies and materials. Economics, design, and regulation of food packaging are briefly presented.

**FOOD 417-418 Food Chemistry I and II**
Spring 417; fall 418. 3 credits. Spring; 2 credits, fall. Prerequisites: CHEM 257 or BIOM 330 or 331. S-U or letter grade.

**FOOD 417**

A course on the chemistry of foods and food ingredients. The chemical and physical properties of water, proteins, lipids, 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.

**FOOD 419 Food Chemistry Laboratory**
Spring. 2 credits. Prerequisites: biochemistry (BIOM 330 or 331 or CHEM 257 or equivalent) and concurrent registration in food chemistry (FOOD 417). M W 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 described in the proposal, analyzing the data, and writing a paper following the format used by the Journal of Food Science.

**FOOD 423 Physical Principles of Food Preservation and Manufacturing**
Fall. 3 credits. Prerequisite: PS 321. Letter grades only. Lec, T R 11:15-12:05; disc, T 12:20-2:15. S. J. Mulvaney and J. S. Roberts.
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.

FOOD 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 ranging from pasteurized milk to cheddar cheese. Laboratories include a study of a food processing pilot plant facility. One full day field trip to operating dairy plants in the area will be scheduled during the semester.

FOOD 430 Understanding Wine and Beer

An introduction to wine and beer appreciation through the study of fermentation biology, product composition, and sensory perception. Samples of wines and beers will be 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 wine-making techniques; and the effects of brewing raw materials and processing procedures on beer quality.

FOOD 447 International Postharvest Food Systems
Fall or spring. 3 credits. Prerequisite: Food Science 394. Letter grades only. Lect, M W 10:10-11:00. Offered alternate years. Next offered fall 2004. Staff.

An interdisciplinary course designed for all undergraduate and graduate students. Describes postharvest food losses and methods to reduce the loss. Topics include storage and care of unprocessed and minimally processed foods such as cereal grains, fruits, vegetables, tubers, and fish; biology and control of fungi, insects, and vertebrates in foods; chemical causes of quality loss; effects of climate; and economic and social factors affecting food preservation and storage. Emphasis is given to the problems in developing countries. The third credit requires a written case study of a country or commodity.

FOOD 450 Fundamentals of Food Law

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 this legal system during legislative action, regulatory rule making, and with respect to compliance.

FOOD 456 Advanced Concepts in Sensory Evaluation

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.

FOOD 459 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.

FOOD 471 Individual Study in Food Science
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register with an Independent Study Form (available in 140 Food Science). S-U grades optional. Staff.

May include individual tutorial study, a special topic selected by a professor or a group of students, or selected lectures of a course already offered. Since topics vary, the course may be repeated for credit.

FOOD 498 Undergraduate Teaching Experience
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register with 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. Students meet with a discussion or laboratory section and regularly discuss objectives with the course instructor.

FOOD 499 Undergraduate Research in Food Science
Fall or spring. 4 credits maximum. S-U grades optional. Students must register with 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.

FOOD 559 Research for Lausanne Exchange Students
Fall/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 faculties of both Cornell University and the University of Lausanne.

FOOD 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 4:00-5:00. Staff.

A weekly seminar series on contemporary topics and issues in the field of Food Science and Technology. Representatives from academia, industry, and government provide presentations on a wide variety of topics. Graduate students in the field of Food Science and Technology may use the series to present their required thesis research seminar. Required of all graduate students in the field of Food Science and Technology. Strongly recommended for graduate students minoring in Food Science and Technology.

FOOD 604 Chemistry of Dairy Products

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 are covered. This course emphasizes current research in dairy chemistry.

FOOD 607 Advanced Food Microbiology

This two-credit course explores advanced topics in food microbiology. A major emphasis is placed on critical evaluation of current literature and on microbiological 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. Seminars and guest lectures may be arranged to provide an introduction to other advanced food microbiology topics (e.g., risk assessment).

FOOD 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. Next offered fall 2004. K. J. Siebert.

Food science applications using multivariate statistical methods (chemometrics) include extracting information from large data sets, modeling molecular and product properties,
optimizing analytical methods and processing operations, discerning relationships between product composition and sensory properties, identifying cultivars or species, and detecting adulteration. These techniques covered are also applicable to many other problems in biology and chemistry.

FOOD 616 Flavors—Analysis and Applications  
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 trigeminal stimuli from the perspectives of chemical structures, methods of analysis, uses and interactions in food systems, and consumer acceptance.

FOOD 620 Food Carbohydrates (also NS 620)  
Spring. 2 credits. Limited to qualified seniors and graduate students. Prerequisite: BIOLBM 330 or equivalent. T R 10:10-11:00. Offered alternate years. Not offered spring 2005. B. A. Lewis and J. W. Brady.  
A consideration of the chemistry of 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.

FOOD 621 Food Lipids  
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.

FOOD 644 Food Polymer Science: Principles and Applications  
Spring. 2 credits. Prerequisites: Introductory chemistry and physics. T R 1:20-1:10. Offered alternate years. S. J. Mulvany.  
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.

FOOD 665 Food and Bioprocessing Systems  
Fundamental and quantitative analyses of processes for manufacture of foods and related biological products. Topics covered include centrifugation, membranes, supercritical fluids, extraction, high pressure, pulsed electric field, thermal processing, drying and crystallization.

FOOD 684 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.

FOOD 695 Current Readings in Food Science  
Fall and spring. 1 credit. Prerequisite: 300- to 400-level course relevant to the chosen topic. S-U grades only. Lect., by arrangement/1 hour per week. S-U grades only. Staff.  
A seminar series on current topics chosen by participating faculty 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, Irradiating; Food Engineering. This course can be taken multiple times. Graduate students in Food Science are strongly encouraged to enroll in this course. Interested students should contact the designated instructor(s) for each term.

FOOD 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 field faculty members. The experience may include leading discussion sections; preparing, assisting in, or teaching lectures and laboratories; and tutoring.

FOOD 800 Masters-Level Thesis Research  
Fall or spring. Credit TBA. Maximum credit, 12. Prerequisite: limited to master's candidates, permission of Special Committee chair. S-U grades only. Graduate faculty.

FOOD 900 Graduate-Level Thesis Research  
Fall or spring. Credit TBA. Maximum credit, 12. Prerequisite: limited to doctoral students who have passed the "A" exam; permission of Special Committee chair. S-U grades only. Graduate faculty.

HORT 201 The Art of Horticulture  
Fall and spring. 2 credits. Studio T 1:25-4:25. M. A. Merwin.

This introductory course explores the breadth of the art and beauty of horticulture. It addresses the symbolic use of plants and gardens in art, the natural history of horticulture as recorded in art, the artist's relationship with the garden, and the use of plant materials in art forms. Students will have ample opportunity to paint, illustrate, photograph, and write about plants and gardens.

HORT 225 Vegetable Production  
Fall. 4 credits. Lects, M W F 11:15; lab, W 2:00-4:25; 4 field trips (September). W 11:15-6:00. L. A. Ellerbrock.

Intended for those interested in the production, processing, and marketing of vegetables. Topics included are techniques, problems, and trends in the culture, harvesting, and storage of the major vegetable crops. Field trips to conventional and organic farms and hands-on experience in growing vegetables in the greenhouse are included.

FRUIT AND VEGETABLE SCIENCE: HORTICULTURAL SCIENCE  
See Horticulture.

HORTICULTURE  

HORT 101 Horticultural Science and Systems  
Fall. 4 credits. Lect, M W F 9:05; lab, W 1:25-4:25. I. A. Merwin.

The science and technology of horticultural plants grown for food 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 190 Sustainable Agriculture (also CSS 190)  
Fall. 2 or 3 credits. Lect, R 10:10; lab, M or T 2:00-4:25. C. J. Peters and J. Mt. Pleasant.

Designed to be an enjoyable introduction to basic food production resources (soils, crops, and climates) and 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 descriptive climatology. Written assignments are prepared for the web. Extra credit can be earned by participation in team preparation and delivery of a lesson in sustainable agriculture.

HORT 201 The Art of Horticulture  
Fall and spring. 2 credits. Studio T 1:25-4:25. M. A. Merwin.

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Intended for those interested in the production, processing, and marketing of vegetables. Topics included are techniques, problems, and trends in the culture, harvesting, and storage of the major vegetable crops. Field trips to conventional and organic farms and hands-on experience in growing vegetables in the greenhouse are included.

FREEHAND DRAWING AND SCIENTIFIC ILLUSTRATION  
Freewith Drawing is a program in the Department of Horticulture.

[FR DR 109 Nature Drawing]  
[FR DR 214 Watercolor]
HORT 243 Taxonomy of Cultivated Plants (also BIOL 243)
Fall. 4 credits. Prerequisite: 1 year of introductory biology or written permission of instructor. May not be taken for credit after BIOL 248. Lec, M W F 1:25-4:25. A. M. Petrovic. Study of the scientific principles involved in the maintenance 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 300 Herbaceous Plant Materials
Fall. 3 credits. Fee for field trip: $75. Lecs, T R 10:10; lab, T 2:00-4:25. W. B. Miller. Identification, use, characteristics, and garden cultural requirements of annual and herbaceous perennials. Emphasizes 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. Lecs, M W 11:15; lab, M 1:25-4:25. 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 accent plants including potted 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. Lecs, T R 10:10; 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 fertigation, materials handling, environmental stewardship 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 predictive 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 (also CSS 317)
Fall. 3 credits. Prerequisites: BIOL 241 or an equivalent course approved by instructor. Letter grade only. Offered odd years. Lecs, T R 11:15-12:50; lab, R 1:25-4:25. A. G. Taylor. Experiment Station. Study of the principles and practices involved in seed production, conditioning, storage, quality management, packaging, and stand establishment. Information is applicable to various kinds of agricultural and horticultural seeds. Hands-on laboratory experience.

HORT 330 Turfgrass Management
Fall. 4 credits. Prerequisite: CSS 260 or permission of instructor. Lec, M W F 1:25-4:25. A. M. Petrovic. Study of the scientific principles involved in the maintenance 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 400 Principles of Plant Propagation
Fall. 3 credits. Prerequisites: BIOL 242 and 244 or another course in plant physiology. Lecs, T 9:05; lab, R 1:25-4:25. K. W. Mudge. Sexual (seed) propagation and asexual (vegetative) propagation including cuttage, grafting, tissue culture, layering, and specialized vegetative reproductive structures. Physiological, environmental, and anatomical principles and applications are stressed in lecture and hands-on skills in laboratories. Examples include both temperate and tropical horticultural, agronomic, and forestry crops.

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 415 Principles and Practices of Agroforestry (also NTRSES 415 and CSS 415)
Fall. 3 credits. Prerequisite: senior or graduate standing or permission of instructor. S-U option. Lec, M W F 10:10-11:00. Optional laboratory, HORT 416 (also NTRSES 416 and CSS SCAS 416). Offered even years. E. Fernandez, K. Mudge, C. Buck. An introduction to modern and traditional agroforestry systems which involves spatial and temporal integration of multiple uses. Woody plants (trees, shrubs) with annuals or perennial crops or with livestock. Interactions between woody and nonwoody components of agroforestry systems are considered, based on above- and below-ground processes. The sustainability of agroforestry systems is critically examined from biophysical, socio-economic, and policy perspectives.

HORT 416 Principles and Practices of Agroforestry—Laboratory (also NTRSES 416 and CSS 416)
Fall. 1 credit. Optional lab component of HORT 415. Prerequisites: NTRSES 310 and CSS SCAS 415. S-U grades optional. Offered odd years. K. Mudge, C. Buck. An integrated set of laboratory and field exercises designed to develop competency in diagnostic and management skills applied to agroforestry practice. Sessions include field trips to local practitioners as well as working demonstration farms and forests, case study design and analysis, use of computer-based sources of information, and practical skills with woody plants including identification, propagation, planting, pruning, and measurement.

HORT 420 Principles of Nursery-Crop Production
Fall. 4 credits. Prerequisite: HORT 400. Lecs, M W F 9:05; 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. Lecs, M W 9:05-9:55; lab, W 1:25-4:25. Offered odd years. S. Gan. A study of the processes controlling the 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 procedures/conditions for storage, transportation, and quality monitoring of harvested horticultural crops will also be discussed.

HORT 435 The Care of Woody and Herbaceous Plants in the Landscape
Fall. 4 credits. Prerequisites: HORT 301 and 491. Lecs, M W F 9:05; lab, M 1:25-4:25. Offered even years. G. L. Good. A study of the practices involved in the maintenance of ornamental plants in the landscape. Major emphasis is on post-planting techniques, including water and fertilization, weed management, pruning, and general tree care. Labs have a hands-on focus.

HORT 440 Restoration Ecology
Fall. Weeks 1-10. 3 credits. Prerequisite: upper division or graduate standing. Letter grade only. Lecs, T R 10:10; lab, F 1:25-4:25. Offered odd years. T. H. Whitlow. An inquiry based treatment of the principles and methods of ecology, conservation biology, hydrology, soil science and related disciplines applied to the restoration of degraded terrestrial ecosystems. Weekly labs, four weekend field trips, and a semester-long project provide many opportunities for experiential learning. Substantial commitment outside of the classroom is expected.

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. Pruitt. An integrated set of laboratory and field exercises designed to develop competency in diagnostic and management skills applied to agroforestry practice. Sessions include field trips to local practitioners as well as working demonstration farms and forests, case study design and analysis, use of computer-based sources of information, and practical skills with woody plants including identification, propagation, planting, pruning, and measurement.
HORT 444 Vineyard Management
Fall. 3 credits. Lecs; T R 9:05; lab, R 1:30–4:25. Offered odd years. R. M. Pool. Commercial grape production with an emphasis on the problems of production in cold climates. Students examine site selection, world and regional grape varieties, and the anatomical and physiological basis for vineyard management decision making. 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 even years. I. A. Merwin.
The ecology and technology of deciduous 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 BIOPL 449)
Fall. 1 credit. Prerequisites: introductory biology course and BIOPL 242 or 342 or permission of instructor. 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 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.

HORT 455 Mineral Nutrition of Crops and Landscape Plants (also CSS 455)
Spring. 3–5 credits. Prerequisite: CSS 260 and BIOPL 242 or equivalent. Lecs, M W F 9:05; lab/disc, M 2:00–4:25. Offered even 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 understand the principles of mineral nutrient function in crop plants, are able to diagnose deficiencies by symptoms and tissue tests, and can devise organic and conventional nutrient management schemes that maximize productivity and mineral nutrient supplies.

HORT 456 Golf Course Management
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 investigates the consequences of anthropogenic activities from local soil management to global change on soil biodiversity and microbiolally 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. 4 credits. Prerequisites: major in horticulture or landscape architecture or permission of instructor. Lecs, 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 golf 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 requires students to implement what they have learned by creating a new landscape serves to integrate theory, principles, and practices.

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. Lecs, T R 12:20–1:10, lab, T R 1:25–4:25. N. L. Bassuk and P. J. Trowbridge.
The second half of this course continues focus on the winter identification, uses and establishment of woody plants in urban and garden settings. Lecs, T R 12:20–1:10, lab, T R 1:25–4:25. N. L. Bassuk and P. J. Trowbridge.
The second half of this course continues focus on the winter identification, uses and establishment of woody plants in urban and garden settings. Lecs, T R 12:20–1:10, lab, T R 1:25–4:25. N. L. Bassuk and P. J. Trowbridge.
The second half of this course continues focus on the winter identification, uses and establishment of woody plants in urban and garden settings. Lecs, T R 12:20–1:10, lab, T R 1:25–4:25. N. L. Bassuk and P. J. Trowbridge.
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The second half of this course continues focus on the winter identification, uses and establishment of woody plants in urban and garden settings. Lecs, T R 12:20–1:10, lab, T R 1:25–4:25. N. L. Bassuk and P. J. Trowbridge.
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.
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 and spring. 1 credit. Undergraduate participation in weekly departmental seminar series. Graduate students should enroll in HORT 600. May be taken four times for one credit per semester. S-U grades only. R 4:00. D. W. Wolfe and L. A. Weston.

HORT 496 Internship in Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisites: permission of student's adviser in advance of participation in internship programs. Students must register with 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 Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of instructor(s). Students must register with an Independent Study form (available in 140 Roberts Hall). Independent study in horticultural sciences under the direction of one or more faculty members. Staff.

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 with an Independent Study form (available in 140 Roberts Hall). Staff. Designed to give qualified undergraduate students teaching experience through actual involvement in planning and teaching horticultural sciences courses under the supervision of departmental faculty members. 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. Prerequisite: permission of instructor. Students must register with 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 project emphasizing the application of principles and practices to professional horticultural teaching, extension, and research programs and situations. Required of Master of Professional Studies (Agriculture) candidates in the respective graduate fields of horticulture.

HORT 600 Seminar in Horticulture
Fall and spring. 1 credit. S-U grades only. W 4:30-5:25. R 4:00. D. W. Wolfe and L. A. Weston. Weekly seminars consist of graduate student research projects, 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 2:30-4:25. Offered every year. D. W. Wolfe.
This course provides experience in applying statistics 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 analysis of variation, common block and incomplete block designs; selecting an appropriate significance level; designing on-farm experiments and demonstration plots; regression methods in relation to mechanistic models and path and principal components analysis; and plant growth analysis techniques.

HORT 616 Breeding for Pest Resistance (also PL BR 618)
Fall. 2 credits. S-U grades optional. Prerequisites: BLOG 281 and PL BR 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, BIOM 331, CHEM 357, or equivalent, or permission of instructor. Letter grade only. Lec, T R 8:40-9:55; lab, T 1:25-2:25. T. H. Whitlow. An examination of physiological processes in woody plants emphasizing whole plant integration and how these processes affect plant growth under both natural and cropping systems. Topics include: evolution of the woody plant form, structure and function of the root and shoot, growth periodicity, dormancy, growth analysis, carbon balance and allocation, root symbioses, and physiological responses to biotic and abiotic stress. Faculty from Geneva and Fruit and Vegetable Science collaborate in teaching.

HORT 625 Advanced Postharvest Biology
Spring. 3 credits. TBA. Coordinator: S. Gan.

HORT 635 Tools for Thought
Fall or spring. 1 credit. S-U grades only. One hour per week, TBA. Staff. A seminar series on current topics chosen by participating students and faculty, on a rotating basis. Format consists of weekly discussion groups, with each participant presenting at least one oral report based on independent reading and/or experimentation relating to the chosen topic. Interested students should contact the designated instructor(s) for each term.

HORT 636 Current Topics in Horticulture
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 are not offered more than twice under this number.

HORT 700 Graduate Teaching Experience
Fall or spring. Credit variable. Open only to graduate students. Undergraduates should enroll in HORT 498. S-U grades optional. Prerequisite: permission of instructor. Hours TBA. 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.

HORT 800 Thesis Research, Master of Science
Fall or spring. Credit variable. TBA. S-U grades only.

HORT 900 Thesis Research, Doctor of Philosophy
Fall or spring. Credit TBA. S-U grades only.
INTERNATIONAL AGRICULTURE

INTAG 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, multinational team approach in helping farmers and rural development planners adjust to the ever-changing food needs of the world.

INTAG 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. E. C. Fernandes.
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 crop systems, and agroforestry. In addition to specific 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.

INTAG 402 Agriculture in the Developing Nations I
Fall. 2 credits. K. V. Raman, 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 non-government 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 (INTAG 602), which includes a trip to a developing country during the intersession.

INTAG 403 Traditional Agriculture in Developing Countries
Fall. 1 credit. S-U only. Staff.
Today, perhaps over half of the world’s arable land is farmed by traditional farmers. They developed sustainable agriculture practices which 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.

INTAG 404 Crop Evolution, Domestication, and Diversity (also PLBR 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.

INTAG 480 Global Seminar: Environment and Sustainable Food Systems (also ALS 480 and EDUC 480)
Spring. 1–3 credits. Prerequisite: juniors, seniors, and graduate students. Letter grade. J. Lassoie, L. Buck, D. Miller.
For description, see ALS 480.

INTAG 494 Special Topics in International Agriculture (also INTAG 984)
Fall, spring, summer. 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.

INTAG 496 International Internship
Fall, spring. 1–6 credits. See CILS 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 researches and initiates an appropriate international internship and negotiates a learning contract with the faculty supervisor, stating the conditions of the work assignment, supervision, and reporting.

INTAG 497 Independent Study in INTAG
Fall and spring. 1–3 credits. S-U or letter grade. Prerequisite: permission of instructor and signed Independent Study form. Staff.
Independent Study in INTAG 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.

INTAG 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 agriculture and rural development.

INTAG 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. R. Blake.
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.

INTAG 602 Agriculture In The Developing Nations II
Spring. 3 credits. Prerequisites: INTAG 402 and (or) permission of instructors. Field trip to India during January intersession. Note: cost of January 2004 field-study trip is approx. $2500, which includes air fare, 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 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.

INTAG 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.

INTAG 612 Intellectual Property Management and Licensing (also PL BR 612)
Spring. 2 credits. Prerequisite: open to graduate students and to seniors undergraduates. S-U grades optional. A. F. Krattiger, M. A. Mutschler, R. Potter, and R. D. Kryder.
For description, see PL BR 612.

INTAG 620 Rural Livelihoods and Biological Resources: Technologies and Institutions

INTAG 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 community development, 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.

INTAG 694 Graduate Special Topics in INTAG
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.
Agriculture

Internship Opportunities in Burgundy, France

Agriculture Study Tour to Burgundy, France

Seminar on Agricultural Trade Policy (AEM 730)

Global Marketing Strategy (AEM 449)

"Global Agribusiness Management (AEM 329)

International Trade Policy (AEM 430)

Communication

Sociology

Rural Sociology

Population Dynamics (R SOC 201)

International Development (R SOC 205)

Social Indicators, Data Management and Analysis (R SOC 213)

Sustainable Development (R SOC 261)

Education, Inequality and Development (R SOC 305)

Comparative Issues in Social Stratification (R SOC 370)

Population Policy (R SOC 418)

Migration and Population Redistribution (R SOC 430)

Social Impact of Resource Development (R SOC 440)

Population, Environment, and Development in Sub-Saharan Africa (R SOC 495)

Sociological Theories of Development (R SOC 606)

The Sociology of "Third World" States (R SOC 725)

*Includes overseas travel

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. Cost of basic drafting equipment for the major plus materials for projects, about $250.

Introduction 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. Cost of basic drafting equipment and project supplies, about $250.

Fundamentals of landscape design applied to small-scale site-planning projects. Work in the studio introduces course participant to the design process, design principles, construction materials, planting design, and graphics.
Both before and after 1492. A major focus is American Indian cultures and philosophies continually transformed their cultural perceptions of landscape.

LA 155 American Indian Cultural Landscapes: Changes in Time
 FALL 3 credits.
 Lectures with slides and other media illustrate various American Indian civilizations 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 Indian American cultural landscapes.

LA 201 Medium of the Landscape
 FALL 5 credits. Limited to landscape architecture majors. Cost of basic drafting equipment, supplies, and fees, about $200; expenses for field trip, 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, earthform, water, and vegetation.

LA 202 Medium of the Landscape
 SPRING 5 credits. Prerequisite: LA 201 with a grade of C or better. Cost of supplies and fees, about $250; expenses for field trip, about $250.
 This course focuses on the role of materials in design, design theory, and design vocabulary associated with landscape architectural projects.

LA 260 Pre-Industrial Cities and Towns of Native America (also CRP 360 and CRP 666 and LA 666)
 FALL 3 credits. Offered alternate years.
 Various American Indian civilizations as well as diverse European cultures have all exerted their influence 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 which now lie within the boundaries of modern cities. This course explores how urban centers evolve, what lies beneath today's cities, and how previous centuries have altered the urban landscape. Students participate in a local archaeological excavation. Three Saturday 8-hour field labs are required; students choose three labs from seven that are offered.

LA 262 Laboratory in Landscape Archaeology (also ARKEO 262)
 SPRING 3 credits. Prerequisites: LA 261 or ARKEO 261 or permission of instructor. 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 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.

LA 266 Jerusalem through the Ages (also NES 266, JWST 266, ARKEO 266, RELST 266)
 FALL 3 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 Jebusite Jerusalem, Jerusalem as the capital of the Davidic dynasty, the Roman era city of Herod and Jesus, the Crusaders and medieval Jerusalem, and Ottoman Jerusalem as the city entered the modern era. Students examine the original historical sources (e.g., Bible, Josephus, the Madaba map, etc.) which pertain to Jerusalem.

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 design and planning are critically explored through theory and practice in this studio.

LA 315 Site Engineering I
 SPRING 3 credits. Prerequisite: permission of instructor. Cost of supplies and fees, about $250; basic expenses for field trip, about $250.
 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 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 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.

LA 403 Directed Study: The Concentration
 FALL 1 credit. Prerequisite: Any landscape architecture undergraduate students in their final year of study. Cost of supplies and fees, about $250.
 Working with their advisor, students create a written and visual paper that documents the concentration's 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. Prerequisite: Any landscape architecture undergraduate students only. Cost of supplies and fees, about $250.
 The course provides the student a comprehensive understanding of the role of the professional landscape architect and the problems and opportunities one may encounter in an office or in other professional situations. Topics discussed include practice diversity, marketing professional services, office and project management, construction management, computers in the profession, and ethics.

LA 483 Seminar in Landscape Studies
 FALL 3 credits. Limited to seniors in any major or graduate students in any field. Offered spring 2005.
 A topical seminar with a different subject and method each time it is offered. Subject and schedule include "Landscape and Visual Culture," (fall 2003) 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 2004) a study of common places, including their spatial and visual patterns, uses, and material culture; "Landscape and Critical Thinking," (fall 2005) dealing with landscape as a tool for studying social and artistic issues, landscape as a basis for social inquiry.

**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 architectural 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 490 Rome Wasn't Built in a Day]
- Spring. 3 credits.
- In this electronic course, students learn about the historical context and urban development of Rome through the study of Rome from antiquity to the present. The course engages participants in the investigations of urban design in Rome both as a case study and as a vehicle for exploring concepts applicable to many contemporary cities worldwide. The material focuses on the intersection between historical studies of urban space, architectural geography, urban landscape formation, and the design of cities. Lectures, research, and readings and exercises are developed using the digital text, the course engages participants in the investigations of urban design in Rome both as a case study and as a vehicle for exploring concepts applicable to many contemporary cities worldwide. The material focuses on the intersection between historical studies of urban space, architectural geography, urban landscape formation, and the design of cities. Lectures, research, and readings and exercises are developed using the digital text, the course engages participants in the investigations of urban design in Rome both as a case study and as a vehicle for exploring concepts applicable to many contemporary cities worldwide.

**LA 491 Creating the Urban Eden: Woody Plant Selection, Design, and Landscape Establishment (also HORT 491)**
- Fall. 4 credits. Prerequisites: major in horticulture or landscape architecture or permission of instructor. Limited to 48 students. S-U grades optional. Cost of supplies, about $50; expenses for field trips, about $50.
- 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 a variety of planting, pruning, and care practices of site amelioration and plant establishment. Design follows the written specifications and graphic details are 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. Attendance limited to horticulture and landscape architecture majors. Limited to 48 students. S-U grades optional. Cost of supplies, about $50; expenses for field trips, about $50.
- This course focuses on the identification, uses, and establishment of woody plants in urban and garden settings. Issues of site assessment and soil remediation are emphasized in addition to soil volume calculations, drainage and surface detailing and planting techniques. Students critically assess potential planting sites, select appropriate trees, shrubs, vines and ground covers for a given site. Design for specific sites followed by written specifications and graphic details are produced to implement these proposals. Students implement a hands-on manner, site remediation and planting techniques they have learned by creating new landscapes that serve to integrate theory, principles and practices. Together, HORT/LA 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, history, or technology. 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 crisis. 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. S-U grades optional.
- Students must register with 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 with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.
- This course includes giving up to three lectures per week, teaching a laboratory course, or teaching an independent study course under the supervision of department faculty.

**LA 499 Undergraduate Research**
- Fall or spring. 1-5 credits. Students must register with an Independent Study form. Students will 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 500 Composition and Theory**
- Fall. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250. Field trip about $250.
- The studio focuses on the spatial design of project-scale site development. Students develop their expertise in applying the design theory, vocabulary, and graphic expression introduced in LA 501.

**LA 505 Landscape Representation I**
- Fall. 3 credits. Prerequisite: concurrent enrollment in LA 501 or permission of instructor.
- This course introduces students to both conventional and unconventional modes of landscape architectural design representation. Drafting, orthographic drawing, axiomatic project, lettering, analysis and concept drawing are taught alongside more expressive modes of direct site study and representation.

**LA 506 Graphic Communication II**
- Spring. 3 credits. Prerequisites: LA 505 and concurrent enrollment in LA 502 or permission of instructor.
- This intermediate level course focused on modes of landscape representation from ideation to presentation. Representation modes may include freehand, process drafting, analysis and orthographic drawing, concept modelling, composite drawings, and visual books.

**LANAR 524 History of European Landscape Architecture**
- Fall. 3 credits.
- Offered through the College of Architecture, Art, and Planning.

**LANAR 525 History of American Landscape Architecture**
- Spring. 3 credits.
- Offered through the College of Architecture, Art, and Planning.

**LA 545 The Parks and Fora of Imperial Rome**
- Spring. 3 credits. Prerequisites: advanced standing in a design field, classics or history of art, other disciplines, or by permission of the instructor.
- This advanced seminar is seeking an interdisciplinary group of students in classics, art history, archaeology, landscape architecture, horticulture, and architecture to bring their knowledge of Latin, Greek, Italian, archaeology, drawing, design, or computer modeling to a collaborative study of the ancient fora and public parks depicted on the Severan Marble plan of Rome. Opportunity for a spring break trip to Rome.

[LA 569 Archaeology in Preservation Planning and Site Design (also CRP 569)]
- Spring. 3 credits. Offered alternate years.
- Offered spring 2005.
- In response to federal, state, and local legislation, historical archaeology now plays an important role in design, planning, and land-use decisions. Students develop the research skills needed to complete environmental review projects and historic landscape plans.

**LA 580 Landscape Preservation: Theory and Practice**
- Fall. 3 credits. Prerequisites: limited to junior and senior undergraduates, and graduate students.
This course examines the evolving practice of landscape preservation in the United States. Topics include the recent history of the discipline, methodologies in documentation 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**

Spring. 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. Seminar in landscape design theory. For graduate students and seniors.

**LA 598 Graduate Teaching**

Fall or spring. 1–3 credits. Prerequisite: permission. Students must register with 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 2 hours per week = 1 credit hour).

**LA 601 Integrating Theory and Practice I**

Fall. 5 credits. Limited to graduate students. 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 use 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 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 sense of site and place. Social, cultural, physical, and historic factors and their relationship to site design and planning are critically explored through theory and practice.

**LA 603 Directed Study: The Concentration**

Fall, spring. 1 credit. Prerequisite: any landscape architecture graduate student 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 estimation, 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 Grading**

Fall. 2 credits. Limited to 10 students. Prerequisite: LA 315 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 altered the landscape in their own way as they created their 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 638 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 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. 3-D 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 fields. Topics include the influences of culture, history, and criticism, as well as reinterpretation 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**


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 110 Introduction to the Field of Natural Resources**

Fall. 3 credits. Limited to first-year students in Natural Resources. This course provides a comprehensive overview of the modern field of natural resources 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
A practical, field-oriented course emphasizing nonindustrial, private forest land in the multiple purpose management of small, principled and practices of stewardship and research projects in local forests.

NTRES 303 Forest Management and productivity, and nutrient cycling.

NTRES 302 Forest Ecology Laboratory Fall. 1 credit. Cost of weekend trip approximately $30. Concurrent enrollment in NTRES 301 required. T. J. Fahey. Field trips designed to familiarize students with the nature of regional forests and to provide experience with approaches to quantifying forest composition and its relation to environmental factors. Optional weekend field trips to Adirondacks and to the White Mountains, New Hampshire. Includes group research projects in local forests.

NTRES 303 Forest Management and Maple Syrup Production Spring. 3 credits. Letter grades only. Offered alternate even years. P. J. Smallidge. A practical, field-oriented course emphasizing principles and practices of stewardship and multiple purpose management of small, nonindustrial, private forest land in the northeastern United States, including the production of maple syrup.

NTRES 305 Applied Population Ecology Fall. 3 credits. Letter grade only. Prerequisite: NTRES 210 and background in biology or ecology strongly recommended; completion or concurrent enrollment in CALS math requirement. 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 multispecies population dynamics, with emphasis on understanding the relationship between ecological processes and the animal level and subsequent dynamics at the population level. Significant emphasis is placed on principles as applied to conservation and management. Computer and field-based exercises are used to reinforce concepts presented in lecture.

NTRES 306 Natural Resources Planning and Management Fall. 3 credits. Prerequisite: junior standing. T. B. Lauber. 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 308 Natural Resources Planning and Management Fall. 3 credits. Prerequisite: NTRES 301 or BTRY 301. J. T. Fahey. Emphasis is placed on the application of these principles to the conservation and management of fisheries resources and aquatic habitats. Illustrative examples are provided from current literature and case studies.

NTRES 310 Fish Ecology, Conservation, and Management Spring. 3 credits. Prerequisites: NTRES 210 or permission of instructor; NTRES 305 or a general ecology course recommended. J. Jackson, E. Mills, 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 habitats. Illustrative examples are provided from current literature and case studies.

NTRES 311 Fish Ecology Laboratory Spring. 1 credit. Prerequisite: NTRES 310 or concurrent enrollment. Two weekend field trips. J. Jackson, E. Mills, 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 314 Environmental Governance Fall. 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 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 603.

NTRES 315 Biological Statistics I (also BTRY 301) Fall. 4 credits. Prerequisite: 1 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 316 Biological Statistics II (also BTRY 302) Spring. 4 credits. Prerequisite: NTRES 315 or BTRY 301. J. Tantillo.

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 multifactor analysis of variance (ANOVA), and a brief foray into nonlinear modeling. Applied analysis is carried out in the Splus statistical computing environment.

NTRES 320 Principles of Toxicology (also TOX 320) Spring. 3 credits. Prerequisites: one year each of chemistry and biology with labs, 1 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 and policy. For description, see EAS 321.
NTRES 350 Global Ecology and Management
Spring. 3 credits. Prerequisites: college-level ecology. J. B. Yavitt. The subjects of biogeography, ecology, and biodiversity have patterns and processes that emerge only at the global scale. Recognizing the global importance of these patterns and processes is even more imperative in light of the tremendous increase in the human population size and the effects of humans on the Earth. This course is an introduction to the field of global ecology. Topics include comparative ecology and biogeography, community and biogeography, and ramifications of global climatic change.

[NTRES 370 Conservation of Birds]
Spring or summer. 2 credits. Prerequisite: NTRES 210 or permission of instructor. Offered alternate odd years. Next offered spring 2005. 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 practice, 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 371 Conservation of Birds Laboratory]
Spring or summer. 1 credit. Concurrent enrollment in NTRES 370 required. Saturday mornings TBA. Offered alternate odd years. Next offered spring 2005. 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. Field trips for taking and organizing field notes; the relationships of birds to their habitats and to other birds; and methods and procedures for censusing and surveying songbird populations.

[NTRES 400 International Environmental Issues]
Fall or winter. 4 credits. Prerequisite: junior standing or above. Next offered fall 2004.

NTRES 402 Environmental and Natural Resources Policy Processes
Spring. 3 credits. Prerequisites: junior standing, special application process, and course fee (approx. $400). Lec. January 12-day intersession, three 2-hour orientation sessions in January and four 2-hour sessions in February and March. Completed applications due by October 15. Applications are available by contacting map.10@cornell.edu or at www.dnr.cornell.edu/courses/NTRES/402/402in fо.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 stages; roles of lobbyists, legislature, executive branch, and other agencies. Case studies, presentations by Washington policy makers appearing as guest lecturers. Required interviews, term paper, and oral reports. Includes 11 days in January in Washington, D.C.

NTRES 406 Ecology Risk Assessment (also TOX 406)
Fall. 3 credits. Prerequisites: BIOES 261 or equivalent; permission of instructor if not an advanced student in natural sciences of engineering. J. W. Gillett.

This course strives to develop understanding of and competence in the different types of ecological (nonhuman health) risk assessments based on USEPA principles and methods. Focus is on cases for chemical, physical, and biological stressors in a variety of circumstances.

NTRES 407 Religion, Ethics, and the Environment
Fall. 4 credits. For juniors, seniors, and graduate students; others by permission only. S-U grades optional. R. A. Baer.

How religion (especially Christianity and Judaism), philosophy, and ethics influence our treatment of nature. Themes include character and moral development, similarities and differences between moral and scientific claims, truth telling, public reason, and property. Also covers animals rights vs. ecosystem concerns, responsibility to future generations, the limitations of rationalism in ethics, and discussion of whether women approach moral issues differently than men. One additional credit may be available through the Writing-in-the-Majors program. Students may apply at the first class, only 8-10 students will be accepted.

NTRES 411 Seminar in Environmental Ethics
Fall. 4 credits. For seniors, juniors and graduate students. S-U grades optional.

Moral concerns relative to the natural environment and agriculture. Major themes generally include: animal rights vs. ecosystem concerns; natural resource management and the concept of the public interest; applying environmental ethics in a democratic and pluralistic society; how our treatment of one another parallels our treatment of nature; and land use ethics. Several classes focus on the nature of facts, values, knowledge, and truth telling.

NTRES 415 Principles and Practices of Agroforestry (also HORT 415 and CSS 415)
Fall. 3 credits. Prerequisites: senior or graduate standing or permission of instructor. Lec. M W F 10:10-11:00. Offered alternate years; possibly offered fall 2003. L. Buck, E. Fernandes, K. Mudge.

An integrated set of laboratory field exercises designed to expose students to: the diversity of wetland ecosystems; the vegetation, soils, water chemistry, and hydrology of wetlands in the region; methods of sampling wetlands vegetation, soils, and water; and methods of wetland identification and delineation.

NTRES 416 Wetland Ecology and Management-Laboratory
Fall. 1 credit. Optional. Concurrent enrollment in NTRES 418 is required. L. Buck.

An integrated set of laboratory field exercises designed to expose students to: the diversity of wetland ecosystems; the vegetation, soils, water chemistry, and hydrology of wetlands in the region; methods of sampling wetlands vegetation, soils, and water; and methods of wetland identification and delineation.

NTRES 417 Principles and Practices of Agroforestry—Laboratory (also HORT 416 and CSS 416)
Fall. 3 credits. Prerequisite: NTRES 415. Offered alternate years; possibly offered fall 2003. L. Buck, E. Fernandes, K. Mudge.

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 principles and techniques, including demographic viability analysis of populations, genetic analysis, as well as aspects of the human dimensions of conservation biology.
transformed into useful information for decision makers.

**NTRES 471 Ecoregions: Ecology and Conservation**
Spring. 2 credits. Letter grade only. Prerequisites: NTRES 210, 305; statistics recommended; junior standing or above. Lec/Lab. Offered alternate even years. 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 498 Stream Ecology (also ENTOM 456, BIOEE 456)**
Spring. 4 credits. Limited to 60 students. Prerequisites: none; BIOEE 261 recommended. Offered even years. P. Beckarsky.

For description, see ENTOM 456.

**NTRES 458 Human Dimensions of Natural Resource Management**
Spring. 3 credits. Grades optional. Limited to juniors and seniors. J. Enck and B. Lauber.

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 459 Wildlife Population Analysis: Techniques & Models**
Spring. 3 credits. Prerequisites: NTRES 305 (or equivalent, or by permission of instructor), a college-level math or statistics class. Lecture/lab: 2-week intensive course (M-T W R F morning lectures, afternoon labs) in January with follow-up meetings during the spring semester.

This course will explore the theory and application of a variety of statistical estimation and modeling techniques used in the study of wildlife population dynamics. The course will focus on exploration of a selection of the tools needed for modern wildlife conservation and management, including (possibly) analysis of mark-recapture data, population viability analysis, decision theory, and matrix modeling.

**NTRES 460 Quantitative Ecology and Management of Fisheries Resources**
Spring. 4 credits. S-U grades optional. Prerequisites: NTRES 304 recommended or permission of instructor. Offered alternate even years. P. J. Sullivan.

The dynamics of marine and freshwater fisheries resources are examined with a view towards observation, analysis, and decision making from 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 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

**NTRES 470 Ecological Change and Human Dimensions**
Fall, spring, or winter. Credit TBA. S-U grades optional. Prerequisite: permission of instructor; R. A. Baer, T. Brown, L. E. Duck, D. J. Decker, J. Enck, J. Gillett, B. Knuth, B. Lauber, J. Tamills, 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 with 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. 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 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 with an Independent Study form (available in 140 Roberts Hall).

**NTRES 496 Special Topics in Fish and Wildlife Biology and Management**
Fall or spring. Credit TBA. S-U grades optional. Prerequisite: permission of instructor: B. Bedford, B. Blossey, T. Fahey, M. Krasny, J. Lassoie, R. Schneider, R. Sherman, P. Smallidge, J. Yavit.

Topics in ecology and management of landscapes are arranged depending on the interests of students and availability of staff. Students must register with 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 with 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. 2 credits. Prerequisite: 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 resources 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. Special topics seminar on subjects related to resource policy and management. Offering varies by semester and is subject to availability of staff.

**NTRES 602 Seminar on Selected Topics in Resource Policy and Management**
Fall. 2 credits. S-U grades only. 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 603 Introductory Seminar (also CEE 603)**
Fall or spring. 1 credit. S-U grades only. Offered alternate even years. P. Sullivan.

This introductory seminar is required for undergraduate students interested in the field of natural resources. The seminar introduces the core concepts of natural resources and their management, and provides an overview of the research and professional opportunities in the field. Students will learn about the principles and methods used in natural resource management, and will have the opportunity to interact with professionals in the field. The seminar is based on lectures, discussions, and guest lectures, and is designed to help students develop the knowledge and skills needed to pursue further study in natural resources.

**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, communications issues, and challenges to risk assessment methodologies. Some sessions held jointly with other seminar series. Enrollment in seminar requires short reports and preparation for two regular 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 and two 300-level courses in chemistry, biological science, or toxicology. Offered alternate even years. 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 612 Fish and Wildlife Ecology Seminar**

Fall and spring. 1 credit. Prerequisite: permission of instructor. Check with department for availability. Staff.

Discussion of individual research, current problems, and current literature in fish and wildlife ecology. Offering varies by semester and subject to availability.

**NTRES 614 Environmental Governance**

Spring. 4 credits. S. Wolf.

For description, see NTRES 314. 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 615 Case Studies and Special Topics in Agroforestry**


**NTRES 616 Forest Science and Management Seminar**

Fall. 2 credits. 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 618 Critical Issues in Conservation and Sustainable Development**

Fall. 3 credits. Preference to graduate students with minor in conservation and sustainable development; seniors by permission. Limited to 30 students. T R 2:30–4:25. Staff.

Establishes a conceptual foundation for analyzing and addressing conservation and development issues from an interdisciplinary perspective. Engages students in the inherent conflicts between natural resource conservation and rural development. Students work in interdisciplinary groups to analyze issues and cases from both developing and developed countries.

**NTRES 620 Wildlife Population Analysis: Techniques and Models**

Spring. 3 credits. Prerequisites: NTRES 305 or permission of instructor. S-U grades optional. Not offered 2003–2004. L. E. Buck.

**NTRES 625 Quantitative Ecology and Management of Fisheries Resources**

Spring. 4 credits. S-U grades optional. Prerequisites: NTRES 304 recommended or permission of instructor. Offered even years. P. J. Sullivan.

The course is taught in conjunction with NTRES 460 (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 670 Spatial Statistics**


Spatial statistical concepts and techniques are developed and applied to ecological and natural resource issues. Topics include visualization of 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 Organic Inputs in Tropical Soils and Agroforestry (also INTAG 696 and CSS 696)**

Fall and spring. 1 credit. S-U grades only. F 12:20–1:10. E. Fernandes, L. Fisher.

For description, see INTAG 696.

**NTRES 698 Current Topics: Environmental Toxicology (also TOX 698)**

Fall, spring. 1–3 credits. 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 699 Graduate Individual Study in Natural Resources**

Fall or spring. Credit. TBA. S-U grades only. Prerequisite: permission of instructor. NTRES graduate faculty.

**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.

**Related Courses in Other Departments**

Courses in many other departments are relevant to students majoring in Natural Resources. The following list includes some of the most closely related courses but is not exhaustive.

- Environment and Society (R SOC 208, 324, 340, 410, 440, 495)
- Environmental Law, Ethics, and Philosophy (SATS 206; CRP 390, 443, 444, 451, 453, PHIL 241, 246, 247, 381)
- Human Systems and Communication (COMM 260, 285, 352, 421)
- Physical Sciences (BEE 151, 301, 371, 425, 435, 471, 473, 475, 478; CSS and EAS 260, 321, 365, 371, 398, 483; EAS 102, 104; CEE 432)
- Public Policy and Politics (GOVT 427, 428; BIO & SOC 461; CEE 529)
- Resource Economics (AEM 250, 450, 451)
- Spatial Data Interpretation (CSS 411, 420, 620, 660)

**PLANT BREEDING**


**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 BR 201 Plants, Genes, and Global Food Production**

Fall. 2 credits. Prerequisite: 1 year of introductory biology or permission of instructor. Lec, T R 11:15–12:05. S. R. McCouch.

This course provides an introduction to plant breeding. It offers a sense of the historical and social importance of the field, tracing its evolution from the pre-scientific days of crop domestication to modern applications of biotechnology. It offers specific examples of how breeding objectives are realized and raises questions about the environmental, social, and economic consequences of intensive food production systems. This course may be used for partial fulfillment of the GLS distribution requirement GROUP B—Biological Sciences.

**PL BR 228 Plant Genetics**

Spring. 2 or 3 credits (2 credits if taken after BIOLGD 281). Prerequisites: 1 year of introductory biology or equivalent, permission of instructor required for students who have taken BIOLGD 281.


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 401 Plant Cell and Tissue Culture**  
Fall. 3 credits. Prerequisites: a course in plant biology or genetics, or permission of instructor. Lects, T R 10:10. E. D. Earle. Lectures and demonstrations dealing with the techniques of plant tissue, cell, protoplast, embryo, and anther culture and the applications of those techniques to biological and agricultural studies. Plant improvement 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 (alternate weeks) plus 1 hr TBA. E. D. Earle, A. R. Alan.

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 propagation, storage, and genetic manipulation. 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 begins 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 of crop domestication, and the practice of plant breeding. The course explains the necessary technical and biological knowledge and skills of the modern plant breeder, and includes case studies of specific crop improvement programs. These case studies are used to illustrate the history and practice of plant breeding, demonstrate the potential of genetic improvement of crop plants, and the problems faced by breeders in plant improvement.

**PL BR 404 Crop Evolution, Domestication and Diversity (also BIOPL 404, INTAG 404)**  
Fall. 2 credits. S-U or letter grade. 
Prerequisites: BIOGD 281 or PL BR 225 or permission of the instructor. Lect, 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 also are addressed.

**PL BR 446 Plant Cytogenetics 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. Wassef.

This course aims to provide fundamental knowledge and techniques in plant cytogenetics. Emphasis is on applications to research on plant genetics and plant breeding. Plant materials involve 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. The 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. 
Prerequisites: permission of adviser 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 "CALS Independent Study, Research, Teaching, or Internship" form signed by the faculty member who will supervise their study and assign their credits and grade. S-U grades only. Staff.

On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty advisor and student, stating the conditions of the work assignment, supervision, and reporting.

**PL BR 497 Individual Study in Plant Breeding**  
Fall or spring. Credits variable, may be repeated to a maximum of 6. S-U optional. 
Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.

**PL BR 498 Undergraduate Teaching**  
Fall or spring. Credits variable, may be repeated to a maximum of 6. S-U optional. 
Prerequisites: permission of instructor, and previous enrollment in course to be taught or equivalent. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.

Undergraduate teaching assistance in a plant breeding course. Teaching experience may include leading a discussion section, preparing and teaching laboratories, and tutoring.

**PL BR 499 Undergraduate Research**  
Fall or spring. Credits variable. S-U optional. 
Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.

Undergraduate research projects in plant breeding.

**PL BR 604 Methods of Plant Breeding Laboratory**  
Fall. 2 credits. Prerequisite: PL BR 403 or equivalent (may be taken concurrently). S-U optional. T R 1:25-4:15. M. E. Sorrells and R. E. Anderson.

Field trips to plant breeding programs involve discussion of breeding methods used, overall goals, selection and screening techniques, and variety and germ plasm release. Additional labs include use of computers in plant breeding research and selection techniques for disease resistance. For a term project each student designs a comprehensive breeding program on a chosen crop.

**PL BR 606 Advanced Plant Genetics**  
Spring. 3 credits. S-U grades optional. 
Prerequisites: BIOGD 281 or equivalent and instructor's permission. Lects, T R 1:25-2:40. M. Jahn.

Provides an advanced survey of genetics in higher plants including selected topics in Mendelian genetics, plant reproductive biology, chromosome biology, cytogenetics, 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.

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 Intellectual Property Management and Licensing**  
Fall. 2 credits. Prerequisite: open to graduate students and to senior undergraduates. S-U or letter option. Lect, M W F 10:30-11:20, weeks 1-4, A. F. Krattiger, M. A. Mutschler, R. Potter, and R. D. Kryder.

Comprehensive course for graduates and senior undergraduates in any field of agriculture and the life sciences on intellectual property (IP) management and licensing. The course covers statutory protection (copyright, trademarks, patents, plant variety protection), contracts (from material transfer to licensing), management of IP (freedom-to-operate, valuation, genetic resources, trade, marketing, etc.) 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. S-U grades optional. 
Prerequisites: BIOGD 281 and PL BR 403 or equivalents. An introductory course in plant pathology and/or entomology also highly recommended. M 2:30-4:25, weeks 1-4. Offered alternate even years. P. Griffiths.

A multidisciplinary examination of the challenge of incorporating disease and insect resistance into crop plants. Topics covered include national and international germplasm collections, identification of sources of resistance, resistance mechanisms in plants, monogenic and polygenic control of...
PL BR 653.6 Molecular Breeding (also BIOPL 653.5)
Fall. 1 credit. S-U grade or letter option.
Lecs, M W F 10:10-11:00 (12 weeks) Oct. 1-Oct. 29. 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 900 Graduate-Level Dissertation
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.

PL BR 901 Doctoral-Level Dissertation Research
Fall or spring. Credit TBA. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty.
For students admitted to candidacy after the "A" exam has been passed.

PL BR 653.7 Quantitative Genetics in Plant Breeding
Spring. 3 credits. S-U grades optional.
Prerequisite: PL BR 653.6 offered alternate years.
M. E. Sorrells.
Emphasis is on critical discussion and evaluation of selected benchmark papers and current literature. 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 716 Perspectives in Plant Breeding Strategies
Spring. 3 credits. S-U grades optional.
Prerequisite: PL BR 653.6 offered alternate years.
M. E. Sorrells.
Emphasis is on critical discussion and evaluation of selected benchmark papers and current literature. 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
Spring. 3 credits. S-U grades optional.
Prerequisites: PL BR 403 and BTRY 601 or equivalent. M 2:55-4:10. Offered even years.
D. R. Viands.
Discussion of quantitative genetics and quantitative trait loci (QTLs) for more efficient plant breeding. Specific topics include: 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. During one period, plants in the greenhouse are evaluated to provide data for computing quantitative genetic parameters.

PL BR 726 Problems and Perspectives in Computational Molecular Biology (also CS 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, evolutionary relationships across species. 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. We pair students/faculty 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 should be listed on an overhead slide to initiate discussion in the group.

PL BR 800 Master's-Level Thesis Research
Fall or spring. Credit TBA. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty.
For students working on a master's thesis.

PL BR 801 Independent Research
Fall or spring. Credit TBA. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty.
For students admitted to candidacy after the "A" exam has been passed.

PL PA 201 Magical Mushrooms, Mischievous Molds
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 241 Plant Diseases and Disease Management
Fall. 4 credits. Prerequisite: one year of biology. Lecs, M W F 11:15; lab, T or W 1:25. Lectures co-meet with PA 401; laboratories and exams are separate. Credit can only be for one of these courses. Staff.
An introduction to plant diseases, their diagnosis, and management. Topics covered include: fungi, bacteria, viruses, nematodes, and 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.
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 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 with 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 with 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 with 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 600 Professional Skills in Science and Plant Pathology**

Fall. 1 credit. S-U grades only. Lec, T 9:00-9:55; lab T 12:25-1:25.

Prerequisites: PL PA 401 or permission of instructor. Lee, M W 9:05 (7 weeks, 1st half of semester only); lab W 12:25–1:25 (7 weeks, 1st half of semester only). Offered alternate years. Next offered fall 2005. S. V. Beer.

This course emphasizes bacterial disease of plants, their occurrence in the field, isolation of bacterial pathogens and 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 only. Prerequisites: BIOMI 250 or permission of instructor. Lec, M W 9:05-9:55, Grady, S. W. 12:25–1:25 (7 weeks, 1st half of semester only). Offered alternate years. Next offered fall 2005. A. Collmer and S. W. Winans.

Introduction to genotypic approaches, tools, and discoveries involving the study of bacterial interactions with plant and animal hosts. Topics include the TIGRE Comprehensive Microbial Resource and Artemis tools, the pathogens *Yersinia pestis*, *V. cholerae*, *Pseudomonas syringae*, *Ralstonia solanacearum*, *Agrobacterium tumefaciens*, and the symbiont *Sinorhizobium meliloti*.

**PL PA 609 Fungal Pathology**

Spring. 1 credit. S-U grades only. Prerequisites: PL PA 309, 401 or equivalent, or permission of instructor. Lec, F 12:25–1:25 (7 weeks, 2nd half of semester); lab F 2:20–3:20 (7 weeks, 2nd half of semester). Offered alternate years. W. Loeber.

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 pathogens 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. Next offered fall 2005. E. B. Nelson. This course is intended to provide students with a broad exposure to the biology of Oomycetes. The basic attributes of this important group and animal, plant, and invertebrate parasites are detailed in lectures and demonstration sessions. Emphasis is placed biological characteristics important to the pathology of these organisms. Topics address evolutionary biology, systematics, genetics, developmental biology, mechanisms of pathogenesis, unique aspects of Oomycete metabolism and reproduction, growth, 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]
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. 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]
Spring. 1 credit. S-U grades optional. Prerequisites: PL PA 401 or permission of instructor. Lec, M W 9:05-9:55 (7 weeks, 2nd half of semester). Offered alternate years. E. B. Nelson and W. Koeller. 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. 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. M. G. Milgroom. Introduction to basic principles of population genetics and evolution as they relate to plant pathogens. Topics include quantifying 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. Examples from fungi, oomycetes, bacteria and viruses are included.

[PL PA 628 Filamentous Fungal Genomics and Development (also BIOGD 6328)]
Spring. 1 credit. S-U grades optional. Prerequisite: BIOGD 281 or equivalent. Lec, M W F 10:10. (4 weeks, last 4 of semester) Next offered spring 2005. B. G. Tuigeon. 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 Ustilago maydis and from well known genetic models such as Aspergillus nidulans and Neurospora crassa.

[PL PA 642-661 Special Topics Series]
Unless otherwise indicated, the following description applies to courses 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]

[PL PA 647 Phytobacteriology Research Updates]

[PL PA 649 Fungal Biology]
Spring. 1 credit. TBA. K. T. Hodge.

[PL PA 650 Diseases of Vegetable Crops]

[PL PA 652 Field Crop Pathology]

[PL PA 656 Special Topics in Plant Disease Management]
Fall and spring. 1 credit. S-U grades only. Lec, F 12:20–1:10. C. D. Smart. Weekly discussions of current topics in plant disease management. These include not only management practices, but also factors that influence management strategies. Students are required to read current literature and present oral reports on a topic. This course is offered only at the Geneva campus.

[PL PA 661 Diagnostic Lab Experience]
Summer and fall. 1 or 2 credits. S-U grades only. Requires 3 hrs/wk per credit hour. T. A. Zitter. For graduate students and advanced undergraduates with a special interest in diagnosing plant diseases. Students work in the Diagnostic Laboratory (Plant Pathology Department) under supervision of the diagnosticians. Coursework or experience in diagnostic techniques is strongly advised. Priority is given to graduate students in plant pathology and plant protection.

[PL PA 662 Molecular Plant-Pathogen Interactions I and II (also BIOPL 652.1)]
Spring. 1 credit. Prerequisites: BIODG 281, BIODB 350 or 351, and BIOP 653.1. Lec, M W F 10:10. (12 weeks) Jan. 26–Feb. 20. A. Colmer, S. B. Lazzorowitz, G. Martin, B. Turgeon. Examines the molecular and cellular factors that control pathogen-plant interactions from the perspectives of pathogen biology and plant responses to pathogen infection. Beginning spring 2004, alternate years will focus on: (I) plant perception of microbial pathogens and the interplay of plant defenses and pathogen counterstrategies that result in resistance or susceptibility to pathogen production, with topics including the genetic nature of dominant and recessive resistance, induction of pathogen defense genes, apoptotic responses that limit infection, and RNA interference; and (II) the genetic and molecular mechanisms of fungal pathogenesis, with an emphasis on fungal and bacterial virulence proteins, toxins, and their deployment systems.

[PL PA 663 Plant Molecular Biology 1]
Fall. 1-5 credit. Prerequisites: BIO GS 281, BIO BM 330 or 331.

Section 01 Concepts and Techniques in Plant Molecular Biology (BIO PL 653.1)

This is an introductory module that provides a broad overview of molecular biology concepts relevant to the plant sciences, and serves as a prerequisite to other modules in the BIO PL 653 (fall) and BIO PL 652 (spring) series. The course is divided into two sections: 1) gene discovery, which covers genetic, molecular, and genomics approaches to the isolation of plant genes; and 2) gene characterization, which covers DNA sequencing, DNA and RNA blotting, use of gene databases, and various approaches to producing transgenic plants. Emphasis is on understanding the appropriate
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.

**PL PA 664 Molecular Plant-Microbe Interactions (also BIOL 652, Sec 02 and BIOMI 652, Sec 02)**
Spring. 1 credit. Prerequisites: BIODG 281,
BIOM 330 or 331 or 333, and BIOL 655 (section 01) or their equivalents. S-U grades optional. Lects, M W 12:20-12:35 (12 lecs) Jan. 26-Feb. 20. Offered alternate even years. S. C. Winans.

For course description, see BIOL 652, Sec. 02.

**PL PA 681 Plant Pathology Seminar**
Fall and spring. 1 credit. Required of all
plant pathology majors. S-U grades only.

**PL PA 684 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 788 Research in Molecular Plant Pathology**
Fall and spring. 2, 4, or 6 credits.
Prerequisite: permission of instructor before beginning research. S-U grades only.
S. V. Beer.

Guided research experiences in laboratories addressing questions concerning the interaction of pathogens (bacteria, fungi, viruses) and plants at the molecular level. Intended for beginning graduate students with a concentration in Molecular Plant Pathology and sufficient theoretical background and practical laboratory experience. Students submit plans and reports on each research experience.

**PL PA 797 Special Topics**
Fall or spring. 1-5 credits. S-U grades optional.
An opportunity for independent study of a special topic.

**PL PA 798 Graduate Teaching Experience**
Fall or spring. 1-5 credits. S-U grades. Staff.
Graduate teaching assistant in a mycology or
plant pathology course by mutual agreement
with the instructor. This experience may include, but is not limited to, preparing, assisting in, and teaching laboratories, preparing and delivering lectures, leading discussion sessions, and tutoring.

**PL PA 800 Master's-Level Thesis Research**
Fall or spring. Credit THA. S-U grades optional. Prerequisite: permission of adviser. Graduate faculty.
For students working on a master's degree.

**PL PA 900 Graduate-Level Thesis Research**
Fall or spring. Credit THA. S-U grades optional. Prerequisite: permission of adviser. Graduate faculty.
For students in a Ph.D. program who have not passed the "A" exam.

**PL PA 901 Doctoral-Level Thesis Research**
Fall or spring. Credit THA. S-U grades optional. Prerequisite: permission of adviser. Graduate faculty.
For doctoral candidates who have passed the "A" exam.

**POMOLOGY (FRUIT SCIENCE)**
See Horticulture

**RURAL SOCIOLOGY**

**R SOC 201 Population Dynamics (also SOC 202)**
Fall and spring, or summer. 3 credits. S-U optional. Students must register for this course as R SOC 201. T R 1:55-2:10. P. Eloundou-Enyegue.

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.

**R SOC 205 International Development (also SOC 260)**
Fall and spring. 3 credits. Enrollment limited to 35. ALs students must register for this course as R SOC 201. T R 1:55-2:10. P. Eloundou-Enyegue.

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 on 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, we examine Southern societies (economies, ecologies, class/gender relations) and the impact of global forces on Southern resources. Such forces include global food systems, new forms of export production, development agencies, multilateral institutions, local bureaucracies, transnational corporations, the debt crisis, and new technologies. Also examined are the new global justice movements, such as environmentalism, feminism, and landless workers, peasant, and grassroots activism.

**R SOC 206 Gender and Society (also FGSS 206)**
Spring. 3 credits. Enrollment limited to 35. Lects, M W 11:15-12:05; sec, various times. Staff.
Course familiarizes students with origins of gender hierarchies, social and 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.

[R SOC 207 Problems of Contemporary Society (also SOC 207)]
Fall. 4 credits. S-U grades optional. Lec, M W F 11:15-12:05; Sec F. D. Heckathorn. 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, the institutions through which they are created and perpetuated, and the forms of institutional change required to address them, are emphasized.

[R SOC 208 Technology and Society]

[R SOC 209 Social Inequality (also SOC 208)]

[R SOC 213 Social Indicators, Data Management, and Analysis]
Fall. 3 credits. Offered alternate years (complement of R SOC 214). T R 11:40-12:55. J. Francis. 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.

[R SOC 214 Research Methods for the Social Sciences]

[R SOC 215 Introduction to Organizations (also SOC 215)]

[R SOC 220 Sociology of Health of Latinos and Ethnic Minorities (also LSP 220)]
Fall. 3 credits. S-U optional. Enrollment is limited to 15. T R 10:10-11:25. P. 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.

[R SOC 261 Sociology of Sustainable Development]

[R SOC 275 Immigration and a Changing America]
Fall. 3 credits. S-U grades optional. M. W 2:55-4:10. M. M. Kritz. Immigration has shaped population and society throughout U.S. history. Today, immigration has reemerged as a major force in American life. The course examines how contemporary and earlier immigrations differ in their determinants and consequences. The first part of the course focuses on who the new immigrants are, why they come, where they live, and what they do. Current trends in immigration are discussed as well as immigration and refugee policies that shape immigration. The second part of the course evaluates the integration of immigrants, having on U.S. society, economy, and policy. Theories of immigration, immigration policies, and the diversity of immigrant experiences receive attention throughout the course.

[R SOC 301 Theories of Society (also SOC 375)]
Spring. 3 credits. Prerequisites: Rural sociology or sociology course. S-U grades optional. Enrollment is limited to 30. T R 11:40-12:55. P. Eberts. An introduction to the "classical" sociological theorists (Marx, Weber, Durkheim) of the late nineteenth and early twentieth century, as well as "erased" and missing sociological voices of the period (such as C. Perkins, Gilmor, W.E.B. DuBois). The course addresses the dramatic social upheavals including the fall of the Ottoman Empire, industrialization, capitalism, and rise of bureaucracy to which these thinkers reacted and the inspiring (and conflicting) visions for the future which they offered. The intellectual history, the influence of the theorists on subsequent sociology, and the potential for relevance to contemporary society are emphasized.

[R SOC 302 Evaluating Statistical Evidence (also SOC 301)]
Fall. 4 credits. S-U optional. Lec, M W 11:15-12:05. S. Szelenyi. A first course in statistical evidence in the social sciences emphasizes statistical inference and multiple regression models. Theory is supplemented with numerous applications.

[R SOC 305 Education, Inequality and Development]
Spring. 3 credits. Letter grade. Prerequisite: introductory social science course. 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 education, (3) education and socioeconomic stratification, (4) the effects of education on development, and (5) tools for evaluating education projects.

[R SOC 311 Social Movements (also AIS 311)]
Spring. 3 credits. Prerequisites: R 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, they are utilized as political action 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 processes 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.

[R SOC 318 Ethnohistory of the Northern Iroquois (also AIS 318)]

[R SOC 324 Environment and Society (also S&TS 324 and SOC 324)]
Fall or summer. 3 credits. Enrollment limited to 100. 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, social ecology, 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, desertification, climate change, and ozone depletion. A sociological framework is applied to evaluate interrelationships of substantive and philosophical/ideological issues.

[R SOC 331 Consumer Demographics (also AEM 416)]
Fall. 3 credits. Letter grades only. T R 8:40-9:55. W. Brown. Students participate in a consulting project, using demographic and geographic analysis to describe consumer characteristics and behavior for a chain of retail establishments. Requires skills in both quantitative analysis and technical writing.

[R SOC 333 Genomics and Society]

[R SOC 336 Rural Areas in Metropolitan Society]

[R SOC 340 Sociology of Food Systems]

[R SOC 360 Sociology of American Indians (also AIS 361)]

[R SOC 367 American Indian Politics and Policy (also AIS 367)]

[R SOC 370 Comparative Issues in Social Stratification (also SOC 371)]
Fall. 3 credits. Prerequisite: an introductory social science course. T R 1:25-2:40. T. A. Lyson. 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.
R 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. Students should select a faculty advisor and begin project 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.

R SOC 410 Health and Survival Inequalities (also SOC 410)
Historical inequalities in health 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.

R SOC 414 Population Policy (also B&amp;S 341)
R SOC 421 Theories of Reproduction (also SOC 421)
Spring. 4 credits. S-U grades optional. TBA. A. Brown.
Examines the contentious debate on what makes women have any, few, or many children. It covers theories of population growth and changing fertility in both historical and contemporary perspectives. 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.

R SOC 430/630 Human Migration: Internal and International
Fall. 3 credits. Offered even years. Prerequisite: Demography course or permission of instructor. T R 2:50-4:25. D. Brown.
This course analyzes the determinants and consequences of internal and international migration in developed and developing nations. Multilevel and multidisciplinary approaches are emphasized. Public policy implications of the volume and composition of migration for origin and destination communities are examined. Techniques and measurement issues are discussed. (For 630, graduate students will also meet with instructor every other week to discuss graduate readings and topics relevant to term project.)

R 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 measures 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, fertility, and marriage. The role of migration in shaping ethnic stratification systems is 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 631, graduate students will also meet with the instructor every other week to discuss graduate readings and topics relevant to their papers.

R SOC 435/635 Indigenous Peoples and Globalization (also AIS 435/635)
Spring. 3 credits. Limited to 25 students. Prerequisites: undergraduates, permission of instructor. S-U grades optional. M 10:10-1:10. A. Gonzales.
Examines 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 de-territorialization of social and political arrangements cotemporal with modernization or the expansion of communication 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.

R SOC 437 Aging and Aging Social Policy in the 1990s
R 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, 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.

R SOC 494 Special Topics in Rural 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.

R SOC 495/695 Population and Development in Sub-Saharan Africa
R SOC 497 Independent Study in Rural Sociology
Fall or spring. 3 credits variable (may be repeated for credit). Students must register with 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.

R SOC 560 Managing Local Environmental Systems: Social Perspectives and Research Bases
R SOC 599 M.P.S. Project
Fall and spring. 1-6 credits. S-U optional. Lec: TBA. Graduate faculty. For students admitted specifically to a M.P.S. program.

R 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 policy-making; (2) participatory processes for generating community development; and (3) planning strategies as mechanisms for creating community development opportunities.

R SOC 602 Community Development Seminar
R SOC 603 Classical Sociological Theory
Fall. 4 credits. Prerequisites: open to graduate students only. T R 2:55-4:10. M. J. Pfeffer.
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.

R SOC 605 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.

R SOC 606 Sociology of Natural Resources and Development
R SOC 608 Demographic Techniques (also PAM 608)
Fall. 3 credits. Prerequisite: multivariate statistics or permission of instructor. S-U grades optional. W 4:30-7:30. D. Gurak, 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, sources and quality of demographic data, population estimation and projection, and stable population models.
This graduate seminar considers issues surrounding population and development in Asia. Case studies pertaining to Southeast Asia and both are considered from a historical perspective. Recent social, economic, and demographic changes in the region are considered in depth. Evolving gender roles in demographic changes in the region are highlighted. The linkages between population and development are elaborated and both are considered from a historical perspective. Recent social, economic, and demographic changes in the region are considered in depth. Evolving gender roles in demographic changes in the region are highlighted.

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 (and sample where appropriate), choice of questions, and issues of validity and reliability. Ethical considerations are highlighted.

This seminar is designed to introduce graduate students in the social science 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.

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Barbano, David M., Ph.D., Cornell U. Prof., Food Science
Bartsch, James A., Ph.D., Purdue U. Assoc. Prof., Biological and Environmental Engineering
Basuk, Nina L., Ph.D., U. of London. Prof., Horticulture
Batt, Carl A., Ph.D., Rutgers U. Prof., Food Science
Baughner, Sherene, Ph.D., SUNY Stonybrook. Assoc. Prof., Landscape Architecture
Bauman, Dale E., Ph.D., U. of Illinois. Prof., Animal Science
Baye, Philippe C., Ph.D., U. of California at Riverside. Assoc. Prof., Crop and Soil Sciences
Beer, Steven V., Ph.D., U. of California at Davis. Prof., Plant Pathology
Bell, Alan W., Ph.D., U. of Glasgow (Scotland). Prof., Animal Science
Belinder, Robin R., Ph.D., Virginia Polytechnic Inst. and State U. Prof., Horticulture
Bergstrom, Gary C., Ph.D., U. of Kentucky. Prof., Plant Pathology
Bjorkman, Thomas N., Ph.D., Cornell U. Assoc. Prof., Horticultural Sciences (Geneva)
Blake, Robert W., Ph.D., North Carolina State U. Prof., Animal Science
Blossey, Bernd, Ph.D., Christian-Albrechts U. (Germany). Asst. Prof., Entomology
Boisclair, Yves R., Ph.D., Cornell U. Assoc. Prof., Horticultural Sciences (Geneva)
Bolton, John, Ph.D., Brandeis U. Asst. Prof., English
Boney, John, M.D., U. of California at Berkeley. Asst. Prof., Communication
Borger, John, Ph.D., U. of California at Davis. Assoc. Prof., Horticultural Sciences (Geneva)
Bryant, Ray B., Ph.D., Purdue U. Prof., Crop and Soil Sciences
Bur, Thomas J., Ph.D., U. of California at Berkeley. Prof., Plant Pathology (Geneva)
Butler, Walter R., Ph.D., Purdue U. Prof., Animal Science
Caffarella, Rosemary S., Ph.D., Michigan State U. Prof., Education
Calderone, Nicholas W., Ph.D., Ohio State U. Assoc. Prof., Entomology
Carlson, William S., Ph.D., Stanford U. Assoc. Prof., Education
Chan, Alice P., Ph.D., Michigan State U. Assoc. Prof., Communication
Chase, Larry E., Ph.D., Pennsylvania State U. Assoc. Prof., Animal Science
Chau, Ho Yen, Ph.D., Johns Hopkins U. Assoc. Prof., Applied Economics and Management
Cheng, Lailiang, Ph.D., Oregon State U. Asst. Prof., Horticulture
Cherney, Jerome H., Ph.D., U. of Minnesota. Prof., Crop and Soil Sciences
Christy, Ralph D., Ph.D., Michigan State U. Prof., Applied Economics and Management
Coffman, W. Ronnie, Ph.D., Cornell U. Prof., Plant Breeding
Collmer, Alan R., Ph.D., Cornell U. Prof., Plant Pathology
Colucci, Stephen J., Ph.D., SUNY. Prof., Earth and Atmospheric Sciences
Contreras, Martha, Ph.D., U. of California at Riverside. Asst. Prof., Biological Statistics and Computational Biology
Coon, Evan G., Ph.D., Queen's U. Asst. Prof., Natural Resources
Cook, Harry K., Ph.D., North Carolina State U. Assoc. Prof., Food Science and Technology (Geneva)
Cook, Robert E., Ph.D., North Carolina State U. Prof., Biological and Environmental Engineering
Dazzi, Ashim K., Ph.D., U. of Florida. Prof., Natural Resources
Degaetano, Arthur, Ph.D., Rutgers U. Assoc. Prof., Earth and Atmospheric Sciences
DelGloria, Stephen D., Ph.D., U. of California at Berkeley. Prof., Crop and Soil Sciences
Dettmers, Robert E., Ph.D., Ohio State U. Assoc. Prof., Horticulture
De Jong, Walter S., Ph.D., U. of Wisconsin. Asst. Prof., Plant Pathology
Delaney, Terrence, Ph.D., U. of Washington. Asst. Prof., Plant Pathology
Dillard, Helene R., Ph.D., U. of California at Davis. Prof., Biological and Environmental Engineering
Dippel, Robert, Ph.D., U. of California at Berkeley. Prof., Crop and Soil Sciences
Drinkwater, Laurie, Ph.D., U. of California, Davis Assoc. Prof., Horticulture
Durst, David A., Ph.D., Massachusetts Institute of Technology. Prof., Food Science and Technology (Geneva)
Duxbury, John M., Ph.D., U. of Birmingham (England). Prof., Crop and Soil Sciences
Earle, Elizabeth D., Ph.D., Harvard U. Prof., Plant Breeding
Ebets, Paul R., Ph.D., U. of Michigan. Prof., Rural Sociology
Elondou-Enyegue, Parfait M., Ph.D., Pennsylvania State U. Asst. Prof., Rural Sociology
English-Lob, Gregory M., Ph.D., U. of California at Davis. Assoc. Prof., Entomology (Geneva)
Everett, Robyn, Ph.D., Michigan State U. Prof., Animal Science
Ewe, John, Ph.D., Brandeis U. Asst. Prof., Entomology
Fahey, Timothy J., Ph.D., U. of Wisconsin. Prof., Natural Resources
Feldman, Shelley, Ph.D., U. of Connecticut. Assoc. Prof., Rural Sociology
Fernandes, Erick C. M., Ph.D., North Carolina State U. Assoc. Prof., Crop and Soil Sciences
Fiek, Gary W., Ph.D., U. of California at Davis. Prof., Crop and Soil Sciences
Foresline, Philip L. M.S., U. of Minnesota. Asst. Prof., Horticultural Sciences (Geneva)
Fox, Danny G., Ph.D., Ohio State U. Prof., Animal Science
Francis, Joe D., Ph.D., U. of Missouri. Assoc. Prof., Plant Pathology
Fry, William E., Ph.D., Cornell U. Prof., Plant Pathology
Galton, David M., Ph.D., Ohio State U. Prof., Plant Pathology
Gan, Susheng, Ph.D., U. of Wisconsin. Asst. Prof., Horticulture
Gavin, Thomas A., Ph.D., Oregon State U. Assoc. Prof., Horticulture
Gay, Geraldine K., Ph.D., Cornell U. Prof., Communication
Gebremedhin, Kifle G., Ph.D., U. of Wisconsin. Prof., Biological and Environmental Engineering
Geisler, Charles C., Ph.D., U. of Wisconsin. Prof., Rural Sociology
Gellert, Paul K., Ph.D., U. of Wisconsin. Asst. Prof., Rural Sociology
Gilbert, Cole, Ph.D., U. of Kansas. Assoc. Prof., Entomology
Gillett, James W., Ph.D., U. of California at Berkeley. Prof., Natural Resources
Gleason, Kathryn L., Ph.D., Oxford U. Assoc. Prof., Landscape Architecture
Gloy, Brent A., Ph.D., Purdue U. Asst. Prof., Applied Economics and Management
Gonzales, Angela M.A., Harvard U. Asst. Prof., Rural Sociology
Good, George L., Ph.D., Cornell U. Prof., Horticulture
Goodworth, Robert C., Ph.D., Michigan State U. Prof., Animal Science
Gottfried, Herbert W., Ph.D., Ohio U. Assoc. Prof., Landscape Architecture
Gravani, Robert B., Ph.D., Cornell U. Prof., Food Science
Griffiths, Phillip D., Ph.D., U. of Florida. Asst. Prof., Horticultural Sciences (Geneva)
Gura, Douglas T., Ph.D., U. of Wisconsin. Prof., Rural Sociology
Hahn, Russell R., Ph.D., Texas A & M U. Assoc. Prof., Crop and Soil Sciences
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Harman, Gary E., Ph.D., Oregon State U. Prof., Horticultural Sciences (Geneva)
Harrington, Laura, Ph.D., Massachusetts U. Asst. Prof., Entomology
Headland, Dalva E., Ph.D., Colorado State U. Assoc. Prof., Education
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Hirsch, Thomas A., Ph.D., U. of Wisconsin. Prof., Rural Sociology
Hoch, Harvey, Ph.D., U. of Wisconsin. Prof., Plant Pathology (Geneva)
Robinson, Terence L., Ph.D., Washington State U. Assoc. Prof., Horticultural Sciences (Geneva)
Roelofs, Wendell L., Ph.D., Indiana U. Prof., Entomology (Geneva)
Rose, Jocelyn, Ph.D., U. of California, Davis. Asst. Prof., Plant Biology
Rosenberger, David A., Ph.D., Michigan State U. Prof., Plant Pathology (Geneva)
Rossi, Frank S., Ph.D., Cornell U. Asst. Prof., Horticulture
Rucstam, Lars G., Ph.D., U. of Stockholm. Assoc. Prof., Natural Resources
Rutt, Donald A., Ph.D., North Carolina State U. Prof., Entomology
Sanderson, John P., Ph.D., U. of California at Riverside. Prof., Entomology
Sanford, John C., Ph.D., U. of Wisconsin. Assoc. Prof., Horticultural Sciences (Geneva)
Scherer, Clifford W., Ph.D., U. of Wisconsin. Assoc. Prof., Communication
Schefe, Dietram A., Ph.D., U. of Wisconsin. Asst. Prof., Communication
Schneider, Rebecca, Ph.D., Cornell U. Asst. Prof., Natural Resources
Schrader, Dawn, Ph.D., Harvard U. Assoc. Prof., Education
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Shanahan, James E., Ph.D., U. of Massachusetts-Amherst. Assoc. Prof., Communication
Shapiro, Michael A., Ph.D., U. of Wisconsin. Assoc. Prof., Communication
Shelton, Anthony M., Ph.D., U. of California at Riverside. Prof., Entomology (Geneva)
Shields, Elson J., Ph.D., U. of Wisconsin. Prof., Entomology
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Smith Einarson, Margaret E., Ph.D., Cornell U. Assoc. Prof., Plant Breeding
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Solomons, Mark E., Ph.D., U. of Wisconsin. Prof., Plant Breeding
Steenhuis, Tammo S., Ph.D., U. of Wisconsin. Prof., Biological and Environmental Engineering
Steponkus, Peter L., Ph.D., Purdue U. Prof., Crop and Soil Sciences
Straub, Richard W., Ph.D., U. of Missouri. Prof., Entomology (Geneva)
Strawderman, Rob, Ph.D., Harvard U. Assoc Prof., Biological Statistics and Computational Biology
Sullivan, Patrick J., Ph.D., U. of Washington. Asst. Prof., Natural Resources
Tanksley, Steven D. Ph.D., U. of California at Davis. Prof., Plant Breeding
Tauer, Loren W., Ph.D., Iowa State U. Prof., Applied Economics and Management
Taylor, Alan G., Ph.D., Oklahoma State U. Prof., Horticultural Sciences (Geneva)
Thies, Janice E., Ph.D., U. of Hawaii. Assoc. Prof., Crop and Soil Sciences
Thonney, Michael L., Ph.D., U. of Minnesota. Prof., Animal Science
Timmons, Michael B., Ph.D., Cornell U. Prof., Biological and Environmental Engineering
Tingey, Ward M., Ph.D., U. of Arizona. Prof., Entomology
Topoleski, Leonard D., Ph.D., Purdue U. Prof., Horticulture
Trancik, Roger T., M.L.A., Harvard U. Prof., Landscape Architecture
Turechek, W., Ph.D., Ohio State. Asst. Prof., Plant Pathology
Turgeon, B. Gillian, Ph.D., U. of Dayton. Assoc. Prof., Plant Pathology
Varambhum, Michael, Ph.D., Cornell U. Assoc. Prof., Animal Science
vanEs, Harold M., Ph.D., North Carolina State U. Prof., Crop and Soil Sciences
Vand, Donald R., Ph.D., U. of Minnesota. Prof., Plant Breeding
Villani, Michael G., Ph.D., North Carolina State U. Prof., Entomology (Geneva)
Walker, Larry P., Ph.D., Michigan State U. Prof., Biological and Environmental Engineering
Walker, Michael F., Ph.D., U. of Wisconsin. Prof., Biological and Environmental Engineering
Walther, Joseph B., Ph.D., U. of Arizona. Assoc. Prof., Communication
Wang, Ping, Ph.D., Cornell U. Assoc. Prof., Entomology, Geneva
Watkins, Christopher B., Rutgers U. Assoc. Prof., Horticulture
Weber, Courtney A., Ph.D., U. of Florida. Asst. Prof., Horticultural Sciences (Geneva)
Weiler, Thomas C., Ph.D., Cornell U. Prof., Horticulture
Welch, Ross M., Ph.D., U. of California at Davis. Prof., Crop and Soil Sciences
Weslock, Leslie A., Ph.D., Michigan State U. Assoc. Prof., Horticulture
Wheeler, Quentin D., Ph.D., Ohio State U. Prof., Entomology
White, Gerald B., Ph.D., Pennsylvania State U. Prof., Applied Economics and Management
Whitlow, Thomas H., Ph.D., U. of California at Davis. Assoc. Prof., Horticulture
Wiedmann, Martin, Ph.D., Cornell U. Asst. Prof., Food Science
Wien, Hans C., Ph.D., Cornell U. Prof., Horticulture
Wilcox, Wayne F., Ph.D., U. of California at Davis. Prof., Plant Pathology (Geneva)
Wilks, Daniel S., Ph.D., Oregon State U. Prof., Earth and Atmospheric Sciences
Williams, Linda, Ph.D., Brown U. Assoc. Prof., Rural Sociology
Wilson, Arthur L., Ph.D., U. of Georgia. Assoc. Prof., Education
Wolf, Steven, Ph.D., U. of Wisconsin/Madison. Asst. Prof., Natural Resources
Wolfe, David W., Ph.D., U. of California at Davis. Prof., Horticulture
Wurtsbo, Randy W., Ph.D., U. of Alberta. Asst. Prof., Food Science and Technology (Geneva)
Yavitt, Joseph B., Ph.D., U. of Wyoming. Assoc. Prof., Natural Resources
Zitter, Thomas A., Ph.D., Michigan State U. Prof., Plant Pathology
ADMINISTRATION
Porus Olpadwala, dean
Andrea Simitch, associate dean
Nasrine Seraji, chair, department of architecture
Buzz Spector, chair, department of art
Pierre Clavel, chair, department of city and regional planning
John McKeown, interim director, administration and finance
Elizabeth A. Cutter, director, admissions and student services
M. Susan Lewis, director, career services
Leon Lawrence, director, multicultural affairs
Margaret N. Webster, director, visual resources facility
Jayne A. Worden, registrar

FACULTY ADVISERS
Architecture students are assigned faculty advisers. Juniors and seniors have one assigned adviser and are also invited to share their concerns with and to seek advice from the most appropriate faculty member or college officer, including the registrar, the department chair, and the dean.

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 their concerns and seek advice from the volunteer student advisers at anytime.

DEGREE PROGRAMS
Degree
Architecture B.Arch.
Fine Arts B.F.A.
History of Architecture and Urbanism B.S.
Urban and Regional Studies B.S.

The college offers programs leading to the bachelor's degree—the five-year program in architecture leads to the Bachelor of Architecture; four-year programs in art and architecture lead to the Bachelor of Fine Arts. In addition, four-year programs with a concentration in either urban and regional studies or history of architecture lead to the Bachelor of Science.

Graduate-level programs are offered in art, architectural design and urban design, architectural sciences, history of architecture and urbanism, historic preservation planning, city and regional planning, regional science, and landscape architecture.

Students in each 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 no entrance or exit examinations. All students have an equal opportunity to succeed; there are no graded tests, 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 curriculum, 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 shop facilities in Rand. The Green Dragon Cafe, 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 146,900 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,400 serials are currently received and maintained.

The Visual Resources Facility, made possible through gifts from George and Adelaide Knight, is located in Sibley Hall and contains the F. M. Wells Memorial Slide Collection, which consists of a large and growing collection of slides of architecture, architectural history, and art. The collection now includes approximately 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 17th century Palazzo Lazzaroni in the center of the eternal city next to 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 Olive Tjaden Gallery and the John Hartell Gallery in Sibley Dome. These galleries display work from a specific course or exhibit examples of recent work by individual faculty, 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 2.0 (C). The record of each student who falls below the standard will be reviewed by the college's Academic Records Committee for appropriate action, among those described below:

1) The student is issued a WARNING. This means the student’s performance is not up to expectations. Unless improvement is shown in the subsequent 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 apply for readmission after a leave of absence of at least two semesters. Application for readmission is made by letter addressed to the college’s Academic Records Committee. 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. Readmission to the college after a required leave of absence is at the discretion of the college's Academic Records Committee. Applications for spring term readmission must be made by November 15, and applications for fall term readmission 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 permanently prohibited from continuing studies in it.

A student may choose to enroll in Cornell courses (through the School of Continuing Education and Summer Sessions, Department of Extramural Study) while on a required leave of absence; however, these courses will not be applied toward the degree even if readmission is granted.

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) for graduation.

ARCHITECTURE


Professional Degree Program
The first professional degree in architecture is the Bachelor of Architecture. This degree counts toward the professional registration requirements established by the various states, National Architectural Accrediting Board, and the National Council of Architectural Registration Boards. The 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 controls, structures, construction and computer graphics, and 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 the areas of planning options and electives. For qualified students the department offers an option that combines the fifth year of the undergraduate program with the first year of the Master of Architecture program. In the fall of the fourth undergraduate year, interested students 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>Subject</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 Math 106</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Spring Term</td>
<td>17-18</td>
</tr>
<tr>
<td></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></td>
<td>Second Year</td>
<td>17-18</td>
</tr>
<tr>
<td>Fall Term</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>261 Site Planning</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Spring Term</td>
<td>18</td>
</tr>
<tr>
<td></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>262 Building Technology, Materials, and Methods</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></td>
<td>Third Year</td>
<td>17</td>
</tr>
<tr>
<td>Fall Term</td>
<td>301 Design V</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>361 Environmental Controls I—</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Lighting and Acoustics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>363 Structural Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Departmental elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Fourth Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Term</td>
<td>401 Design VII</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>411 Professional Practice</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Departmental elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>College elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Spring Term</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>402 Design VIII</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Departmental elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>College elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Fifth Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Term</td>
<td>501 Design IX or 601 or 603</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Overlap Program</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Departmental elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>College or out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Spring Term</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>502 Design X or 602 or 604</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Overlap Program</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Departmental elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>College or out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Out-of-college elective</td>
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</tr>
</tbody>
</table>

#### Electives

<table>
<thead>
<tr>
<th>Departmental Terms</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 professional practice</td>
<td>4</td>
</tr>
<tr>
<td>2 drawing</td>
<td>151, 152</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>College Terms</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 history of architecture: 300-level</td>
<td>9</td>
</tr>
<tr>
<td>2 visual studies</td>
<td>3</td>
</tr>
<tr>
<td>1 architectural theory or 600-level design-related course</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Out-of-College Terms</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 computer programming or applications</td>
<td>3</td>
</tr>
<tr>
<td>1 freshman seminar</td>
<td>3</td>
</tr>
<tr>
<td>1 mathematics, or physical or biological sciences</td>
<td>3</td>
</tr>
<tr>
<td>1 humanities</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Free

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. 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 sub-disciplines 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 362 (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 hour 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.

#### Required Departmental Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Subject</th>
<th>Terms</th>
<th>Numbers</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>design</td>
<td>ART</td>
<td>101-502</td>
<td>62</td>
</tr>
<tr>
<td>1</td>
<td>mathematics</td>
<td>MATH</td>
<td>111</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Math 106, or approved equivalent</td>
<td>3-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>structures</td>
<td>ART</td>
<td>263, 264, 363</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>technology</td>
<td>ART</td>
<td>261, 262, 361, 362</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>architectural theory</td>
<td>ART</td>
<td>231, 232</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>history of architecture</td>
<td>ART</td>
<td>181, 182</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>architecture, culture, and society</td>
<td>342</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Students wishing to receive recognition for a concentration, must submit a Concentration Request form to the Architecture Department Office. In order 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 must also apply to transfer to the Bachelor of Architecture degree program, since the graduate program in architecture requires the Bachelor of Architecture degree or its equivalent for entrance.

Transfer students are responsible for completing that portion of the curriculum that has not been covered by equivalent work. Applicants who have had no previous work in architectural design must complete the 10-semester design sequence. Since this sequence may be accelerated by attending summer 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 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 by 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 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 College of Arts and Sciences. Further information about this option is available at the Admissions Office, B-1 West Sibley Hall, and at the Academic Advising Center of the College of Arts and Sciences, 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 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 complementing their current academic program with an introduction to various facets of architectural studies. Some students may wish to use the Concentration in Architecture for Non-Majors as a means of investigating possible graduate studies in architecture. Some may wish to develop architectural specialties within other disciplines. Students are admitted to this program through application to the Department of Architecture.

The curriculum for students accepted to the Concentration in Architecture Program totals 15 credit hours. Grades received must be C or better in all courses.

9 credits of required courses, including one semester each of:
- ARCH 130, 131, or 132: Introduction to Architecture 3 credits
- ARCH 151: Drawing I 2 credits
- ARCH 111: Concentration in Architecture: Design Studio 4 credits
- ARCH 110: Introduction to Architecture: Design Studio, offered in the summer only, may substitute for ARCH 111.

And 6 credits of elective department courses, chosen, for example, from among the following:
- ARCH 130, 131, 132: Introduction to Architecture 3 credits
- ARCH 152: Drawing II 2 credits
- ARCH 181, 182: History of Architecture I, II 5 credits each
- ARCH 342: Architecture as a Cultural System 3 credits
ARCH 231, 232: Architectural Design I, II 2 credits each
ARCH 263, 264, 363: Structures 3 credits each
ARCH 261, 361, 362: Environmental Controls 3 credits each
ARCH 262: Building Technology 3 credits
ARCH 476: Computer Applications 3 credits

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 and spring. 6 credits. Limited to department 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 department students. Prerequisite: ARCH 101 and ARCH 151. A continuation of ARCH 101. 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 completion 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.

ARCH 301–302 Design V and VI
Fall and spring. 6 credits each term. Limited to department students. Prerequisite for ARCH 301 is ARCH 202. 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 302. Prerequisite for ARCH 402 is ARCH 401 or ARCH 300. 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 department students. Prerequisite: ARCH 402. Staff.
Programs in architectural design, building technology 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 B.Arch. candidates who must satisfactorily complete 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.

Graduate Courses

ARCH 701–702 Problems in Architectural Design
Fall and spring. 9 credits each term. Staff. Basic first-year design course for graduate 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 graduate 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 graduate 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 graduate students whose major concentration is urban design.

Elective Design Courses

ARCH 103–104 Elective Design Studio 103, fall; 104, spring. 6 credits each term. Limited to students from outside the department. Prerequisite for ARCH 103: permission of instructor. Staff.

ARCH 200, 300, 400 Elective Design Studio
Fall or spring. 6 credits. This course is for students who are not architecture majors at Cornell. Prerequisite: permission of department office. Each student is assigned to a class of appropriate level. 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 309 is a design studio that, upon completion, will be credited as an elective design studio. With the successful completion of ARCH 302, ARCH 309 may be used as a substitute for ARCH 401.

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. In order 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 Ix
Fall and spring. 6 credits. Limited to department students. Prerequisite: 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. Only if ARCH 501 is taken in conjunction with ARCH 503 can it be followed by ARCH 502.

ARCH 504 Design Xa
Fall or spring. 6 credits. Limited to department 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.

Related Courses and Seminars

ARCH 110 Introduction to Architecture: Design Studio
Summer. 3 credits. Open to nonarchitecture majors in college, high school students in 11th and 12th grades, and any individuals with a minimum of a high school diploma interested in exploring the field of architecture. S-U option. Not offered every year. 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 is via highly personalized critiques of individual student work by assigned department faculty, 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
Spring. 4 credits. Not open to architecture majors. Prerequisite: acceptance into the Concentration in Architecture Program. 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 interrelationship of the architectural concepts of space, form, function, and technology. Instruction includes critiques of individual student work by department faculty, as well as by periodic reviews by guest critics.

ARCH 303 Special Problems in Architectural Design
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff.
ARCH 306 Praxis: Community Design Workshop (also ARCH 606)
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. F. Davis.
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 non-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 313.01 Furniture Design (Visual Studies)
Fall or spring. 3 credits. Limited enrollment. Students who wish to earn architectural studies credit must enroll in this section. Prerequisite: permission of instructor. Not offered every year. G. Hascup.
This course explores the history, design and materiality of furniture. Analysis of materials and joinery-connective systems are developed in parallel with ergonomic restraints. Design transformation occurs through cycles of conceptual alternatives (models and drawings), increasing in scale as the idea evolves. Full-scale prototypes and detailed tectonic drawings are required on three pieces.

ARCH 313.02 Furniture Design (Technology)
Fall or spring. 3 credits. Limited enrollment. Students who wish to earn architectural technology credit must enroll in this section. Prerequisite: permission of instructor. Not offered every year. G. Hascup.
For description, see ARCH 313.01.

ARCH 313.03 Furniture Design (Free Elective)
Fall or spring. 3 credits. Limited enrollment. Students who wish to earn architectural design credit must enroll in this section. Prerequisite: permission of instructor. Not offered every year. G. Hascup.
For description, see ARCH 313.01.

ARCH 317 Contemporary Italian Culture
Fall or spring. Variable credit (maximum 3). For students in the Rome Program only. Staff.
This course provides a broad view of the culture and social structure of Italy, drawing from Italian literature, history, and current events.

ARCH 411 Professional Practice
Fall or spring. 3 credits. M. Schack.
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 to non-profit agencies. Application of computer technology in preparing specifications.

ARCH 412 Professional Seminar
Fall or spring. 3 credits. Prerequisite: ARCH 411. M. Schack.
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 510 Thesis Introduction
Foreign summer programs and Rome programs 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 project. General instruction in the definition, programming, and development of a thesis topic.

ARCH 605 Special Problems in Design
Fall and spring. Variable credit (maximum 3). Prerequisite: permission of instructor. Staff.
Independent study. This course does not count for design sequence credit.

ARCH 606 Praxis: Community Design Workshop (also ARCH 306)
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. F. Davis.
For description, see ARCH 306.

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.
Issues in architectural and urban design.

ARCH 611-612 Urban Housing Developments
611, fall; 612, spring. 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.

ARCH 613 Transportation
Fall. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff.
The effect of various transportation forms on the environment is considered from the perspectives of architects, engineers, planners, and human ecologists. Readings and discussions of past, current, and future transportation modes focus on aesthetic and physical aspects.

ARCH 614 Low-Cost Housing
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff.
Aspects of low-cost housing involving engineering technology, architecture, physical planning, economics, and sociology.

ARCH 618-619 Seminar in Urban and Regional Design
618, fall; 619, spring. 3 credits each term. Limited to fifth-year and graduate students.
Not offered every year. Staff.
A broad range of issues and problems of urban and regional development and the context in which the designer functions are surveyed. Selected case studies are presented by participants and visitors.
ARCH 334 Column, Wall, Elevation, and Facade: A Study of the Vertical Surface in Architecture (also ARCH 634)
Fall or spring. 3 credits. Limited to third-year students and above. J. Wells. Field and figure relationships (interrelation of parts dominated by the general character of the whole) are the general themes for studying numerous issues relevant to the design of elevations and facades.

The first part of the seminar 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 335 Theory of Architecture
Fall or spring. 3 credits. Prerequisite: ARCH 231–232 or permission of instructor. Not offered 2003–2004. Staff.

ARCH 336 Theory of Architecture
Fall or spring. 3 credits. Limited to third-year students and above. Not offered 2003–2004. Staff.

Theories of modern architecture: De Stijl, cubist and purist painting, industrialized architecture, Le Corbusier's architecture and urban theories, architectural sequence, facades, the free plan, and "DOMINO" theory.

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. Mirin and C. Pearman.

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 431 Theory of Architecture
Fall. 3 credits. Not offered every year. Staff.

Gardening and architecture; urban parks; villas and country houses; and Italian, French, and English landscape gardens. Site planning.

ARCH 432 Theory of Architecture
Spring. 3 credits. Prerequisite: third-year status. Not offered every year. Staff.

The development of urban form, urban intervention, contextualism, ideal cities, historic new towns, streets, piazzas, fortifications, public buildings and social housing types, site planning, and transportation.

ARCH 435 Architecture and Representation
Fall. 3 credits. Limited to degree candidates in architecture. Prerequisite: successful completion of ARCH 231–232. Not offered every year. Staff.

A study of architecture as it functions as a representational art, referring to its past while inferring its present.

ARCH 634 Column, Wall, Elevation, and Facade: A Study of the Vertical Surface in Architecture (also ARCH 334)
Fall or spring. 3 credits. Limited to third-year students and above. J. Wells. For description, see ARCH 334.

ARCH 635 Critical Theory in Architecture
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff.

An inquiry into the fundamental principles of architectural criticism in theory and practice, with emphasis on the structures of criticism in the twentieth century.

ARCH 637 Special Investigations in the Theory of Architecture II
Fall or spring. Variable credit (maximum 4). Prerequisite: permission of instructor and approved independent study form. Staff. Independent study.

ARCH 638 Special Topics in the Theory of Architecture II
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Staff. Topic is announced before preregistration.

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
Fall. 3 credits. Prerequisite: ARCH 342 or permission of instructor. Not offered every year. B. MacDougall.

This course focuses on traditional societies in which beliefs about architectural order are born out of the mythic and religious imagination. Certain themes that are common to a range of cultures are explored in detail. They include the model of the human body as a source of architectural knowledge, the sacred center, the cosmic mountain, and architectural rituals as enactments of myths. Such themes are traced across cultures, through time, and into contemporary theory.

ARCH 446 Topics in Architecture, Culture, and Society
Fall or spring. 3 credits. Prerequisite: ARCH 342 or permission of instructor. B. MacDougall.

ARCH 447 Architectural Design and the Utopian Tradition
Fall. 3 credits. Prerequisite: ARCH 342 or permission of instructor. Not offered every year. Staff.

This course explores the relationship between visionary architecture of the late 19th and 20th centuries and the wider utopian literature of the time. It first explores themes in utopian fiction as well as in anti-utopian tracts and then turns to the attempts of architects, planners, and artists to concretize visions of the ideal world. The course will devote special attention to the ways in which ideals grounded in the utopian tradition have emerged in the social criticism of housing and neighborhood design in the urban setting in recent times.

ARCH 448 The Indian Example and the Visual Tradition in Culture
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 draws on concepts, methods, and findings from the broad field of cultural anthropology to address these questions. Case studies and examples are drawn from a wide range of architectural traditions around the world for which there is significant ethnographic literature, with special emphasis on sub-Saharan Africa, India, and the United States. Topics include the ideational and formal relationships between folk and monumental traditions in complex societies; the structure of the ideal social order and its refraction in the material world; cosmological models and architectural form; geometries of non-Western traditions; and the relationship between indigenization and culture change.

ARCH 349 Undergraduate Investigations in Architecture, Culture, and Society
Fall or spring. Variable credit (maximum 3). 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
Fall. 3 credits. Prerequisite: ARCH 342 or permission of instructor. Not offered every year. B. MacDougall.

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ARCH 349 Undergraduate Investigations in Architecture, Culture, and Society
Fall or spring. Variable credit (maximum 3). 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 649 Graduate Investigations in Architecture, Culture, and Society
Fall or spring. Variable credit (maximum 4). Prerequisite: permission of instructor and approved independent study form. B. MacDougall. Independent study.

Visual Studies

Darkroom fees are charged for all photography courses.

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 251 Introductory Photo I (also ART 181)
Fall or spring or summer. 3 credits. Staff. For description see ART 181.

ARCH 351 Photography II (also ART 261)
Fall, spring or summer. 4 credits. Prerequisite: ARCH 251 or ART 161, or permission of instructor. Staff. For description see ART 261.

ARCH 450 Architectural Publications
Fall and spring. Variable credit (maximum 3). May be repeated for credit. Staff. Colloquy and practicum on issues related to the production of an architectural journal, as well as other theoretical and practical production issues related to the exchange of architectural ideas. Exercises cover both theoretical as well as hands-on aspects of architectural publication.

ARCH 457 Special Project in Photography
Fall or spring. Variable credit (maximum 3). Prerequisites: written proposal outlining the special project and permission of instructor. Not offered every year. Staff. Independent study.

ARCH 458 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 459 Special Topics in Visual Studies I
Fall or spring. 3 credits. Prerequisite: permission of instructor. Staff. Topics announced before preregistration.

ARCH 658 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 659 Special Topics in Visual Studies II
Fall or spring. 3 credits. Prerequisite: permission of instructor. Staff. Topics announced before preregistration.

Architectural Science and Technology

Structures
ARCH 263 Structural Concepts
Fall. 4 credits. Prerequisite: MATH 111 or approved equivalent. M. Cruvellier. Fundamental concepts of structural behavior. Statics and strength of materials. Introduction to and analysis of simple structural systems.

ARCH 264 Structural Elements
Spring. 3 credits. Prerequisite: ARCH 263. J. Ochshorn or staff. Concepts and procedures for the design of individual structural components (columns, beams, etc.) in steel, concrete, and timber construction.

ARCH 363 Structural Systems
Fall or spring. 3 credits. Prerequisite: ARCH 264. M. Cruvellier. Concepts and procedures for the design of overall structural framing systems in steel, concrete, and timber construction.

ARCH 364 Vertigo Structures (also ARCH 664)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year. M. Cruvellier. A course in which students examine and experiment with the design of tall vertical structures, principally in terms of overall structural form and behavior, but also in the context of aesthetic, structural, economic, and social considerations. Weekly meetings include lectures, discussion seminars, and studio-type design reviews.

ARCH 365 Bridge Design (also ARCH 665)
Fall or spring. 3 credits. Prerequisite: ARCH 363 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn. For description, see ARCH 366.

ARCH 366 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.

Construction
ARCH 262 Building Technology, Materials, and Methods
Spring. 3 credits. J. Ochshorn. Properties of materials—their use and application to the design of buildings and building systems. Discussion of various methods of building construction and assembly.

ARCH 367 Working Drawings (also ARCH 667)
Fall or spring. 3 credits. Prerequisite: ARCH 262 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn. Architecture is represented schematically before it is built. Between this initial conceptualization and a building's construction is a process of design development culminating in a set of contractual documents which include drawings and specifications. Through a series of exercises and a final project, this course examines the process of design development and the logical structure of “working drawings.” At the same time, the production of working drawings is pursued as a creative design process. None in which a kind of tension emerges between the various “fictions” of the design and the “reality” of the construction.

ARCH 465 Special Topics in Construction
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 467 Special Investigations in Construction
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff. Independent study.
ARCHITECTURE, ART, AND PLANNING

ARCH 667 Working Drawings (also ARCH 367)
Fall or spring. 3 credits. Prerequisite: ARCH 262 or equivalent. Limited enrollment. Not offered every year. J. Ochshorn.
For description, see ARCH 367.

Environmental Controls

ARCH 261 Environmental Controls—Site Planning
Fall. 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 Controls—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 Controls—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 Controls
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 Controls
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Staff.
Independent study.

Computer Applications

ARCH 372 Imaging and the Electronic Age
Spring. 3 credits. For undergraduate, non-computer-scientists. 2 lectures. 1 recitation. Not offered every year. D. Greenberg.
Historical technological advances which created major paradigm shifts for communications as well as advances in computer technology are presented. The technical fundamentals of computer graphics capabilities are emphasized. The latter half of the course covers the effect of these scientific advances on many discipline-specific areas including architecture, art and animation, photography and the film industry, medicine, engineering design, the corporate structure, and education. The course is heavily supplemented with pictorial content consisting of slides, movies, and live interactive demonstrations.

ARCH 374 Computer Graphics I (also COM S 468)
Fall. 3 credits. Prerequisite: COM S/ENGRD 211. Staff.
For description, see COM S 465.

ARCH 375 Practicum in Computer Graphics
Fall. 2 credits. Enrollment limited. Prerequisites: COM S 212 and permission of instructor. Recommended: COM S 314. Corequisite: COM S 417. Staff.
For description, see COM S 418.

ARCH 378 Microcomputer Applications in Design
Fall. 3 credits. Prerequisites: previous knowledge of PC-based CAD or permission of instructor. Not offered 2003-2004. Staff.
This course covers advanced principles, concepts, and applications of microcomputer-aided design, synthetic imaging, and animations. It combines seminar-style presentation with hands-on laboratory sessions. The course uses IBM PC platforms exclusively.

ARCH 379 Design by Computer
Spring. 3 credits. Limited to third-year students and above. Not offered every year. Staff.
Exploration of the formalization of the design process for computability with the computer, and the role of computers in design. Lecture with CAD lab.

ARCH 476 Special Topics in Computer Applications
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: 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
477, fall; 478, spring. Variable credit (maximum 4). Limited to third-year students and above. Prerequisites: ARCH 374, plus concurrent registration in COM S 314 or equivalent, and permission of instructor. D. Greenberg.
Advanced work in computer graphics input and display techniques, including storage tube, dynamic vector, and color raster displays.

ARCH 479 Micro-Computer Applications in Design (also ARCH 679)
Fall. 3 credits. Prerequisites: 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, building blocks for design; creating multimodal, multidimensional, immersive, virtual environments; interactive transformation and synthesis of design concepts; and "reverse architectural" of canonical works. The emphasis of this course is on concepts as well as methods and techniques of computer graphics and their application to simulating the creative design process in architecture.

Graduate Courses

ARCH 679 Micro-Computer Applications in Design (also ARCH 479)
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.
For description, see ARCH 479.

ARCH 761-762 Architectural Science Laboratory
761, fall; 762, spring. 6 credits each term. Open to architectural science graduate only. D. Greenberg.
Projects, exercises, and research in the architectural sciences.

ARCH 763-764 Thesis or Research in Architectural Science
763, fall; 764, spring. Variable credit (maximum 12). Limited to architectural science graduate students. Staff.
Independent study.

Architectural History

The history of the built domain is an integral part of all aspects of the architecture curriculum, from design and theory to science and technology. Incoming students take ARCH 181-182 in the first year, and three additional courses from the 380-399 series, preferably in the third and fourth years. Seminars are intended for advanced undergraduate and graduate students and do not satisfy undergraduate history requirements. Courses with the same number may only be taken once to satisfy history of architecture or independent requirements.

Sequence Courses

ARCH 181 History of Architecture I
Fall. 3 credits. Required of all first-year students in architecture; open to all students in other colleges with an interest in the history of the built domain. Staff.
The history of the built environment as social and cultural expression from the earliest to more recent times. Themes, theories, and ideas in architecture and urban design are explored, beginning with the earliest written records.

ARCH 182 History of Architecture II
Spring. 3 credits. Required of all first-year students in architecture; open to all students in other colleges with an interest in the history of the built domain; may be taken independently of ARCH 181. Staff.
The history of the built environment as social and cultural expression from more recent times to the present. Architecture and urban design theories, themes, and ideas are addressed in greater detail leading to the present time.

Directed Electives

ARCH 386 History of Theory
Fall or spring. 3 credits. Prerequisites: ARCH 181-182 or permission of instructor. Not offered every year. Staff.
This course, in which classroom discussion and debate play a central role, explores the history of important theoretical issues involving art and architecture. The readings, which span from the Greeks to today, focus on more than just questions of aesthetics and include
ARCH 381 From Eutopia to the Ghetto: 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 artistic factors 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 throughout the discussion of several twentieth-century urban plans and built projects.

ARCH 382 The Cinematic City
Fall. 3 credits. Prerequisites: ARCH 181-182 or permission of instructor. Not offered every year. M. Lasansky.
This course examines the relationship between cinematic media and architecture. It explores the representation, perception, and understanding of architecture as it has been mediated by various cinematic genres including film, television, and documentary. We will consider how cinema has been deployed as a tool in architectural production, how it has influenced the experience and design of space, the extent to which it has been used as a vehicle for critical commentary on the urban condition, and the way it is imbedded in the historical development of architecture and urbanism.

ARCH 383 The Construction of Modern Life: The Politics of Memory and the Commodification of Architecture
Fall or spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year. M. Lasansky.
This course examines the complex relationship between the built environment, the construction and definition of cultural heritage, collective memory and civic identity, and the commodification or commercial celebration of significant buildings, sites, and urban events. We focus on late eighteenth-, nineteenth-, and twentieth-century Europe. Particular attention is awarded to the discourse surrounding the restoration of buildings (and figures such as Ruskin, Viollet-le-Duc, and Giovanni), political agendas guiding restoration and urban renewal projects; newly defined venues of modern urban spectacle (such as the world’s fair, department stores, museums, and panoramas); and the role played by tourism in the commodification of local and foreign sites.

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 the unique topography and natural resources of the city’s location. The last portion of the course addresses the legacy of the Renaissance during the period of Italian unification and the Fascist regime.

ARCH 385 Magnificent Utility—Architecture and the Arts of Persuasion
Fall or spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year. C. Otto.
Architects put revolutionary attitudes about form, space, light, and the arts into practice during the course of the seventeenth century. Focusing on the urban centers of Rome and Paris and the cultural landscapes of Spain, England, and Central Europe, this course explores how architecture, urban design, and the arts were employed to promote state and church.

ARCH 386 The Architecture of India and Its Interpretation
Fall or spring. 3 credits. Not offered every year. B. MacDougall.
This course surveys the architectural record of ancient and medieval India with an emphasis on stupas and temple traditions. It devotes attention to European efforts to write a Western-style architectural history for India and to the British fascination with explaining Indian ethnicity and history over two centuries. We will attempt to evaluate the claim made by the historian James Ferguson that architecture provided the basis for reconstructing an imperfectly known Indian history. We will also examine the notion that scholarly enterprises were closely entwined with strategies of imperial power. To this end, we will read 19th-century firsthand reports on architecture in antiquarian English-language journals alongside more modern accounts. They will be compared with indigenous architectural writings that were often unacknowledged by Europeans.

ARCH 387 The 19th Century: Tales of the City
Fall or spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year. M. Woods.
Nineteenth-century cities as settings for modernism and modernity, new visions, and experiences of modern life, are the focus of this course. The relationship between urbanity and creativity that emerges during the 19th century engage us in Berlin, Paris, London, New York, Chicago, New Orleans, and other cities. Issues of center and periphery, nation and locality, and capital and colony also emerge. Urban pleasures and dangers for men, women, and the other as revealed through literature, painting, photography, and film are examined.

ARCH 388 Modernism
Fall or spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year. C. Otto.
Precursors and proponents of the modern movement from the late nineteenth century into the 1940s are considered in this course.

The cultural intents of the modern are examined in architectural and urban design for individuals, groups, and institutions, from Mies van der Rohe, Le Corbusier, and Frank Lloyd Wright to de Stijl, the Bauhaus, and design education. Attention is paid to the politics of design in serving the state during the 1930s.

ARCH 389 Architecture, Revolution, and Tradition
Fall or spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year. M. Woods.
From early eighteenth to early nineteenth century, European society underwent profound change. Political absolutism—the doctrine of unlimited governmental control—was challenged; Enlightenment attitudes—commitments to human reason, science, and education—gained ascendancy. This course considers architectural and urban design in these times of tumult. It begins with efforts to foment architectural revolution within inherited traditions and ends with attempts to establish design traditions within revolutionary settings.

ARCH 390 American Architecture and Building I (also AM ST 390)
Fall or spring. 3 credits. Prerequisites: ARCH 181–182 or permission of instructor. Not offered every year. M. Woods.
A review of architecture, building, and responses to the landscape from the prehistoric period to the Civil War. Architecture and building as social and collaborative arts are emphasized and thus the contributions of artisans, clients, and users as well as professional architects and builders are examined. The architectural expressions of Native Americans, African Americans, women, and others are treated in addition to those of European colonists and settlers.

ARCH 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 Architecture 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 through representation in both commercial and avant-garde films from the medium’s birth until the present day. The focus varies each semester with particular emphasis to include the representation of house and housing, the modern city, technology and visions of the future, and finally the image of the architect. Representations of these themes in other forms such as painting, photography, theater, literature, and advertising also are examined. The course includes selected readings from modern architecture and film, screenings in class, class discussions, presentations, and papers.
ARCH 393 The Cumulative City
Fall or spring. 3 credits. Prerequisites: ARCH 181-182 or permission of instructor.
Not offered every year. C. Otto.
Well-established cities were transformed by radical and unimagined change in the
nineteenth and twentieth centuries. Politics and economies were recast, populations
exploded, and new technologies reshaped transportation, communication, and building. This
course explores transformation historically in the cumulative city, focusing on
specific cities in America and Europe, Africa and Asia. The cultural context of each city is
examined to understand how it changed and how meanings became associated with
evolving urban forms.

ARCH 394 Toward the Millennium
Fall or spring. 3 credits. Prerequisites: ARCH 181-182 or permission of instructor.
Not offered every year. C. Otto.
Theory and practice in architecture and urbanism are investigated from the 1950s to
the present. From the Americanized International Style to the recent
internationalism of design attitudes, the
immediate past is explored historically to probe the matrix of meanings associated with
contemporary form, urbanism, and technology.

ARCH 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 398 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.

Courses in Preservation
ARCH 563 Measured Drawing (also CRP 567)
Fall. 3 credits. For undergraduate architecture students and graduate students in
history and preservation. Prerequisite: permission of instructor. M. Tomlan.
For description, see CRP 567.

ARCH 564 Problems in Contemporary Preservation Practice (also CRP 563)
For description, see CRP 563.

ARCH 565 Perspectives on Preservation (also CRP 562)
Fall. 3 credits. M. Tomlan.
For description, see CRP 562.

ARCH 566 Documentation for Preservation (also CRP 560)
Fall or spring. 3 credits. M. Tomlan.
For description, see CRP 560.

ARCH 587 Building Materials Conservation (also CRP 564)
Spring. 3 credits. Open to juniors, seniors, not offered every year. M. Tomlan.
For description, see CRP 564.

ARCH 588 Historic Preservation Planning Workshop: Surveys and Analyses
(also CRP 561)
Fall or spring. 4 credits. M. Tomlan.
For description, see CRP 561.

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.

ARCH 682 Seminar in Urban History
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every
year. Staff.

ARCH 683 Seminar in the History of Theory
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every
year. Staff.

ARCH 684 Seminar in the Italian Renaissance: Architecture, Politics,
and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every
year. M. Lasansky.

ARCH 686 Seminar in Seventeenth- and Eighteenth-Century Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every
year. C. Otto.

ARCH 688 Seminar in Twentieth-Century Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every
year. C. Otto.

ARCH 689 Seminar in the History of Cities
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every
year. Staff.

ARCH 690 Seminar in American Architecture, Building, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every

ARCH 692 Seminar in Nineteenth-Century Architecture, Building, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every

ARCH 696 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisites: 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.

ARCH 299 Undergraduate Independent Study in the History of Architecture and Urbanism
Fall or spring. Variable credit (maximum 12). 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
Buzz Spector, chair; R. Benoia, V. Kord, J. Locy, T. McGraw, F. Meyer, G. Page,
director of graduate studies; B. Perlus, J. L. Squier, W. S. Taft, K. WalkingStick, and
visiting critics.

Undergraduate Program
The curriculum in art is a program of study within the College of Architecture, Art, and
Planning, as well as other colleges at Cornell.
The undergraduate curriculum in art is an excellent background for a career in the visual
arts. Past graduates have found it 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. 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.

**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)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 121</td>
<td>Modern Art in Italy</td>
</tr>
<tr>
<td>ART 221</td>
<td>Early Christian to the Baroque Age</td>
</tr>
<tr>
<td>ART 321</td>
<td>Modern Art in Italy</td>
</tr>
<tr>
<td>ART 421</td>
<td>Early Christian to the Baroque Age</td>
</tr>
</tbody>
</table>

**Dual Concentration**

If a student is interested in studying in more than one area, they 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 25 credits in the first area of concentration (22 for printmaking) and 15 credits in the second area of concentration (14 for printmaking). Drawing is only available as a second area of concentration.

The required courses for the dual concentration are:

<table>
<thead>
<tr>
<th>First Area of Concentration</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painting: ART 121, 221, 321, 422</td>
<td>23</td>
</tr>
<tr>
<td>Sculpture: ART 141, 241, 441</td>
<td>23</td>
</tr>
<tr>
<td>Printmaking: ART 131/132/133 (2 of 3)</td>
<td>23</td>
</tr>
<tr>
<td>Photography: ART 161, 261, 263/264</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Area of Concentration</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painting: ART 121, 221, 321, 422</td>
<td>23</td>
</tr>
<tr>
<td>Sculpture: ART 141, 241, 441</td>
<td>23</td>
</tr>
<tr>
<td>Printmaking: ART 131/132/133 (2 of 3)</td>
<td>23</td>
</tr>
<tr>
<td>Photography: ART 161, 261, 263/264</td>
<td>22</td>
</tr>
</tbody>
</table>

**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, theatre, and dance, etc.

Students must file an approved "Area of Concentration" form. In addition to the courses required of all BFA majors during their first and second year (see BFA curriculum), students must take two studios at a 200 level or 300 level, a minimum of 2 "Out of College" studio electives (OCE Studio) of 3-4 credits each, ART 481/Pre-Thesis Combined Media and ART/482 Thesis 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

**ART 400** Rome Studio

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
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<tbody>
<tr>
<td>ART 312</td>
<td>Modern Art in Italy</td>
</tr>
<tr>
<td>ART 318</td>
<td>History of Art in Rome: Renaissance in Rome and Florence</td>
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</table>

**ART 372.20** Special Topics in Art History

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ITALA 111/112</td>
<td>Italian Language</td>
</tr>
<tr>
<td>ARCH 317</td>
<td>Contemporary Italian Film</td>
</tr>
</tbody>
</table>

**16 Total**

Other electives available to BFA students include courses in Architectural History, Visual Studies, City and Regional Planning, and Independent Study in Art.

Students may petition to take more than 16 credits per semester in the Rome Program. Students may study in Rome for one or two academic semesters.

*Fulfills 300-level Theory and Criticism requirement.
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:


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.

A candidate for the B.F.A. degree at Cornell is required to spend the last two terms of candidacy in residence at the university, subject to the conditions of the Cornell faculty legislation of November 14, 1962. No student may study in absentia for more than two terms.

Students who transfer into the undergraduate degree program in art must complete a minimum of four terms in residence at Cornell and a minimum of 60 credits at the university, of which 30 credits must be taken in the Department of Art, including four terms of studio work.

For those students matriculating in fall of 2003:

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, 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 Theory and Criticism requirement (note: offerings may change from year to year. Check the current course catalog.)

ART 312 (Rome students only)
ARCH 447
ART H 370, 377, 422, 463, 464, 466, 494, 571, 594
ENGL 395
GERST 660
GOVT 375
ASRSSC 304, 503
ANTHR 320, 322, 453
THETR 376

First Year

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<thead>
<tr>
<th>Fall Term (Required Curriculum)</th>
<th>Credits</th>
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<tr>
<td>111 Introductory Art Seminar</td>
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<tr>
<td>Art History Elective</td>
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<tr>
<td>121 Introductory Painting</td>
<td>3</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>141 Introductory Sculpture</td>
<td>3</td>
</tr>
<tr>
<td>151 Drawing I</td>
<td>3</td>
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<tr>
<td>Freshman Writing Seminar</td>
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<tr>
<td>In/Out College Electives</td>
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<td>Art History Elective</td>
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<tr>
<td>121 Introductory Painting</td>
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<tr>
<td>or</td>
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<tr>
<td>141 Introductory Sculpture</td>
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<tr>
<td>152 Drawing II</td>
<td>3</td>
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<td>One of the following: 131</td>
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<tr>
<td>Introductory Etching</td>
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<tr>
<td>132 Introductory Graphics</td>
<td></td>
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<tr>
<td>133 Introductory Lithography</td>
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<tr>
<td>Freshman Writing Seminar</td>
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Second Year

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<tr>
<td>161 Introductory Photography</td>
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<td>171 Electronic Imaging in Art</td>
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<tr>
<td>251 Drawing III</td>
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<td>Out-of-College Elective (OCE)/Art History</td>
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<tr>
<td>200 Level Studio</td>
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<tr>
<td>200 Level Studio</td>
<td>4</td>
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<tr>
<td>252 Drawing IV</td>
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<tr>
<td>OCE/Art History</td>
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<td>OCE</td>
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Third Year

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<tr>
<td>200 Level Studio</td>
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<tr>
<td>Art Studio concentration</td>
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<tr>
<td>300-level course in Theory and Criticism</td>
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<td>OCE</td>
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<td>In/OCE</td>
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<td>In/OCE's</td>
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Fourth Year

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<tbody>
<tr>
<td>Thesis</td>
<td>6</td>
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<td>In/OCE's</td>
<td>9</td>
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<tr>
<td>Total</td>
<td>15</td>
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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 artistic interests of the faculty are presented and discussed. A maximum of two absences are allowed except by permission of chairman.

**Related Courses**

**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 ideal 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 300-level Theory and Criticism requirement for Fine Arts majors.

**ART 317 History of Art in Rome: Early Christian to the Baroque Age**  
This course is a survey of the early Christian period to the fantastic visions of Piranesi in the eighteenth century. Special emphasis is placed on the developments of the Renaissance and Baroque periods. Weekly lecture and field trips.

**ART 318 History of Art in Rome: Renaissance in Rome and Florence**  
Fall. 4 credits. Rome Program only. Not offered every year. Staff.  
This course surveys art from the beginning of the 15th century to Michelangelo's death in 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. Credits variable (maximum 4). 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 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 as 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 opportunities, 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 art work. Students will study work from a wide range of artists who have received significant recognition within the visual arts community. Reviews of major exhibitions such as Documenta, La Biennale di Venezia, and the Whitney Biennial are discussed. Students will be encouraged to travel to nearby cities to look at contemporary work.

**ART 613 On-Line Publication for the Visual Artist**  
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 on-line magazine. Additionally each student learns to create a home page on the web.

**ART 614 Contemporary Theory in the Visual Arts**  
This seminar explores selected writings on 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 Culture**  
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 on-line magazine. Additionally, each student learns to create a home page on the web.

**Studio Courses in Painting**

Fees for painting courses: 121, 221, 321, 322, 421, 422, 429: $40

**ART 121 Introductory Painting**  
Fall, spring, or summer. 3 credits. Staff.  
This course is an advanced course centered on issues of artistic expression. A variety of painting materials and techniques are explored. In addition, paints and associated techniques developed in the twentieth century are used as well as developing technologies applicable to the painting process.

**ART 221 Painting I**  
Fall or spring. 4 credits. Prerequisite: ART 121 or permission of instructor. Staff.  
This course is an advanced course centered on issues of artistic expression. A variety of painting materials and techniques are explored. In addition, paints and associated techniques developed in the twentieth century are used as well as developing technologies applicable to the painting process.

**ART 321 Painting II**  
Fall or spring. 4 credits. Prerequisite: ART 221 or permission of instructor. Staff.  
This course is an advanced course centered on issues of artistic expression. A variety of painting materials and techniques are explored. In addition, paints and associated techniques developed in the twentieth century are used as well as developing technologies applicable to the painting process.

**ART 421 Pre-Thesis in Painting**  
Fall or spring. 6 credits. Prerequisite: ART 322. Staff.  
This course is an advanced course centered on issues of artistic expression. A variety of painting materials and techniques are explored. In addition, paints and associated techniques developed in the twentieth century are used as well as developing technologies applicable to the painting process.

**ART 422 Thesis in Painting**  
Fall or spring. 6 credits. Prerequisite: ART 421. Staff.  
This course is a focused independent project demonstrating creative ability and technical proficiency. Projects are exhibited in an appropriate space at the end of the term.

**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 project under the supervision of a faculty member selected to guide their progress and evaluate their results.
ART 721-722, 821-822 Graduate Painting
721, fall; 722, spring; first-year M.F.A. students. 9 credits. 821, fall; 822, 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.

### Studio Courses in Printmaking

Fees for printmaking courses:
- Intaglio: 131, 231, 431.1, 439.1: $95
- Lithography: 133, 233, 431.2, 432.2, 439.2: $95
- Screenprinting: 132, 232, 431.3, 432.3, 439.3: $45

**ART 131 Introductory Intaglio**
Fall and spring. 3 credits. Staff.
This course is a basic introduction to etching techniques, with emphasis on engraving, lift ground, relief printing, monotypes, and experimental techniques.

**ART 132 Introductory Graphics**

**ART 133 Introductory Lithography**
Fall and spring. 3 credits. Staff.
This course studies the theory and practice of lithographic printing, using limestone block and aluminum plate. Basic lithographic techniques of crayon, wash, and transfer drawing are studied.

**ART 231 Intaglio II**
Spring. 4 credits. Prerequisite: ART 131. Staff.
A studio course in advanced etching techniques. Refinement of processes and ideas through the use of acquatint, spit bite, lift ground, soft ground, and dry point in black and white with an introduction to multiple plate color printmaking.

**ART 232 Advanced Screen Printing**

**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 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.

### Independent Studio in Printmaking

**ART 439 Independent Studio in Printmaking**
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 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**
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.

### Studio Courses in Sculpture

Fees for sculpture courses:
- 141: $50
- 241, 341, 342, 343, 441, 442: $75

**ART 141 Introductory Sculpture**
Fall, spring, or summer. 3 credits. Staff.
A series of studio problems introduce the student to the basic principles of artistic expression in threedimensional media, i.e., clay modeling, direct plaster, plaster casting, and construction in wood, metal, and other materials.

**ART 241 Sculpture II**
Fall or spring. 4 credits. Prerequisites: 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. The sculpture program, which is housed in its own building, contains a fully equipped bronze casting foundry.

**ART 341 Sculpture III**
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 explores the selection and expressive use of materials, media, scale, and content. Group discussions and individual criticism. Experimentation is encouraged.

**ART 432 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 further study of the art of sculpture through both assigned and independent projects executed in various media. Instruction through bi-monthly 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. 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 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 B & W courses: $135
- Fee for color courses: $215
- Fee for an additional B & W course taken the same term: $55
- Fee for an additional color course taken the same term: $135

**ART 161 Photography I (also ARCH 251)**
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 (also ARCH 351)**
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, spring, or summer. 4 credits. Prerequisite: ART 161 or ARCH 251, or permission of instructor. Staff.
This is a studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photography.

**ART 264 Photo Processes**
Fall, spring, or summer. 4 credits. Prerequisite: ART 161 or ARCH 251, or permission of instructor. Staff.
This is a studio course in alternative and non-silver photographic processes. Emphasis is on camera skill, 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 instructor. Staff.
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 161, 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. Advanced photography project to demonstrate creative ability and technical proficiency.

**ART 469 Independent Studio in Photography**
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 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 461-462 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**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ART 151 Drawing I</td>
<td>Fall, spring, or summer. 3 credits. Staff. This course 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.</td>
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<tr>
<td>ART 152 Drawing II</td>
<td>Spring. 3 credits. Prerequisite: ART 151. Staff. This course 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.</td>
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<tr>
<td>ART 158 Conceptual Drawing</td>
<td>Summer. 3 credits. 6-week session only. Staff. This course 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.</td>
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</tr>
<tr>
<td>ART 159 Life and Still-Life Drawing</td>
<td>Summer. 3 credits. 6-week session only. Staff. This course 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.</td>
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<tr>
<td>ART 271 Electronic Imaging in Art</td>
<td>Fall or spring. 4 credits. This course is a general course in electronic imaging in art. Students explore various approaches to 2- and 3-D webart using software programs and various functions.</td>
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<tr>
<td>ART 272 Digital Video and Sound</td>
<td>Fall or spring. 4 credits. This course is a general course in digital video and sound. Students explore various approaches to 2- and 3-D webart using software programs and various functions.</td>
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<tr>
<td>ART 273 Computer Animation (also CIS 518)</td>
<td>Fall or spring. 4 credits. Staff. This course is a general course in computer animation.</td>
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<tr>
<td>ART 459 Independent Studio in Drawing</td>
<td>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 drawing that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.</td>
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**ART 109 Studio Courses in Drawing**

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<tr>
<td>ART 152 Drawing II</td>
<td>Spring. 3 credits. Prerequisite: ART 151. Staff. This course 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.</td>
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<tr>
<td>ART 271 Electronic 3-D Modeling and Animation</td>
<td>Fall or spring. 4 credits. This course is a general course in electronic 3-D modeling and animation. Students explore various approaches to 2- and 3-D modeling, animation, and rendering.</td>
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<tr>
<td>ART 272 Digital Video and Sound</td>
<td>Fall or spring. 4 credits. This course is a general course in digital video and sound. Students explore various approaches to 2- and 3-D modeling, animation, and rendering.</td>
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<td>ART 273 Computer Animation (also CIS 518)</td>
<td>Fall or spring. 4 credits. Staff. This course is a general course in computer animation.</td>
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<tr>
<td>ART 459 Independent Studio in Drawing</td>
<td>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 drawing that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.</td>
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**Special Studio Courses**

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</thead>
<tbody>
<tr>
<td>ART 109 Studio Courses in Drawing</td>
<td>Fall, spring, or summer. 4 credits variable. This course is a general course in electronic 3-D modeling and animation. Students explore various approaches to 2- and 3-D modeling, animation, and rendering.</td>
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<tr>
<td>ART 272 Digital Video and Sound</td>
<td>Fall or spring. 4 credits. This course is a general course in digital video and sound. Students explore various approaches to 2- and 3-D modeling, animation, and rendering.</td>
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<td>ART 273 Computer Animation (also CIS 518)</td>
<td>Fall or spring. 4 credits. Staff. This course is a general course in computer animation.</td>
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**Course Fees:**
- 171, 372, 479: $250
- 271, 272: $105
- 391, 392: $50
- 481, 482, 489: $70

**Prerequisites:**
- Student must be a junior in good academic standing and have the written permission of the instructor. Rome Program only. Staff.
- Fall, spring, or summer. 4 credits variable. This course is an independent studio in drawing that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.
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 459/659, FILM 391, DANCE 391)
Fall. 3 credits. Prerequisite: 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]
Spring. 3 credits. Prerequisite: one of the following courses: ART 171, THETR 277, THETR 377, MUSIC 120, or equivalent; and student must be a junior and have permission of the instructor. Lab fee $50. Not offered 2003–2004. Staff.

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 the 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, printmaking, 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. 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 electronic imaging that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans a studio course 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. Prerequisite: ART 481 and 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 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 489 Independent Studio in Combined Media
Fall, spring, or summer. Credits variable (maximum 4). 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 combined media that allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

City and Regional Planning


The department offers several programs of study at both the undergraduate and graduate levels.

The Undergraduate Program in Urban and Regional Studies
The Program in Urban and Regional Studies (URS) is a four-year academic program aimed at assessing the problems of human communities and regions. Students who graduate from the program receive a Bachelor of Science degree. The program provides both an excellent liberal arts 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
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; (7) area requirements 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: 2 courses
b. Foreign language: 3 courses or qualification in one foreign language
c. Distribution Requirements: 9 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 (2–3 courses required)
Group 2: Quantitative and formal reasoning (1–2 courses required)
Group 3: Social sciences and history (2–3 courses required)
Group 4: Humanities and the arts (2–3 courses required)

Advanced Placement Credit
Students may apply up to two courses of approved advanced placement credit in calculus, computer science, and science toward satisfaction of the distribution requirement in Groups 1 and 2 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.

2. Required Courses for the Major in Urban and Regional Studies: 5 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
IRST 210: Statistical Reasoning
MATH 171: Statistical Theory and Application in the Real World
SOS 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
A. Students must take one listed CRP course in each of the following 6 areas: Design, Economics, Environment, History, Politics/Policy, Quantitative Analysis
a. Design
CRM 381: Principles of Spatial Design and Aesthetics

b. Economics
CRM 370: Regional Question: The Case of Italy (Rome)
CRM 401: Seminar in Urban Political Economy
CRM 404: Urban Economics
CRM 417: Industrial Restructuring: Implications for State and Local Policy

c. Environment
CRM 354: Introduction to Environmental Planning
CRM 378: Recycling Resource Management
CRM 380: Environmental Politics
CRM 384: Green Cities
CRM 443: Emerging Global Environmental Trends
*CRM 444: Resource Management & Environmental Law
*CRM 451: Environmental Law
*CRM 453: Environmental Aspects of International Planning
*Meets requirement only with instructor's permission.

d. History
CRM 261: Urban Archaeology
CRM 360: Pre-Industrial Cities and Towns of North America
CRM 361: Seminar in American Urban History
ARCH 399: Special Topics: Architectural History (Rome)
ART 317.20: Art History: Early Christian, Romanesque, and Gothic Art in Rome and Central Italy (Rome)
ART 318.20: Art History: Renaissance in Rome (Rome)
HIST 419: Seminar in American Social History: Race, Class, and the American City (Cornell-in-Washington)

e. Politics/Policy
CRM 293: Inequality, Diversity, and Justice
CRM 314: Planning, Power, and Decision Making
CRM 318: Politics of Community Development
CRM 365: American Indians, Planners, and Public Policy
CRM 371: Cuba: The Search for Developing Alternatives
CRM 376: Latin American Cities
CRM 412: Devolution, Privatization, and the New Public Management

CRM 416: European City-Urban Political Economy (Rome)
CRM 418: Government Policy Workshop
CRM 448: Social Policy and Social Welfare (also Cornell-in-Washington)
CRM 474: The Third World Urbanization
GOVT 500: Politics/Policy: Theory, Research, and Practice (Cornell-in-Washington)
(4 credits of the 8-credit course—see B below)

f. Quantitative Analysis
CRM 321: Introduction to Quantitative Methods for the Analysis of Public Policy
CRM 328: Overview: Quantitative Methods Policy Analysis
CRM 408: Introduction to Geographic Information Systems (seniors only)
CRM 529: Mathematics for Planners
ILRST 211: Quantitative Reasoning II

B. Students must take any additional 5 CRM 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.

4. Free Electives: 6–9 courses

5. Physical Education (2 terms of PE)

Required courses for graduation: 34
Required credits: 120

Honors Program
Each year a few well-qualified juniors may join the honors program. Each honors student develops and writes an honors thesis under the guidance of his or her faculty adviser.

Concentrations
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, Women's Studies, etc.). 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 coursework 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.

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 may earn degree credits through courses taken with Cornell faculty assigned to Rome and with accredited instructors. Courses are available in areas of urban development, regional development, and architecture and art.

Research and fieldwork. Students are welcome to work with departmental 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 thesis project are required for the M.R.P. degree. Interested students apply to the Graduate School, usually in the senior year.

Dual degree options. Students accepted in the Cornell 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 consult 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—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. Prospective candidates who believe that their circumstances are exceptional and should consult with the Director of Admissions in the Cornell division of interest to them before filing an application.

Forms for transfer application and financial aid are available from the Cornell University Office of Admissions, 410 Thurston Avenue, Ithaca, NY 14850-2488. Official transcripts of all high school and college work must be submitted along with SAT or ACT scores and letters of recommendation.

Prospective 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 William W. Goldsmith, Program Director, Urban and Regional Studies, Cornell University, 106 West Sibley Hall, Ithaca, NY 14853-6701 (telephone: 607-255-4613).

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 (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 Sustainable Development (MPS/ID) degree is administered through 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 (MA) in Historic Preservation Planning prepares students for professional work in the creative preservation and utilization of our physical heritage.

The Master of Science (MS) or Master of Arts (MA) in Regional Science is the study of regional economies and their interactions with each other. Central issues include capital flows, trade, location of economic activity, growth, and regional conflicts. Graduates are positioned for careers as researchers and policy analysts at the highest levels in national governments, corporations, and international organizations.

The Doctor of Philosophy (PhD) program is for those who seek 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 Palazzo Massimo. Instruction is given by Cornell professors-in-residence and by another 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 urban development to central city poverty, from environmental threats to downtown revitalization, and from municipal finance to the new position of women in the urban economy.

CRP 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. Kuder. 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 UFS First-Year Seminar
Spring. 1 credit. S-U grades only. W. Goldsmith.

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 281 Fieldwork In Urban Archaeology
Fall. 3 credits. S. Baugher.
For description, see LA 261.

CRP 293 Inequality, Diversity and Justice (also GOVT 293, PHIL 193, SOC 293)
Spring. 4 credits. R. Miller.
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-based organizations; and the interplay between neighborhood-based community development activities and regional economic development policy making.

CRP 314 Planning, Power, and Decision Making
Spring. 3 credits. Staff.
This seminar examines various bases of political and professional power. What do professionals who want to serve the public need to know about power and decision-making processes in the institutional settings in which they operate? How and why can professionals make a difference when facing problems characterized by great complexity and severe inequalities among affected groups? The course addresses these questions and many others.

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. Staff.
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. Strengths and weaknesses of those methods are also be considered.

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 that are used in policy analysis. Its goal is to set the context for the techniques presented, to understand the questions that each addresses, to be aware of their potential and limitations, their range of applicability, and the pitfalls to be avoided.
CRP 334 Neighborhood Planning Workshop (also CRP 530) Fall. 3 credits. Letter grade. R. 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 neighborhood and local area. A participatory action research approach is used to co-produce professional-quality development plans with local stakeholder groups. Significant fieldwork required.

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). 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) Spring. 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, inclusionary 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. S-U grades optional. A. M. Pender. 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 such as sustainability, quality of life, environmental hazards and environmental justice. Students are also introduced to the basic regulatory and institutional aspects of environmental planning and tools and techniques for environmental impact assessment, inventorying and risk analysis.

CRP 360 Pre-Industrial Cities and Towns of North America (also LA 260/ LA 666 and CRP 666) Fall. 3 credits. S-U grades optional. S. Baugher. For description, see LA 260.

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/ LA 547) Spring. 3 credits. S. Baugher. For description, see LA 263.

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 20th century including long range 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 Fall. 3 credits. Open to sophomores, juniors, seniors. Not offered 2003-2004. B. Lynch. Cuba is a symbol; it is also a society. This course looks beyond the symbol to Cuban society, environment, and political economy in a Caribbean context. The 1959 Revolution was a defining moment in Cuban history and a central element in Cuban culture. Students learn about the experiences that shaped the revolution, altered its course in the 1970s and 1980s, and led to the special period of the 1990s.

CRP 376 Latin American Cities (also CRP 676) Fall. 3 credits. Not offered 2003-2004. B. Lynch. This course offers students an opportunity to understand urban dynamics in a rapidly changing region of the world. We ask how colonial powers, the nation-state, and global economic forces have shaped Latin American urban landscapes and the patterns of daily life in the city. The first part of this course explores the social, political, and spatial dimensions of these processes. Topics include rural-urban flows, sociospatial segregation, housing environment and employment. The second half of the course focuses on responses to these social and economic transformations: state interventions and repression, coping strategies, social movements, and transmigration.

CRP 378 Recycling and Resource Management (also CRP 578) Spring. 3 credits. S-U grades optional. Not offered every year. R. Young. Advanced resource 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 comprehensive exposure to leading practitioners and best practices in the recycling field. Open to undergraduate and graduate students. Graduate students have additional research requirements.

CRP 380 Environmental Politics Fall. 4 credits. Letter grade. R. Booth. Examines the political 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. Not offered 2003-2004. R. Trancik. A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications, factors in the contemporary urban context of Europe and North America.

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 ecology and the technology and policies that shape it. Alternative transportation, renewable energy, urban design, recycling and resource management, and sustainable economics are explored as means toward transforming cities to become the basis of a new, ecological society. Open to both graduate and undergraduate students. Graduate students have additional research requirements.

CRP 395 Special Topics Fall, spring, summer. 4 credits variable. Hours to be arranged. Staff. For description, see department coordinator, 106 West Sibley.

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. L. Thordike. Wilderness and wildland resources have been under assault by the Congress, the "Wise Use" movement, property rights activists, pollutants and the actual users. This seminar 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 managers, organized special interests, legal system, citizens, and user groups will be examined. Practical exposure to planning and policy development through readings, discussions, guest practitioners and field trip to Finger Lakes National Forest. Optional weekend trip to Adirondack Park Wilderness area.
[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 information. This course focuses on GIS in the social sciences. Many of the exercises and examples are based on planning issues, but the concepts can be applied to many other disciplines such as government, economics, natural resources, and sociology. Some of the issues covered include: fundamentals of spatial analysis; overview of GIS technology and applications; designing a GIS project; gathering and analyzing data; and creating thematic maps.

[CRP 412] *Devolution, Privatization, and the New Public Management* (also CRP 610, AEM 433/633, and FGSS 411/811)  
Fall. 3 credits. S-U grades optional. M. Warner. 
This course addresses devolution and privatization of government services in a national and international context and then focuses on the local public sector response in the United States. Privatization, intermunicipal cooperation, and internal restructuring are reversed including changing roles for the private, nonprofit sector, and unions. Implications for policy, program design, public advocacy, and citizen involvement are addressed. A special topic may include welfare reform. Graduate students are expected to write a major research paper in addition to short papers throughout the term.

[CRP 416] *European City: The Public Sphere and Public Space*  
Spring. 2–4 credits variable. 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? All of these, how do Italian (or European) conditions and policies differ from those in the United States (or elsewhere)? All of these questions are covered.

[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 multi-firm 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 616, AEM 434/634 and FGSS 420/620)  
Students undertake research requested by clients (associations of local government unions, non-profits, and state, federal, and international agencies) to analyze and identify alternative approaches to restructing government service delivery. The course requires teamwork and includes qualitative and quantitative methods of analysis in collaboration with clients.

[CRP 443] *Emerging Global Environmental Trends* (also CRP 543)  
Spring. 3 credits. Limited to 20 students. Open to juniors, seniors, and graduate students, and by permission of instructor. Not offered 2003–2004. R. Booth. 
This seminar focuses on the emergence of broad trends that suggest human society is facing a global environmental crisis. It examines the factual grounds on which concern about these trends is founded, their implications, and steps human society might take in order to reverse or otherwise alter these trends before they generate enormous and irreversible problems.

[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 processes to the management of 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 other natural 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. 4 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 for 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 581)  
Fall. 4 credits. R. Booth. 
An introduction to how the legal system handles environmental problems. Study of federal environmental statutes (e.g. the Clean Air Act, 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 fields. 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. Not offered 2003–2004. 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 457] *Community Service Fieldwork*  
Fall or spring. 4 credits variable. Permission of instructor required. Staff. 
Undergraduate students work under the direction of a faculty member in the CRP department on a project that assists a public or nonprofit organization. Projects involve urban and regional issues as defined by a client and agreed upon by the faculty member.

[CRP 474] *Urban Transformations in the Global South* (also CRP 674)  
Spring. 4 credits. S-U grades optional. B. Lynch. 
Economic globalization and the post-colonial political order are continually reshaping urban societies and landscapes in the global South, often by relegating everyday life to the margins and shrouding it in illegality. This course focuses on the spatial, social, and political dimensions of urban transformations, paying particular attention to such topics as competition among cities for international capital and its implications for social relations, dynamic interrelations between informal sectors and labor markets and in housing, urban environmental challenges and municipal efforts to address them, and issues related to governance, social movements, and new formulation of citizenship.
space and the public-nonprofit sectors are as that of city and regional planning. Both the public and nonprofit sectors is the same city and regional planning. The perspective of and public. The concept of space is central to the context of every topic is both spatially oriented. From foundation courses in economics is it from foundation courses in economics is microeconomics necessary. M. Drennan. Fall. 4 credits. No prior knowledge of econometrics necessary. M. Drennan. Fall. 4 credits. Microeconomics. M. Drennan. Spring. 4 credits. Prerequisite: microeconomics. M. Drennan. For description, see CRP 404.

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. Upperclass undergraduate courses are numbered from 300 to 499. (Undergraduate students 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. Beardon. 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. The course also covers the economic theory necessary to understand the many applications of economics presented in subsequent courses in city and regional planning.

CRP 513 Introduction to Planning Practice and History
Fall. 4 credits. P. Clavel and N. Kudva. An introductory graduate seminar on the theory and history of planning, profession, 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 417)
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 use 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—with an emphasis on calculus—needed by the student who wishes to take intermediate-level courses in economics, urban and regional analysis, quantitative methods for the social sciences, and policy analysis. Topics include: matrix algebra, set theory, functions, differentiation, and integration.

CRP 530 Neighborhood Planning Workshop (also CRP 330)
Fall. 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. Reviews issues in residential, retail, industrial, office, and low-income housing projects. Guest speakers and case studies included.

CRP 533 Real Estate Marketing and Management
Fall. 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 MPS/RE 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)
Spring. 3 credits. Limited to 20 students. Not offered 2003-2004. R. Booth. For description, see 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
Spring. 3 credits. Basic statistics is a prerequisite for this course. Not offered every year. M. Drennan.
An introduction to econometrics, covering bivariate and multivariate regression. Applications include population, employment, and tax revenue forecasting for sub-national economies. Probit and logit models explained. Lectures and plan-making exercises included.

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 263/4 LA 547)
Spring. 3 credits. S. Baugher.
For description, see LA 263.

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
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. S-U grades optional. A-M. Esnard.
For description, see CRP 354.

CRP 555 Urban Systems Studio (also LA 701)
Fall. 5 credits. Prerequisite: permission of instructor. R. 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 assessment through project implementation. Fundamentals involved in defining, stimulating and recognizing quality in design are addressed. The analysis of case study presentations by guest speakers examine the methods and procedures employed to achieve quality design and how this can create added value to development.

CRP 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 in students an understanding of the spatial issues, knowledge, and skills needed to design for the functional, aesthetic, social, and cost needs of urban 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 non-profit 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 559 Documentation for Preservation (also ARCH 586)
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 560 Historic Preservation Planning Workshop: Surveys and Analyses (also ARCH 588)
Fall or spring. 4 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 review and organizational structures. Lectures and training sessions. Emphasis on fieldwork with individuals and community organizations.

CRP 561 Perspectives on Preservation (also ARCH 589)
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 (also ARCH 584)
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 (also ARCH 587)
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 projects in history and preservation planning in a field or laboratory setting or both.

CRP 566 Planning and Preservation Practice
Fall. 1 credit. Prerequisite: graduate standing in CRP programs or MPS/RE or permission of instructors. S-U grades only. R. Pendall and M. Tomlan.
Students participate in field study of city planning, historic preservation, economic and community development, and real estate issues in large Eastern U.S. cities.

CRP 567 Measured Drawing (also ARCH 583)
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)
Spring. 3 credits. For description, see 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. Not offered 2003-2004. 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.
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 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. 3 credits 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 economic 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 distribution of resources. This includes the analysis of patterns through which the current neoliberal economy 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**


For description, see CRP 412.

**CRP 632 Methods of Regional Science and Planning I**

Spring. 3 credits variable. Staff.

See CRP 632. CRP 633 will provide an introduction to deterministic methods and models such as input/output models, social accounting models, and optimization models.

**CRP 633 Methods of Regional Science and Planning II**

Fall. 4 credits. S-U grades optional.

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, addressing 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.

This 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 dynamism of this transition, in the light of a similarly dramatic transition 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. J. Forester.

This seminar explores issues of "practice" (rhetoric and negotiation, interpretation and judgment, narrative and recognition) as they influence democratic deliberations involving questions of ethics and argument, participation and identification, personal trauma and working-through, and more. The approach we take can be called "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)**

Spring. 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 regulations. Current legal issues affecting the real estate industry are discussed.

**CRP 658 Residential Development**

Spring. 3 credits. Letter grade. Fee. For mandatory field trip. B. 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 explored. Co-op experiences of the residential development project team is discussed, and classes are supplemented by presentations from visiting professionals. A semester-long project is conducted in student teams on an actual site.

**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 664 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 LA 666)**
Fall. 3 credits. S-U grades optional. S. Baugher.
For description, see 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. 4 credits. Prerequisite: second-year graduate standing. Not offered 2003–2004. 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 and planning. 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 UN system up to the early 1970s, how these function and have evolved over time. The second part examines some of the crises and tensions within the international system since the 1980s and how these have affected institutional change and current debates on reform and global governance.

**CRP 674 Urban Transformations in the Global South (also CRP 474)**
Spring. 4 credits. S-U grades optional. B. Lynch.
For description, see CRP 474.

**CRP 675 Seminar in 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)**
For description, see CRP 376.

**CRP 677 Issues in African Development (also CRP 477)**
Fall or spring. 1 credit. S-U only. M. Ndulo.
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 mega projects and the reasons they become targets of social movement activity.

**CRP 679 Wilderness and Wildlands: Issues in Policy and Planning (also CRP 395)**
Fall. 2–3 credits variable. Graduate seminar open to juniors and seniors. Not offered every year. L. Thorndike.
For description, see CRP 395.

**CRP 683 Environmental Aspects of International Planning (also CRP 453)**
For description, see CRP 453.

**CRP 703 Contemporary Theories of Regional Development**
Fall or spring. 4 credits. Not offered 2003–2004. P. Clavel.

**CRP 714 Gender, Race, and Class in Planning**
Fall. 3 credits. L. Beneria.
This 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**
Fall or spring. 3 credits. Not offered 2003–2004. Staff.

**CRP 733 Seminar in Regional Models**
Fall or spring. 3 credits. Not offered 2003–2004. Staff.

**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 requirements 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 795 Planning Internships**
Fall, spring, or summer. 1–12 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. 1–6 credits variable. Staff.
CRP 796 Professional Writing and Publishing (Colloquium)
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
Fall or spring. 1 credit. Not offered 2003-2004. Staff.]

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
Fall. 3 credits. Not offered 2003-2004. Staff.]

CRP 810 Advanced Planning Theory
Fall. 3 credits. Not offered 2003-2004. Staff.

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.

CRP 890 Planning Research Seminar I
Fall or spring. 2 credits. Staff. Intended for doctoral candidates in city and regional planning; other students welcome. Presentation and discussion of current problem areas and research by advanced doctoral students, faculty members, and visitors.

CRP 892 Doctoral Dissertation
Fall or spring. 1-2 credits variable. Staff.

Special Topic Courses
Fall or spring. Variable credit. Staff. Typical topics are:

CRP 609 Urban and Regional Theory
CRP 619 Planning Theory and Politics
CRP 629 Quantitative Methods and Analysis
CRP 639 Regional Development Planning
CRP 649 Social-Policy Planning
CRP 659 Urban Development Planning
CRP 669 History and Preservation
CRP 679 Planning and Developing Regions
CRP 689 Environmental Planning

CRP 699 Regional Science
CRP 719 Planning Theory and Politics

LANDSCAPE ARCHITECTURE
Landscape Architecture at Cornell is jointly sponsored by the College of Agriculture and Life Sciences and the College of Architecture, Art, and Planning.

The Program

Landscape Architecture offers a three-year Master of Landscape Architecture License Qualifying Degree, administered through the Graduate School, for those who have a four-year undergraduate degree in another field. The major is composed of several parts: core courses related to professional education in Landscape Architecture; a concentration in a subject related to the core courses; and free electives. Requirements of the three-year M.L.A. curriculum include 90 credits, 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 specializations in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape and art, or urban design.

Both of these degrees are accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects.

Dual Degree Options
Graduate students can earn a Master of Landscape Architecture and a Master of Science (Horticulture) or a Master of City and Regional Planning simultaneously. Students need to be accepted into both fields of study to engage in a dual degree program and must fulfill requirements of both fields of study. Thesis requirements are generally integrated for dual degrees.

Course Information
Note: All of the following courses are offered through the College of Agriculture and Life Sciences except LANAR 497, 524, and 525.

LA 140 The Symbols of New York State's Cultural Landscape
Spring. 3 credits.

LA 141 Grounding in Landscape Architecture
Fall. 4 credits.

LA 142 Grounding in Landscape Architecture
Spring. 4 credits.

LA 201 Medium of the Landscape
Fall. 5 credits.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>LA 498</td>
<td>Undergraduate Teaching</td>
<td>1-2</td>
<td>Fall or spring</td>
<td>Fall. 1-2 credits.</td>
</tr>
<tr>
<td>LA 501</td>
<td>Composition and Theory</td>
<td>5</td>
<td>Fall</td>
<td>Fall. 5 credits.</td>
</tr>
<tr>
<td>LA 502</td>
<td>Composition and Theory</td>
<td>5</td>
<td>Spring</td>
<td>Spring. 5 credits.</td>
</tr>
<tr>
<td>LA 505</td>
<td>Graphic Communication I</td>
<td>3</td>
<td>Fall</td>
<td>Fall. 3 credits.</td>
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<tr>
<td>LA 506</td>
<td>Graphic Communication II</td>
<td>3</td>
<td>Spring</td>
<td>Spring. 3 credits.</td>
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<tr>
<td>LANAR 524</td>
<td>History of European Landscape Architecture</td>
<td>3</td>
<td>Fall</td>
<td>Fall or spring. 3 credits. LS. 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.</td>
</tr>
<tr>
<td>LA 545</td>
<td>The Parks and Fora of Imperial Rome</td>
<td>3</td>
<td>Spring</td>
<td>Spring. 3 credits.</td>
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<td>LA 547</td>
<td>Americans, Indians, Planners, and Public Policy (also CRP 363/547 and LA 253)</td>
<td>3</td>
<td>Spring</td>
<td>Spring. 3 credits.</td>
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<tr>
<td>LA 582</td>
<td>The American Landscape</td>
<td>3</td>
<td>Fall</td>
<td>Fall. 3 credits.</td>
</tr>
<tr>
<td>LA 590</td>
<td>Theory Seminar</td>
<td>3</td>
<td>Spring</td>
<td>Spring. 3 credits.</td>
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<tr>
<td>LA 598</td>
<td>Graduate Teaching</td>
<td>1-2</td>
<td>Fall or spring</td>
<td>Fall or spring. 1-2 credits.</td>
</tr>
<tr>
<td>LA 601</td>
<td>Integrating Theory and Practice I</td>
<td>5</td>
<td>Fall</td>
<td>Fall. 5 credits. Limited to graduate students.</td>
</tr>
<tr>
<td>LA 602</td>
<td>Integrating Theory and Practice II</td>
<td>5</td>
<td>Spring</td>
<td>Spring. 5 credits. Limited to graduate students.</td>
</tr>
<tr>
<td>LA 603</td>
<td>Directed Study: The Concentration (also LA 403)</td>
<td>1</td>
<td>Fall or spring</td>
<td>Fall or spring. 1 credit.</td>
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<tr>
<td>LA 615</td>
<td>Site Engineering I</td>
<td>3</td>
<td>Spring</td>
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<td>Site Engineering II</td>
<td>2</td>
<td>Fall</td>
<td>Fall. 2 credits.</td>
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</table>
Shaw, John P., M.Arch., Massachusetts Inst. of Technology. Prof. Emeritus, Architecture
Simitch, 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
Taft, 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
Trancik, Roger T., M.L.A.-U.D., Harvard U. Prof., Landscape Architecture/City and Regional Planning
Ungers, O. Mathias, Diploma, Technical U. Karlsruhe (Germany). Prof. Emeritus, Architecture
Vietorisz, Thomas, Ph.D., Massachusetts Inst. of Technology. Adjunct Prof., City and Regional Planning
Walking-Stick, Kay, M.F.A., Pratt Institute. Prof., Art
Warke, 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
Zisovici, 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 specialized 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, which includes the Behrman Biology Advising Center. Co-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 105 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 BIOM 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, 207, 275; BIOGD 184; BIOM 192; BIOMB 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 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 conform to the rules for the care of such animals as outlined in Guiding Principles in the Care and Use of Animals (as approved by the Council of the American Physiological Society), the Guide for the Care and Use of Laboratory Animals (DHEW publication 86-23, revised 1996; see p. 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 as realistically as possible the likelihood of achieving at a level that is consistent with their academic and personal goals. Weak performance in core courses, particularly after the freshman year, may indicate a need to re-evaluate 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 109 and 110 plus 101 and 103 plus 102 and 104, or 105–106 or 107-108 or from specified courses in chemistry or physics.

2) General chemistry (one year): Chemistry 207–208, or 206–208, or 215–216.
The Program of Study Requirements. Note: Core courses cannot count toward the high number of required endowed courses for this program of study.

3) Computational Biology: One course in computer programming (BTRY 600, Introduction to Computer Programming or BTRY 601, Introduction to Computing), one course in mathematics (MATH 221, Linear Algebra and Calculus; MATH 251, Linear Algebra; MATH 294, Engineering Mathematics II; MATH 420, Differential Equations and Dynamical Systems, BTRY 408, Theory of Probability; or BTRY 421, Matrix Computation); a bridging course, i.e., a course in mathematical modeling and computer science; BTRY 459, Phylogenetic Systematics; AN SC 420, Evolution; BION 406, Mathematical Modeling of Populations; OR&IE 360, Engineering Probability and Statistics II; OR&IE 361, Introductory Engineering Stochastic Processes.

Note: Biology majors in the College of Agriculture and Life Sciences who select this program of study are allowed to take up to 61 credit hours in the endowed colleges due to the high number of required endowed courses for this program of study.

THE MAJOR

3) College mathematics (one year): one semester of 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 (Biometry 301, MATH 171, Applied Economics and Management 210, PSYCH 350, IRL 210).

4) Organic chemistry: CHEM 257 and 251, or 357–358 and 251, or 359–360 and 251, or 359–360 and 301.


6) Genetics: BIOC 281.

7) Biochemistry: BIOBM 330, or 331 and 332, or 333.

8) Evolutionary Biology: BIOE 278 or BIOI 448. Note: BIOI 241, Botany, is a prerequisite course to BIOI 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 six 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.

Since modern biology has an important physical and quantitative orientation, students are advised to undertake basic science courses that emphasis this approach. Asterisks in the above list indicate the courses that provide this orientation, but all courses listed are acceptable.

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. Whereas the core requirements of the biology curriculum provide the common foundation deemed essential for all biology majors, the role of the Program of Study is to provide either a concentration in a particular area of biology or, in the case of the General Biology Program of Study, a survey of biology that is broad but not superficial. The Program of Study requirement can be met by taking 13 to 15 credit hours of courses chosen by the student in consultation with his or her biology adviser. Programs of Study for particular subject areas are designed by faculty specializing in the subject. Typically, the Program of Study consists of one or more courses that provide the necessary background in the subject and a list of optional courses from that area or related areas, many of which are at an advanced level (300 or higher). Because biology is an experimental science, most Programs of Study require one or more laboratory courses. The laboratory requirement in some Programs of Study can be met by participation in the independent research course (BIO G 499). The possible Programs of Study and their requirements are listed below:

1) Animal Physiology: BIOAP 311
   a) Lecture courses: BIOE 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 Behavior; BIOAP 458 Mammalian Physiology; BIOBM 407 Nature of Sensing and Response: Signal Transduction in Biological Systems; BIOBM 437 Eukaryotic Cell Proliferation; BIOG 385 Developmental Biology; BIOGD 483 Molecular Aspects of Development; BION 322 Hormones and Behavior; BION 325 Neurodiseases-Molecular Aspects; BION 326 The Visual System; BIONB 492 Sensory Function; NS 331 Physiological and Biochemical Bases of Human Nutrition.
   b) Laboratory courses: BEO 454 AN SC 301 Animal Reproduction and Development; BIO G 401 Introduction to Scanning Microscopy; BIO G 403 Transmission Microscopy for Biologists; BIOAP 413 Histology: The Biology of the Tissues; BIOAP 319 Animal Physiology Laboratory; BIOAP 416 Cellular Physiology and Genomics Laboratory; BIOBM 440 Laboratory in Biochemistry and Molecular Biology; BION 491 Principles of Neurophysiology.

2) Biochemistry: CHEM 300, Quantitative Chemistry; six credits of organic chemistry (CHEM 357–358 or 359–360); a minimum of four credits of organic chemistry laboratory (CHEM 301–302 or 301 or 251–252); four 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 284 is designed for biologists. Five hours of Biochemistry are recommended (331 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 the area of biochemistry should take 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 who select this program of study are allowed to take up to 61 credit hours in the endowed colleges due to the high number of required endowed courses for this program of study.

Note: Bridging courses require linear algebra (MATH 221, Linear Algebra and Calculus; MATH 251, Linear Algebra; MATH 294, Engineering Mathematics II; or BTRY 421, Matrix Computation). Students who use BTRY 408 to fulfill the mathematics requirement or a requirement for an additional course.

Note: Students who use BTRY 408 to fulfill the additional mathematics requirement should not use OR&IE 360, Engineering Probability and Statistics II to fulfill the requirement for an additional course.

Note: Biology majors in the College of Agriculture and Life Sciences who select this program of study are allowed to take up to 61 credit hours in the endowed colleges due to the high number of required endowed courses for this program of study.
4) Ecology and Evolutionary Biology: BIOEE 261, Ecology and the Environment, and 10 credits from the following lists, including at least one course from each group:
   (a) BIOEE 274, The Vertebrates: Structure, Function, and Evolution; BIOEE 373, Biology of Marine Invertebrates, or BIOSM 376, Marine Invertebrate Zoology; BIOEE 471, Mammalogy; BIOEE 470 and 472, Herpetology Lectures and Laboratory; BIOEE 475, Ornithology; BIOEE 476, Biology of Fishes, BIOEE 477, Bacterial Diversity, BIOPL 241, Introductory Botany; BIOSM 449, Seaweeds, Plankton and Seagrasses; ENTOM 212, Insect Biology.
   (b) BIOEE 263, Field Ecology; BIOEE 452, Herbivores and Plants; Chemical Ecology and Coevolution; BIOEE 455, Insect Ecology; BIOEE 456, Stream Ecology; BIOEE 457 and 459, Limnology: Ecology of Lakes, Lectures and Laboratory; BIOEE 466, Theoretical Ecology; BIOEE 462, Marine Ecology; BIOEE 463 and 465, Plant Ecology and Population Biology, Lectures and Laboratory; BIOEE 464, Macroevolution; BIOEE 466 and 468, Physiological Plant Ecology, Lectures and Laboratory; BIOEE 473, Ecology of Agricultural Systems; BIOEE 478, Ecosystem Biology; BIOEE 479 (EAS 479), Paleobiology; BIOG 481, Population Genetics; BIOG 484, Molecular Systematics; BIOG 487, Molecular Evolutionary Genetics; BIOG 699, Cellular Basis of Development, BIOM 420, Microbial Genomics; BIOM 485, Bacterial Genetics; ENTOM 400, Insect Physiology and Genetic Engineering of Plants; BIOL 641, Laboratory in Plant Molecular Biology; BIOL 644, Regulatory Factors in Plant Growth and Development; BIOL 652, Plant Molecular Biology II; BIOL 653, Plant Molecular Biology I. Up to 3 credits for this Program of Study may be chosen from other Biological Sciences courses, including BIOG 499, Undergraduate Research in Biology, with approval from the faculty adviser.
6) Genetics and Development: A minimum of 13 credits, usually chosen from the following courses:
   - BIOG 385, Developmental Biology
   - BIOG 389, Embryology
   - BIOG 450, Vertebrate Development
   - BIOG 480, Seminar in Developmental Biology
   - BIOG 481, Population Genetics
   - BIOG 482, Human Genetics and Society
   - BIOG 483, Advanced Developmental Biology
   - BIOG 484, Molecular Evolution
   - BIOG 485, Advanced Eukaryotic Genetics
   - BIOG 487, Human Genomics
   - BIOG 600, Development of Sensory Systems
   - BIOG 682, Fertilization and the Early Embryo
   - BIOG 684, Advanced Topics in Population Genetics
   - BIOG 687, Developmental Genetics
   - BIOG 689, Cellular Basis of Development
   - BIOM 420, Microbial Genomics
   - BIOM 485, Bacterial Genetics
   - ENTOM 400, Insect Physiology
   - BIOM 544, Advanced Eukaryotic Genetics
   - BIOM 633, Biosynthesis of Macromolecules
   - BIOM 639, The Nucleus
   - PL BR 606, Advanced Plant Genetics
   - BIOPL 343, Molecular Biology and Genetic Engineering of Plants
   - BIOPL 641, Laboratory in Plant Molecular Biology
   - BIOPL 644, Regulatory Factors in Plant Growth and Development
   - BIOPL 652, Plant Molecular Biology II
   - BIOPL 653, Plant Molecular Biology I
   - BIOPL 659, Advanced Eukaryotic Genetics
   - BIOPL 664, Advanced Invertebrate Genetics
   - BIOPL 665, Advanced Eukaryotic Genetics

7) Insect Biology: ENTOM 212, Insect Biology, plus a minimum of three additional courses totaling at least nine credits selected from the following groups. At least one of the three additional courses must be selected from group (a):
   (a) ENTOM 322, Insect Morphology
   - ENTOM 351, 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 Biomonitoring; 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 and BIOM 291. At least 8 additional credits are required, which must include at least one course from each of the following courses: BIOM 414, BIOM 416, BIOM 418, or BIOM 485. Additional approved courses are included in the lists below. Students are invited to complete their requirements in one of three areas of interest: i) Prokaryotic Biology, ii) Molecular Microbiology and Biotechnology, and iii) Pathogenic Microbiology.

- 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 414 (Bacterial Diversity), BIOM 416 (Bacterial Physiology), and BIOM 394 (Applied and Food Microbiology)
- Pathogenic Microbiology: BIOM 404 (Pathogenic Bacteriology and Mycology), BIOM 408 (Viruses and Disease I), BIOM 409 (Viruses and Disease II), and BIOM 417 (Medical Parasitology)

9) Molecular and Cell Biology: Chemistry 357–358 or 359–360; BIOB 432, Survey of Cell Biology; BIOL 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 lists: BIOG 416, Cellular Physiology and Genomics Laboratory, BIOM 433, Laboratory in Cell Biology, BIOM 454, Applications of Molecular Biology, BIOM 457, Eukaryotic Cell Proliferation, BIOM 459, Molecular Basis of Human Disease; BIO G 305, Immunology; BIOG 385, Developmental Biology; BIOG 483, Advanced Developmental Biology; BIOG 484, Molecular Evolution; BIOG 486, Advanced Eukaryotic Genetics; BIOM 290, General Microbiology, Lectures; BIOM 408, Viruses and Disease I; BIOM 409, Viruses and Disease II; BIOM 420, Microbial Genetics; BIOM 485, Bacterial Genetics; BION 222, Neurobiology and Behavior II: Introduction to Neurobiology; BION 325, Neurotoxins: Molecular Aspects; BION 425, Molecular Neurophysiology; BION 495, Molecular Biology; and at least 13 credits from the following lists, including at least one course from each group:
   (a) BIOL 322, Insect Morphology
   - BIOL 351, Introductory Insect Systematics
   - BIOL 483, Insect Physiology
   (b) BIOL 215, Spider Biology; BIOL 325, Insect Behavior; BIOL 333, Larval Insect Biology; BIOL 352, Medical and Veterinary Entomology; BIOL 370, Pesticides, Environment and Human Health; BIOL 394, Circadian Rhythms; BIOL 400, Insect Development; BIOL 443, Entomology and Pathology of Trees and Shrubs; BIOL 444, Integrated Pest Management; BIOL 452, Herbivores and Plants; BIOL 453, Historical Biogeography; BIOL 455, Insect Ecology; BIOL 456, Stream Ecology; BIOL 463, Invertebrate Pathology; BIOL 470, Ecological Genetics; BIOL 471, Freshwater Invertebrate Biology and Biomonitoring; BIOL 477, Biological Control; BIOL 490, Insect Toxicology; BIOL 644, Advanced IPM.
and Genetic Approaches to Neurosciences; BIOPL 343, Molecular Biology and Genetic Engineering of Plants; BIOPL 444, Plant Cell Biology. Graduate-level courses such as BIOBM 631, Protein Structure and Function; BIOBM 633, Biosynthesis of Macromolecules: BIOBM 636, Cell Biology; and BIOBM 639, The Nucleus are also acceptable with permission of adviser. Five hours of biochemistry are recommended (BIOBM 331 and 332, or 330 and 334, or 333 and 334). CHEM 207-208 or 215-216 should be completed within the freshman year.

10) Neurobiology and Behavior: The two-semester introductory course sequence, Neurobiology and Behavior I and II (BIONB 221 and 222) with discussion section (four-credits per term), and seven additional credits. The seven additional credits must include at least one ADVANCED course from the BIONB offerings. "Topics" courses (BIONB 426 and 720b) and independent study (BIO G 499) may be used as supplemental credits but do not qualify as ADVANCED courses.

Note: Students who declare the Program of Study in Neurobiology and Behavior after taking BIONB 221 or 222 for only three credits must still take the 1 credit discussion section in BIONB 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 nine credits of additional coursework 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 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 Aspects; NS 604, 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.

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 count toward the 100 hours required in A&S if those credits fulfill major requirements.

12) Plant Biology: Students choose one area of study from the following two options:

Option (a) Botany: Students are required to take Introductory Botany (BIOPL 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: BIOPL 242 and 244, Plant Function and Growth, Lectures and Laboratory; BIOPL 243, Taxonomy of Cultivated Plants; BIOPL 247, Ethnobotany; BIOPL 248, Taxonomy of Vascular Plants; BIOPL 342 and 344, Plant Physiology, Lectures and Laboratory; BIOPL 343 and 347, Molecular Biology and Genetic Engineering of Plants, Lectures and Laboratory; BIOPL 345, Plant Anatomy; BIOPL 348, The Healing Forest; BIOPL 359, Biology of Grasses; BIOPL 404, Crop Evolution, Domestication, and Diversity; BIOPL 422, Plant Development; BIOPL 441, Plant Cell Biology; BIOPL 445, Photosynthesis, BIOPL 447, Molecular Systematics; BIOPL 448, Plant Evolution and the Fossil Record; BIOPL 452/454, Systematics of Tropical Plants and Field Lab; BIOPL 463, Plant Biochemistry, BIOOE 463 and 465, Plant Ecology and Population Biology, Lectures and Laboratory; or BIOEE 466 and 468, Physiological Plant Ecology, Lectures and Laboratory.

Option (b) Plant Biotechnology: Students are required to take BIOPL 345 and 347, Molecular Biology and Genetic Engineering of Plants, Lectures and Laboratory. Students choose, in consultation with their faculty adviser, a minimum of 10 additional credits from the following list: BIOPL 241, Introductory Botany; BIOPL 242 and 244, Plant Function and Growth, Lectures and Laboratory; BIOPL 342 and 344, Plant Physiology, Lectures and Laboratory; BIOPL 422, Plant Development; BIOPL 441, Plant Cell Biology; BIOPL 462, Plant Biochemistry; PL BR 401, Plant Cell and Tissue Culture; or PL BR 402, Plant Tissue Culture Laboratory.

13) Systematics and Biotic Diversity: A minimum of 13 credits from the following two groups, including credits from group (a), and three from group (b), and at least two laboratory courses (marked with *). BIO G 499, Undergraduate Research in Biology, with approval of the adviser, can be used in fulfillment of up to four credits in group (a), and can count as one laboratory course if it has a laboratory component of two or more credits.

(a) *BIOEE 274, The Vertebrates: Structure, Function, and Evolution; *BIOEE 371, Human Paleontology; *BIOEE 473, The Invertebrates: Form, Function, and Evolution; *BIOEE 471, Mammalogy; *BIOEE 472, Herpetology; *BIOEE 475, Ornithology; *BIOEE 476, Biology of Fishes; BIOMI 290, General Microbiology, Lectures; *BIOMI 291, General Microbiology, Laboratory; BIOMI 415, Bacterial Diversity, Lectures; *BOPHI 241, Introductory Botany; *BIOPL 243, Taxonomy of Cultivated Plants; BIOPL 247, Ethnobotany; *BIOPL 248, Taxonomy of Vascular Plants; BIOPL 343, The Healing Forest; BIOPL 359, Biology of Grasses; BIOPL 645, Families of Tropical Flowering Plants, Lectures; *BIOPL 646, Families of Tropical Flowering Plants; *ENTOM 212, Insect Biology; ENTOM 215, Spider Biology: Life on a Silken Thread; *ENTOM 322, Insect Morphology; *ENTOM 331, Introductory Insect Systematics; *ENTOM 471, Freshwater Invertebrate Biology; *ENTOM 631, Systematics of the Coleoptera; PL PA 309, Introductory Mycology; PL PA 319, Field Mycology.

(b) BIOEE 404, Macroevolution; BIOEE 414, Phylogenetic Systematics; BIOPL 447, Molecular Systematics; BIOPL 448, Plant Evolution and the Fossil Record; BIOPL 453, Historical Biogeography; BIOPL 442, Current Topics in Botany.

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 participating in research should contact faculty members with compatible research interests. Faculty members may consider the students' previous academic accomplishments, interests and goals, and the availability of space and equipment when agreeing to supervise a student in his or her laboratory. Students conducting research may enroll for credit in Biological Sciences BIO G 499. Undergraduate Research in Biology. Registration for this course is done at 216 Stimson Hall. The student's research project must have significant biological content in order to be considered for BIO G 499 credit. Students may not earn credit for research conducted outside of Cornell. Up to three credits of research may be used to complete the program of studies in general biology, genetics and development, systematics and biotic diversity, as well as four credits of research in neurobiology and behavior. 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.

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 grade-point average of at least 3.0. In addi-
tion, students must have at least a 3.0 cumulative 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 Research in Biology, under the direction of the faculty member acting as honors supervisor, although the honors program does not require enrollment for credit. Students accepted into the honors program are required to participate in honors research seminars during both semesters of their senior year; submit an acceptable honors thesis; complete all major requirements; and maintain a 3.00 Cornell cumulative and science grade-point average through graduation. Recommendation to the faculty that a candidate graduate with honors and at what level of honors is the responsibility of the Honors Program Committee. The student's final grade point average is a factor in determining the level of honors recommended.

Students interested in the honors program are strongly encouraged to begin their research projects in their junior year and to consider spending the following summer here at Cornell engaged in full time research on their honors project. Students interested in staying for the summer also are encouraged to apply to the Cornell Hughes Scholars Program.

Biology majors who are considering study abroad and graduating with honors are encouraged to meet with their academic and research adviser during their sophomore year to carefully plan their academic schedule to meet the requirements of the honors program. Application forms, requirements, deadlines 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.

INDEX OF COURSES

The following course identifiers are used to denote biological sciences courses in specific areas: General Courses, BIO G; Animal Physiology, BIOAP; Biochemistry, Molecular and Cell Biology, BIOBM; Ecology and Evolutionary Biology, BIOEE; Genetics and Development, BIOGD; Microbiology, BIOMI; Neurobiology and Behavior, BIONB; Plant Biology, BIOPL; Shoals Marine Laboratory, BIOSL.

Note: Biological sciences ("BIO") courses count as agriculture and life sciences credits for students in the College of Agriculture and Life Sciences and as arts and sciences credits for students in the College of Arts and Sciences.

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**CURRICULUM COMMITTEE**

Many decisions pertaining to the curriculum and to the programs of study are made by the Biology Curriculum 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 of 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 prerequisites for biological sciences majors and other students needing eight 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 for majors" as a prerequisite. BIO G 109-110 is a course sequence intended for nonmajors, and meets the prerequisite for many, but not all, upper-level courses listing "one year of introductory biology" as a prerequisite. Students can earn a maximum of eight 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. May not be taken for credit after BIO G 105-106 or 109-110. S-U grades optional, with permission of instructor. Lect, M W F 9:05 or 10:10. 2 lecs each week; to accommodate these, students must reserve all 3 days. Evening prelims: fall, Sept. 25 and Nov. 4, spring, Feb. 26 and Apr. 8. C. Walcott. Designed both for students who intend to specialize in biological sciences and for those who want to obtain a thorough knowledge of biology as part of their general education. The fall semester covers the chemical and cellular basis of life, energy transformations, physiology, neurobiology, and behavior. The spring semester covers genetics, development, evolution, and ecology. Each topic is considered in terms of modern evolutionary theory, and discussions of plant and animal systems are integrated. 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 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. No admittance after second week of classes. 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, or T or R 5-8:11. One 3-hour lab each week and a weekly lec for discs, special lecs, etc. J. C. Glaeser, P. R. Ecklund, and staff. BIO G 103-104 is designed to provide laboratory experience with major biological phenomena in order to support an understanding of the important concepts, principles, and theories of modern biology. A second 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 laboratory and data transformation techniques, and instrumentation in the major areas of biology.
BIO G 109-110 Biological Principles

109, fall; 110, spring. 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 placement. Due to overlap in content, BIO G 109 may not be taken after BIO G 102, or BIO G 106, 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 as an introductory course for the major in biological sciences or as introductory biology for premedical requirements. Note that this course satisfies the prerequisite for many but not all second- and third-level 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. Examining procedures fall, Sept. 25 and Nov. 4, spring, Feb. 26 and Apr. 8. 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 F 10:10-12:35 (fall), or T 10:10-12:35 (spring), or W 7:30-10 P.M.

H. Greene, 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 complexity and 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 are used for problem-solving experiments, independent projects, and discussions. There are dissections of preserved vertebrate, invertebrate, and plant materials; for those students who object to dissection, alternative materials are available for study and there is no grade penalty for omitting dissection or observation of animals. Testing for students choosing to be tested, will involve identification of important structures in real organisms.

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 register in a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Only students who have already had training equivalent to the portion of the regular course that is to be omitted may register in this manner. This course may not be substituted for 100-level courses and may not be used in fulfillment of college distribution requirements except by permission from the Office of Undergraduate Biology.

BIO G 201 Sophomore 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 only.LEC 2 hours each week and B. Cornella.

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


J. L. Davis, J. J. Doyle.

The main focus of this course is on the diversity of living and extinct species. This diversity is examined from an evolutionary perspective, with an emphasis on 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: free-hand 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, scratch-board, and carbon dust. Potentials and limitations of line and half-tone reproduction, copyright, and portfolio presentation are discussed.

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


An introductory course that includes the principle and use of the scanning 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: BIOP 313, BIOPL 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. Lecs, T 11:15; labs, M W or T R 1:25-4:25.

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 preparation of the specimen and 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 fixatives, cryofixations, ultrathin sectioning, 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 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 covers oral and written 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 PowerPoint. All students present a 10-minute seminar on their research and evaluate other presentations.

BIO G 410 Teaching Contemporary Biology

Fall. 3 credits. S-U grades optional.

Prerequisite: one year introductory biology; permission of instructor. L. Southard and S. Merkel.

This course provides students with the opportunity to experience teaching high school science. Students select an important biologi-
cal 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. 1/2 credit. S-U grades only. Leec TBA.
G. Feigenson and staff. A day of lectures on Saturday, Sept. 13, 9:00-4:00, Racker Building, Biotechnology Bldg, giving an overview of current research in biophysics at Cornell by faculty from different departments across 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 1:25-2:20; lab, R 2:50-4:30. 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 of their advisor 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 field biology, or tutoring. Biological sciences courses currently offering such experience include BIO G 105-106; BIOAP 311, 312, 313, 316; BIOBM 330, 331; BIOEE 274, 475; BIOGD 281; and BIOM 291, 292.

**BIO G 499 Undergraduate Research in Biology**
Fall or spring. Variable credit. Students in the College of Arts and Sciences may not 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) towards graduation. Prerequisite: written permission of faculty member who supervises the research and the College of Agriculture and Life Sciences. They may use up to 15 credits of independent study (BIO G 499) towards graduation. Prerequisite: written permission of faculty member who supervises the research and the College of Agriculture and Life Sciences. They may use up to 15 credits of independent study (BIO G 499) towards graduation. Prerequisite: written permission of faculty member who supervises the research and the College of Agriculture and Life Sciences. They may use up to 15 credits of independent study (BIO G 499) towards graduation. Prerequisite: written permission of faculty member who supervises the research and the College of Agriculture and Life Sciences. They may use up to 15 credits of independent study (BIO G 499) towards graduation. Prerequisite: written permission of faculty member who supervises the research and the College of Agriculture and Life Sciences. They may use up to 15 credits of independent study (BIO G 499) towards graduation. Prerequisite: written permission of faculty member who supervises the research and the College of Agriculture and Life Sciences. They may use up to 15 credits of independent study (BIO G 499) towards graduation. Prerequisite: written permission of faculty member who supervises the research and the College of Agriculture and Life Sciences.
BIOLOGICAL SCIENCES - 2003-2004

Physiology and related fields without equivalent background are strongly encouraged to enroll. Each of 2 afternoon laboratory sections is limited to 40 students. Prerequisite: concurrent or previous enrollment in BIOAP 311 or permission of instructor. Lect, M W 12:20–1:10; lab, M 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 principles in animals, with emphasis on relevance to humans, and to introduce students to physiology research techniques, instrumentation, experimental design, and interpretation of results. Techniques include anesthesia, surgical procedures, dissection under anesthesia, and design, and interpretation of results. Written reports of laboratory activities are required. Grading is based on evaluation of these reports, laboratory performance, weekly quizzes, and a mid-term and a 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, L. Mizra.

Provide students with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates (primarily mammals), as well as methods of analytic morphometry at 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 BIOBM 432, Survey of Cell Tissues (also NS 475). Spring. 3 credits. Prerequisites: BIOBM 330, 331–332, or 333 (may be taken concurrently). M W 9:05; lab, R 2:00. Offered alternate years. Next offered in spring 2004. D. Noden and P. Stover.

For description, see NS 475.

BIOAP 619 Lipids (also NS 602)
Fall. 2 credits. Lecs, T R 11:15. 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, structure, and metabolism; molecular biology, function, and regulation of lipoprotein receptors; mechanism 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 2003. Lec, 1 hour each week. TBA. 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 on dynamic 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 VETPH 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. Graduate student auditors allowed. 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. Prerequisite: 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. 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, placenta and reproductive tracts; and student participation in the form of discussions and/or presentations.

BIOAP 811 Advanced Physiological Methods I
Fall. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator. S-U grades only. Lab TBA. Coordinator: TBA. This is a course for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of faculty members in the Field of Physiology to acquaint graduate students with the latest techniques/methods in biomedical/physiological/genomic research. Three modules are offered each semester by arrangement with the course coordinator.
BIOAP 812 Advanced Physiological Methods II  
Spring. 2 credits. Enrollment limited.  
Prerequisites: graduate student status or permission of course coordinator. S-U grades only. Lab TBA. Coordinator: TBA.  
This is a course for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of faculty members in the Field of Physiology to acquaint graduate students with the latest techniques/methods in biomedical/physiological/genomic research. Three modules are offered each semester by arrangement with the course coordinator.

Related Courses in Other Departments  
Adaptations of Marine Organisms (Biological Sciences [BIOGSM] 413)  
Advanced Work in Animal Parasitology (Veterinary Microbiology 737)  
Animal Development (Veterinary Anatomy 507)  
Animal Reproduction and Development (Animal Science 300)  
Developmental Biology (Biological Sciences [BIOGDD] 385)  
Embryology (Biological Sciences [BIOGDD] 389)  
Fundamentals of Endocrinology (Animal Science 427)  
Insect Morphology (Entomology 322)  
Integration and Coordination of Energy Metabolism (Biological Sciences [BIOGBM] 637 and Nutritional Sciences 636)  
Neuroanatomy (Veterinary Anatomy 504)  
Sensory Function (Biological Sciences [BIONB] 492)  
Teaching Experience (Biological Sciences [BIO G] 498)  
Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

BIOCHEMISTRY, MOLECULAR AND CELL BIOLOGY (BIOBM)  
BIOBM 333 Principles of Biochemistry: Proteins, Metabolism, and Molecular Biology  
Summer (6-week session). 4 credits.  
Prerequisites: one year of introductory biology for majors, one year 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, enzymes, cellular 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 331/332 (BIOBM 332 may be taken concurrently) will 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.  
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 437; BIOGD 483; and BIOBM 632, 656, 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 P.M. 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 proteins and lipid composition, use of light, fluorescence, and electron microscopy, transfection of mammalian cells with eDNA expression vectors, live cell imaging of fluorescently labeled proteins using confocal microscopy, and 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. Lecs, M W F 11:15-12:05. J. M. Calvo, S. Ely.
Lecture topics include large-scale sequencing of genomes, drug discovery based upon genomics, combinational approaches to chemical libraries, pharmacogenomics, antibiotics derived from innate immune system, DNA and eukaryotic animals, engineering plants resistant to insects, and gene therapy. About one-quarter of the course is devoted to exploring factors that are required for commercializing ideas and to some social ramifications of biotechnology.

**BIOM 435-436 Undergraduate Biochemistry Seminar**

4 credits. Fall, Winter, Spring. First meeting will be at 4 P.M. on Tuesday, January 27, 471 Biochemistry Building. 1 credit each term. May be repeated for credit. Limited to upper-class students. Prerequisites: BIOM 330, 335, or 351–352, or written permission of instructor. S-U grades only. Seminar time TBD. Organizational meeting first W of each semester.

Selected papers from the literature on a given topic are evaluated critically during six or seven 2-hour meetings.

**BIOM 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. Prerequisite: BIOG 101–102 or BIOG 105–106 and BIOM 330 or BIOM 331–332. Recommended: BIOD 281 and BIOM 452. S-U grades optional. Lec., T R 12:20–1:10. Disc., D. A. Not offered 2003–2004. R-H. Cohen

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.

**BIOM 439 Molecular Basis of Human Disease (also BIOD 439)**

Fall. 3 credits. Prerequisites: biochemistry and molecular biology (e.g., BIOM 330, BIOM 331–332, or BIOM 333) and genetics (e.g., BIOD 281) or permission from instructor. Recommended: cell biology (e.g., BIOM 452 or BIOAP 310) and physiology (e.g., BIOAP 311 or BIOAP 458). S-U grades optional. Lec., T R 10:10–11:25. W. L. Kraus

This course examines how changes in the normal expression of structure, and activity of gene products caused by genetic mutations, epigenetic phenomena and environmental agents lead to human diseases. The material focuses on how these changes lead to alterations in normal cellular processes, as well as the resulting physiological consequences. Topics are selected from hormone insensitivity syndromes, inborn errors of metabolism, gene fusions resulting in hybrid proteins, gene amplification, gene inactivation, disruption of signaling pathways, disruption of metabolic pathways, and the molecular actions of infectious agents and environmental toxins.

Examples of diseases are selected to emphasize various aspects of genetics, molecular biology, cell biology, physiology, immunology, and endocrinology that have been presented in other courses. In addition, the methods used to identify the underlying biochemical and genetic basis of the diseases, as well as possible pharmaceutical and genetic therapies for treating the diseases, are presented. A portion of each class period will be devoted to discussion of practice questions.

**BIOM 440 Laboratory in Biochemistry and Molecular Biology**

Fall, spring, or summer (3-week session). 4 credits. Enrollment limited. Preference is given to undergraduate biology majors having Biochemistry or Molecular and Cell Biology, and graduate students and to graduate students in a minor in the Field of Biochemistry. Prerequisites: BIOM 330 or 333 or 331–332 (331 or 332 may be taken concurrently). Labs, M W 12:20–4:25 (disc, F 1:25) or T R 12:20–4:25 (disc, M 3:35). Summer (3-week session): M–F 10:30–3:30. S. Ely, 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.

**BIOM 631 Protein Structure and Function**


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 331–332 or equivalent. Lec., T R 11:15. Offered alternate years. P. C. Hinkle. Structure and dynamics of biological membranes, physical methods, model membranes, ionophores, ion-transport ATPases, mitochondrial and chloroplast membrane systems, 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 331–332, and 452, or their equivalents. Lec., T R 9:05–9:55. A. P. Bretcher. This course aims to provide an integrated view of eukaryotic cell organization as elucidated using biochemical, molecular, genetic, and cell biological approaches. Major topics include the cellular traffic and cell polarity. Together with BIOM 437, 632, and 639 this course provides broad coverage of the cell biology subject area.

**BIOM 641 Laboratory in Plant Molecular Biology (also BIOL 641)**

Fall. 4 credits. Prerequisites: BIOD 281 or equivalent, BIOM 330 or 331 or equivalent, and permission of instructor. S-U grades with permission of instructor. Lec., M W F 9:05–4:30. J. B. Nasrallah, M. R. Hanson. 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.

**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. Lec., M W F 10:10 (12 credits) Nov. 1–Dec. 2. 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 signaling in the establishment 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 II).

**BIOM 658 Macromolecular Interactions and Cell Function**

Spring. 2 credits. Prerequisite: BIOM 330 or 333 or 331–352. Recommended: BIOM 631 or 633. S-U grades optional. Lec., T R 9:05–10:05. J. Lis.

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 will be on high-throughput examination of 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 659 The Nucleus**

Spring. 2 credits. Prerequisites: BIOM 330 or 333 or 331–352, or their equivalent. Recommended: BIOD 281. Lec., T R 10:10. J. T. Lis.

Lectures on topics of eukaryotic genome organization, chromatin structure, regulation of gene expression, RNA processing, the structure and movement of chromosomes, and nuclear export and import. 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.

**BIOPL 653 Molecular Biology of Plant Organelles (also BIOL 653.5)**


**BIOPL 655 Molecular Aspects of Plant Development I (also BIOL 655.4)**

1 credit. Lec., M W F 10:10 (12 credits) Nov. 1–Dec. 2. 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 signaling in the establishment 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 II).
[BIOBM 730] Protein NMR Spectroscopy (also VETPR 730)
Spring. 2 credits. Prerequisites: CHEM 399 and 390, or CHEM 287 and 288, or permission of instructor. S-U grades optional. Offered alternate years. Next offered Spring 2005. Lec TBA. L. K. Nicholson, R. E. Osvald.
The student acquires the tools necessary for in-depth understanding of multidimensional, multinuclear NMR experiments. Schemes for magnetization transfer, selective excitation, water suppression, decoupling, and others are presented. The application of these techniques to proteins for resonance assignment, structure determination, and dynamics' characterization is studied.

BIOBM 732-737 Current Topics in Biochemistry
Fall or spring. 1/2 or 1 credit for each topic. May be repeated for credit. Prerequisite: BIOBM 530 or 335 or 331–332 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.

BIOBM 738 Macromolecular Crystallography (also CHEM 788)
Spring. 3 credits. Prerequisite: permission of instructor. Lecs, T, R 10:10. Offered alternate years. S. E. Elcock. Lectures briefly cover the fundamentals of crystallography and focus on methods for determining the three-dimensional structures of macromolecules.

BIOBM 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 in a case-study format. Topics discussed include: regulations; data selection, manipulation, and representation; fraud, misconduct, and whistle-blowing; conflicts of interest and commitment; authorship, ownership, and intellectual property; peer review and confidentiality; scientific response to external pressure; legal liabilities; and professional codes of ethics.

BIOBM 761 Topics in Cancer Cell Biology (also VETM 761)
Spring. Series of 1 credit graduate sections that reflect the cancer expertise of the Cornell faculty. (Course Director: Dr. B. U. Pauli). For description, see VETM 761.

BIOBM 830 Biochemistry Seminar
Fall or spring. No credit. Sem, F 4:00. Staff. Lectures on current research in biochemistry, presented by distinguished visitors and staff members. Lectures are open to everyone, but registration is limited to graduate students in Biochemistry, Molecular and Cell Biology.

BIOBM 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. Hufnaker.
The first half of this course comprises an intensive laboratory covering fundamental aspects of modern molecular biology and cell biology. The second half of the course comprises research in the laboratory of a professor chosen by the student (See BIOBM 832). Students must enroll separately for each half.

BIOBM 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. Hufnaker. 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.

BIOBM 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. G. P. Hess. A seminar course with critical discussion by students of original research papers. A variety of topics in biochemistry, molecular and cell biology are covered.

BIOBM 836 Methods and Logic in Biochemistry, Molecular and Cell Biology, Part I
Spring. 1 credit. Limited to first-and second-year students majoring in the Field of Biochemistry, Molecular and Cell Biology. S-U grades only. Sem and disc TBA. D. Shalowitz. Each student presents one seminar per year on his or her thesis research and then meets with instructors and thesis committee members for evaluation.

BIOBM 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. S-U grades only. Monday, 9–11. D. Shalowitz.
An interactive seminar to develop 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. Student projects include preparation and presentation of a mock research grant proposal.

Related Courses in Other Departments
- Lipids (Biological Sciences [BIOAP] 619 and Nutritional Sciences 602)
- Molecular Aspects of Development (Biological Sciences [BIOGD] 483)
- Molecular Biology Techniques for Animal Biologists (Animal Science 650)
- Molecular Mechanisms of Hormone Action (Biological Sciences [BIOAP] 658 and Veterinary Medicine 798)
- Teaching Experience (Biological Sciences [BIO G] 498)
- Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

ECOLOGY AND EVOLUTIONARY BIOLOGY

BIOEE 154 The Sea: An Introduction to Oceanography, Lectures (also EAS 154)
Spring. 3 credits. The optional one-credit laboratory for this course is offered as BIOEE/EAS 155. S-U grades optional. Lecs, T 11:40–12:55. C. H. Greene, 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. Labs, M 2:00–4:25 or 7:30–9:55. W. B. Provine. See EAS 155 for full course description.

BIOEE 207 Evolution (also HIST 287 and S&TS 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 10:10; disc, 1 hour each week TBA. Summer (6-week session): Lecs and disc, M W 6:00–9:00 P.M. W. B. Provine. Evolution is the central concept in biology. This course examines evolution in historical and cultural contexts. This course aims to understand the major issues in the history and current status of evolutionary biology, and explore the implications of evolution for culture. Issues range from controversies over mechanisms of evolution in natural populations to the conflict between creationists and evolutionists.

BIOEE 261 Ecology and the Environment
Fall or summer. 4 credits. Prerequisite: one year of introductory biology. S-U grades optional. Lecs, M W 11:15; disc, W or R 1:25, 2:30, or 3:35. A. F. Chabot, T. C. Huffaker, W. M. White.
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 urban ecosystems), 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 field work, with emphasis on developing observational skills, journal keeping, and a landscape perspective. Topics include plant succession, niche relationships of insects, influence of herbivores and competition on plant performance, decomposition of soil litter, foraging behavior, census methods, and use of scientific collections.


BIOE 264 Tropical Field Ornithology
Winter, January 5-19, 2004. 3 credits.
Limited to 15 students. Prerequisite: permission of either instructor. Lecs, M W F 10:10, disc, M 10:10 or TBA. Lecs every W and F; occasional lectures on M. Offered alternate years. Not offered 2003-2004. K. A. R. Kennedy, J. D. Haas.
An introduction to the evolution 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 Pilkington fraud, the sociobiology debate, genetic engineering, race and IQ, and racism are presented as examples of current issues in human biology.

BIOE 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 must register 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 prelms: spring, Mar. 4 and Apr. 6. Lecs, TR 9:05; disc, 1 hour each week TBA. Fall, M. Geber; spring, M. 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 evolution by natural selection, levels of selection, concepts of fitness and adaptation, modes of speciation, long-term trends in evolution, rates of evolution, and extinction. Students taking the four-credit option must register for additional materials from the primary literature and write a series of essays in place of the regular prelims.

BIOE 274 The Vertebrates: Structure, Function, and Evolution
An introductory course in vertebrate organismic biology which explores the structure and function of vertebrates with an emphasis on trends in vertebrate evolution. Lectures cover topics such as the origin and evolution of various vertebrate groups, sensory systems, thermoregulation, life history, locomotion, feeding, size, and scaling. Laboratories include dissections of preserved vertebrate animals and noninvasive live animal demonstrations.

BIOE 362 Dynamic Models in Biology (also MATH 362)
Spring. 3 credits. Prerequisites: 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. 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. S. P. Ellner, 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.

BIOE 371 Human Paleontology (also ANTHR 371)
Fall. 4 credits. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Lecs, M W F 2:30; lab, 1 hour each week TBA; occasional field trips. Offered alternate years. K. A. R. Kennedy.
A broad survey of the fossil evidence for human evolution with special attention to skeletal and dental anatomy, geological contexts, paleoecology, dating methods, archaeological associations, and current theories of human origins and physical diversity.

BIOE 373 Biology of the Marine Invertebrates
Fall (but course must be taken in the previous summer at the Shoals Marine Laboratory (SML)). 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 BIOE 373 are strongly encouraged to take BIOE 477. Three-week, full-time course. Daily and evening lectures, laboratories, and field work. Course is taken during the summer; enroll for credit for the subsequent fall semester. Total cost for board, room, and headboard at SML $1,200. Offered alternate years. C. D. Harvell, 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 provides students with a rich diversity 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.

BIOE 405 Biology of the Neotropics
Fall. 2 credits. Limited to 18 students. Prerequisite: BIOE 261 or permission of instructor. S-U grades optional. Lecs and disc, W 7:30-9:30 p.m. P. H. Wrege, A. S. Flecker.
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.

BIOE 452 Herbivores and Plants: Chemical Ecology and Coevolution (also ENTOM 452)
Spring. 3 credits. Prerequisites: one year of introductory biology; BIOE 261, CHEM 257 or 357/358 and 251 or 301, or permission of instructor. S-U grades optional. Field trips, additional lectures, or laboratory demonstrations may be held in place of F lecture. Lecs, M W F 11:15. Offered alternate years. Not offered 2003-2004. P. P. Feeny.
Topics include: significance of plant chemistry in mediating interactions between plants and herbivorous animals; mechanisms and strategies of plant feeding 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.

BIOE 453 Speciation
An advanced course in evolutionary biology focusing on the pattern and process of speciation and the nature 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. Prerequisite: BIOEE 261 or equivalent and ENTOM 212 or knowledge of another taxon. S-U grades optional. Lecs, M W F 11:15. Offered alternate years.
Topics include the nature and consequences of biotic diversification, ecological and evolutionary processes in general.

[BIOEE 456 Stream Ecology (also ENTOM 456 and NTRES 456)]

[BIOEE 457 Limnology: Ecology of Lakes, Lectures]
Fall. 3 credits. Prerequisite: BIOEE 261 or written permission of instructor. Recommended: introductory chemistry. Letter grade, S-U by permission only. Lecs, M W F 11:15. Offered alternate years. Not offered 2003–2004. N. G. Hairston, Jr.
Limnology is the study of fresh waters and other inland, nonmarine environments. This course focuses on lakes and ponds, which are considered as distinct aquatic environments with clear terrestrial boundaries, and within which ecological interactions are especially evident. In lakes, interactions between organisms are often strong and adaptations easily recognized. Physical and chemical properties of the environment impact organisms in important ways and organisms, likewise, influence physics and chemistry. As a result, lakes provide excellent systems for studying the links between physical (thermal and mixing), chemical (dissolved elements and compounds), and organismal dynamics. Lakes are exciting environments for study in their own right, and for gaining perspective on ecological and evolutionary processes in general.

[BIOEE 459 Limnology: Ecology of Lakes, Laboratory]
Fall. 2 credits. Prerequisite: concurrent or previous enrollment in BIOEE 457. Letter grade, S-U by permission only. Lab, T W or R 1:25–4:25; 1 weekend field trip. Fee, $12 (for food on field trip). Offered alternate years. Not offered 2003–2004. N. G. Hairston, Jr., staff.
Laboratories and field trips devoted to studies of the biological, chemical, and physical properties of lakes and other freshwater environments. Exercises focus on understanding the freshwater environment, on experimentation, and on understanding ecological processes within lakes. Optional vertebrate dissection (fish) during one laboratory exercise and during a portion of the weekend field trip.

[BIOEE 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 250, BEE 367, NTRES 305, NTRES 340, NTRES 410, BIOLN 422) or permission of instructor. S-U grades optional. Lecs, T R 1:25–2:40, lab, M–W, 2:00–4:25. Offered alternate years. Not offered 2003–2004. 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)]
Lectures and discussion focus on current research in broad areas of marine ecology with an emphasis on processes unique to marine systems. Marine ecosystems are treated at multiple levels of organization. Emphasis on exploration, interrelationships, and examples of ecosystems and interrelationships. Examples are drawn from all types of marine habitats, including intertidal zones, coastal waters, and tropical coral reefs.

[BIOEE 463 Plant Ecology and Population Biology, Lectures]
Fall. 3 credits. Prerequisite: BIOEE 261 or 278 or equivalent, or permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in BIOEE 465. Lecs, M W F 11:15. Offered alternate years. Not offered 2003–2004. M. A. Geber, P. L. Marks.
This course examines the biological and historical factors affecting the structure of plant communities, and the processes of plant species distribution and abundance, and population dynamics of individual species. The influence of the environment, disturbance history, competition, and herbivory on the organization of plant communities is 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 blend empirical patterns, experimental results, and theory. Readings are drawn from primary literature.

[BIOEE 464 Macroevolution]
Spring. 4 credits. Limited to 25 students. Prerequisite: BIOEE 278 or permission of instructor. Grad students interested in taking this course are strongly encouraged to preregister. S-U grades optional, with permission of instructor. Lecs, T R 10:10–11:25, disc, 1 hour each week TBA. Offered alternate years. A. R. McCune.
An advanced course in evolutionary biology centered on large-scale features of evolution. Areas of emphasis include phylogeny reconstruction, patterns and processes of speciation, the origin of 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, morphological, ecological, systematic, paleobiology, development, and the fossil record.

[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]
A detailed survey of the physiological approaches used to understand the relationships between plants and their environment. Lectures explore physiological adaptation; limiting factors; resource acquisition and allocation; photosynthesis, carbon, and energy balance; water use and water relations; nutrient relations; linking physiology, development, and morphology; stress physiology; life history and physiology; the evolution of physiological performance; and physiology at the population, community, and ecosystem levels. Readings drawn from the primary literature and textbooks.

[BIOEE 467 Seminar in the History of Biology (also HIST 415, B & S CO 447, and S & T S 447)]
Fall or summer (6-week session). 4 credits. Limited to 18 students. S-U grades optional. W. B. Provine.
Specific topics change each year.

[BIOEE 468 Physiological Plant Ecology, Laboratory]
Spring. 2 credits. Limited to 15 students. Prerequisite: previous or concurrent enrollment in BIOEE 466. Lecture, 1:25–4:25, plus additional lab hours TBA. Offered alternate years. Not offered 2003–2004. J. P. Sparks.
A detailed survey of the physiological approaches used in understanding the relationships between plants and their environment. Laboratories apply physiological techniques to specific ecological problems and cover aspects of experimental design and computer-aided data analysis. Most laboratories run past the three-hour period, with students spending an average of three hours/week in additional lab time for this course.

[BIOEE 469 Food, Agriculture, and Society (also B & S CO 469 and S & T S 469)]
A multidisciplinary course dealing with the social and environmental impacts 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 technologies 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]**
Fall. 4 credits. Recommended: BIOEE 274. S-U grades optional, with permission of instructor. Carpooling to the Vertebrate Collections at Cornell Business and Technology Park is necessary several times during the semester. Fee, $15. Lecs, M W F 12:20; lab, M T or W 1:25-4:25; 1 weekend field trip required. Not offered 2003-2004. Staff.

Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systems, ecology, and natural history of mammals of the world, with primary emphasis on the North American fauna. Systematics laboratories held in the Museum of Natural History. 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: BIOEE 261 or permission of instructor. Carpooling to the Vertebrate Collections at Cornell Business and Technology Park is necessary several times during the semester. Fee, $30. Labs, T R 1:25-4:25; occasional field trips and special projects. Offered alternate years. Not offered 2003-2004. H. W. Greene.

Laboratory topics include systematics, morphology, and behavior. Live animals are studied in the field and are used in the laboratory for nondestructive demonstrations and experiments. The systematics laboratory exercises are based on museum specimens and dissection of preserved materials.

**[BIOEE 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, the Thursday meetings may run later because of field trips. Lecs and labs, T R 2:30-4:35. Not offered 2003-2004. A. G. Power, E. C. M. Fernandez. 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 concepts.

**[BIOEE 474 Forensic Anthropology and Human Biology (also ANTHR 474)]**
Spring. 5 credits. Limited to 16 students. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Prerequisite: permission of instructor by preregistering in E231 Corson. Independent research project required. Lecs and labs, T R 10:10-12:05; additional hours TBA. Offered alternate years. Not offered 2003-2004. K. A. R. Kennedy.

Forensic anthropology within the forensic sciences is covered in a broad survey of laboratory and field methods for students with interest in this applied area of biological anthropology. Emphasis is upon human skeletal biology, pathology, age and sex determination, and relevant techniques for the archaeologist and forensic anthropologist.

**[BIOEE 475 Ornithology]**
Spring. 4 credits. Limited to 35 students. Prerequisite: permission of instructor by preregistering in E235 Corson. Recommended: BIOEE 274. S-U grades optional, with permission of instructor. Carpooling to the Laboratory of Ornithology is necessary. Fee, $15. Lecs and labs, T R 12:20-4:25; occasional field trips and special projects. Offered alternate years. D. W. Winkler.

Lectures cover various aspects of the biology of birds, including anatomy, physiology, systematics, evolution, behavior, ecology, and biogeography. Laboratory includes dissection of dead material, studies of skeletons and plumages, and specimen identification of avian families of the world and species of New York. Independent projects emphasize research skills.

**[BIOEE 476 Marine Invertebrates]**
Fall. 4 credits. Limited to 24 students. Recommended: 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 12:20-4:25. With additional lab time TBA. 2 field trips. Offered alternate years. Not offered 2003-2004. A. R. McCune.

An introduction to the study of fishes: their structure, evolution, distribution, ecology, physiology, behavior, classification, and identification, with emphasis on local marine 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. C. D. Harvell, J. G. Morin.

Discussions and directed readings center around current research themes in Invertebrate Biology. Designed as an on-campus companion course to the field-based BIOEE 373, Marine Biology of the Marine Invertebrates. Students will write individual research essays based on projects done in the field.

**[BIOEE 478 Ecosystem Biology]**

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 from acid precipitation and offshore oil pollution. Also includes analysis of climate change and regional environmental change from an ecosystem perspective.

**[BIOEE 479 Paleobiology (also EAS 479)]**
Fall. 2 credits. Prerequisite: 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. J. A. Allmon.

See EAS 479 for full course description.

**[BIOEE 480 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. Lecs, T R 12:20-4:25; occasional field trips and special projects. Offered alternate years. J. A. Allmon, M. 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. Prerequisite: 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 2003-2004. C. D. Harvell, 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. P. L. Marks, R. B. Root.
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 for two weeks 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 481)**

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. Pimentel.

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 665 Limnology Seminar**


A seminar course on advanced topics in freshwater ecology.

**BIOEE 668 Principles of Biogeochemistry**

Spring. 4 credits. Limited to 20 students. Prerequisite: solid background in ecology, environmental chemistry, or related environmental science. Permission of instructor required for undergraduates. S-U grades optional. Lec and disc, T R 10:10–12:05. Offered alternate years. R. Howarth, C. Goodale.

Lectures cover the biotic controls on the chemistry of the environment and the chemical control of ecosystem function. Emphasis is on cycles of major elements and minor elements globally and in selected ecosystems, stressing the coupling of element cycles. A comparative approach is used to illustrate similarities and differences in element cycling among ecosystems. Analysis of both theoretical and applied issues, including global atmospheric changes and factors controlling the acidification of lakes and soils.

**BIOEE 669 Plant Ecology Seminar**


Includes review of current literature, student research, and selected topics of interest to participants.

**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 optional. Sem TBA. Staff.

Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

**[BIOEE 673 Human Evolution: Concepts, History, and Theory (also ANTHR 673)]**

Fall. 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. Not offered 2003–2004.

R. A. R. 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 an 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. Limited to 15 students. Prerequisite: BIOEE 668. 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 763 Workshop in Biogeochemistry**

Fall or spring. 1 credit. May be repeated for credit. Limited to 15 students. Prerequisite: BIOEE 668. S-U grades optional. Workshop and disc, TBA. Staff.

Provides a workshop-forum in which graduate students interact with invited world leaders in biogeochemistry. Workshop topics change each semester. A one-week workshop will be preceded by seven one-hour preparatory discussions of readings.

**BIOEE 767 Current Topics in Ecology and Evolutionary Biology**

Fall. 4 credits. Prerequisite: permission of instructor required for undergraduates. S-U grades optional. Lec and disc, T R 10:10–12:05, 5 P. P. Feeny.

Critical evaluation and discussion of theory and research in ecology and evolutionary biology. Lectures by faculty and student-led discussions of topics in areas of current importance.

**BIOEE 899 M.S. Thesis Research**

Fall or spring. 1–15 credits. Prerequisite: admission to the Field of Ecology and Evolutionary Biology. S-U grades optional. E&FB field faculty.

Thesis research conducted by an M.S. student in the Field of Ecology and Evolutionary Biology with advice and consultation of a major professor who is a member of the Field.

**BIOEE 999 Ph.D. Dissertation Research**

Fall or spring. 1–15 credits. Prerequisite: admission to the Field of Ecology and Evolutionary Biology as a Ph.D. student. S-U grades optional. E&FB field faculty. Dissertation research conducted by a Ph.D. student in the Field of Ecology and Evolutionary Biology with advice and consultation of a major professor who is a member of the Field.

**Related Courses in Other Departments**

- **Evolutionary Theory and Human Behavior (ANTHR 375 and 675)**
- **Ethics and the Environment (B&SOC 206, PHIL 246, and S&TS 206)**
- **Hydrology and the Environment (BEE 371)**
- **Biomechanics of Plants (BEE 456 and BIOMPL 456)**
- **Evolution of the Earth and Life (BIOM 170 and EAS 102)**
- **Undergraduate Seminar in Biology (BIO G 400)**
- **Teaching Experience (BIO G 498)**
- **Undergraduate Research in Biology (BIO G 499)**
- **Population Genetics (BIOMPL 481)**
- **Molecular Evolution (BIOMPL 484)**
- **General Microbiology, Lectures (BIOMPL 290)**
- **Bacterial Diversity (BIOMPL 414)**
- **Microbial Ecology (BIOMPL 418)**
- **Neurobiology and Behavior I: Introduction to Behavior (BIONB 221)**
- **Methods in Animal Behavior (BIONB 323)**
- **Evolutionary Perspectives on Human Behavior (BIONB 327)**
- **Ecology of Animal Behavior (BIONB 329 and BIOMPL 329)**
- **Modeling Behavioral Evolution (BIONB 422)**
- **Animal Communication (BIONB 426)**
- **Animal Social Behavior (BIONB 427)**
- **Introductory Botany (BIOP 241)**
- **Ethnobiology (BIOP 247)**
- **Taxonomy of Vascular Plants (BIOP 248)**
- **Phylogenetic Systematics (BIOP 440)**
- **Molecular Systematics (BIOP 447)**
- **Plant Evolution and the Fossil Record (BIOP 448)**
- **Systematics of Tropical Plants (BIOP 452)**
- **Systematics of Tropics Plants: Field Laboratory (BIOP 454)**
- **Principles and Practice of Historical Biogeography (BIOP 453 and ENTOM 453)**
- **Ecology of Marine Fishes (BIOMPL 303)**
- **Marine Microbial Ecology (BIOMPL 308)**
- **Climates and Ecosystems (BIOMPL 309)**
- **Marine Biology for Teachers (BIOMPL 363)**
- **Field Marine Science (FMS) (BIOMPL 364)**
- **Underwater Research (BIOMPL 365)**
- **SEA Introduction to Oceanography (BIOMPL 366)**
- **SEA Introduction to Maritime Studies (BIOMPL 367)**
- **SEA Introduction to Nautical Science (BIOMPL 368)**
- **SEA Practical Oceanography I, II, and III (BIOMPL 369/370/372)**
- **Field Ornithology (BIOMPL 374)**
- **Field Marine Biology and Ecology (FM&EB) (BIOMPL 375)**
- **Marine Invertebrate Zoology (BIOMPL 376)**
- **Marine Pollution (BIOMPL 402)**
- **Research in Marine Biology (BIOMPL 413)**
- **Tropical Marine Science (BIOMPL 418)**
- **Seaweeds, Plankton and Seagrass: The Ecology and Systematics of Marine Plants (BIOMPL 449)**

ECOLOGY AND EVOLUTIONARY BIOLOGY 167
GENETICS AND DEVELOPMENT (BIOGD)

**BIOGD 132 Orientation Lectures in Molecular Biology and Genetics (also BIOBM 132)**
Spring, weeks 1–3. No credit. Primarily for freshmen, sophomores, and transfer students. S-U grades only. Lect, S 10:10, for first three S of semester. Staff. Discussions by six professors about their research and promising new areas for research in the future.

**BIOGD 281 Genetics**
Fall, spring, or summer (8-week session). 5 credits. Not open to freshmen in fall semester. Enrollment may be limited to 200 students. Prerequisite: one year of introductory biology or equivalent. No admittance after first week of classes. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Lecs, T R 10:10–12:55; lab, T or W or R or F 2:30–4:25. Problem-solving sessions strongly recommended, T or W 8:30–10:00 (additional session by arrangement). T. D. Fox, M. L. Goldberg, 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 structure, gene and chromosome mutations, genes in populations, and extrachromosomal inheritance. Aspects of recombinant DNA technology are discussed. In the laboratory, students perform experiments with microorganisms and conduct an independent study of inheritance in *Drosophila*.

**BIOGD 282 Human Genetics**
Spring. 2 or 3 credits (2 credits if taken after BIOGD 281). Each discussion limited to 20 students. Prerequisite: 1 year of introductory biology or equivalent. S-U grades optional. Lecs, M W F 10:10–11:15; J. Liu. An introduction to the morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

**BIOGD 389 Embryology**
Spring. 3 credits. Preference given to seniors. Prerequisites: 1 year of introductory biology and a knowledge of mammalian adult anatomy. Lecs, TBA; labs, TBA. Not offered 2003–2004. Staff. A course 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.
tions, and about the processes that lead to evolution. Topics include the diversity and measurement of genetic variation, mating and reproductive systems, selection and fitness, genetic drift, migration and population structure, mutation, multilocus models, the genetics of speciation, quantitative traits, and the maintenance of molecular variation. Emphasis is placed on DNA sequence variation, and the interplay between theory and the data from experiments and natural populations. Specific case studies include the population genetic issues involved in DNA fingerprinting, the genetic structure and evolution of 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 BIOBM 330 or 333 and 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, preimplantation genetic diagnosis, 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 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; BIOBM 332 or 330 or 333; and BIOGD 385 or permission of instructor. Lecs. T R 9:05-10:15. A. G. Clark.
An advanced course in developmental biology, with emphasis on the molecular underpinnings of development. 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 in microorganisms, plants, and, especially, animals including fruit flies, nematode worms, and vertebrates. 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. Students will be placed on the role of full genome knowledge in mediating variation in disease risk, will be explored in depth. Methods such as genome-wide association and whole-genome sequencing will be examined. The course will be conducted as a series of lectures with classroom discussion. Assignments will include a series of problem sets and a term paper.

**BIOGD 488 Molecular Evolution**
Spring. 3 credits. Prerequisites: BIOGD 281 and or phylogenetic trees, M W 8:40-9:55. Offered alternate years. R. J. MacIntyre.
An analysis of evolutionary changes in genes and their protein products. Theories of the evolution of the genetic code, the construction of phylogenetic trees from biochemical data, and the role of gene duplications in evolution are discussed. The second half of the course concerns the evolution and the organization of genomes from viruses to higher eukaryotes, including the evolution of satellite DNA sequences and transposable elements.

**BIOGD 489 Bacterial Genetics (also BIOMI 489)**
Fall. 2 credits. Graduate students, see BIOMI 685 for prerequisites: BIOGD 281. Recommended: BIOMI 290 and BIOMB 330 or 331 and 332. Lecs. M W 7:30-9:25 P.M. Staff.
For course description, see BIOMI 485.

**BIOGD 486 Advanced Eukaryotic Genetics**
Spring. 4 credits. Enrollment may be limited to 20 students. Prerequisite: BIOGD 281. BIOBM 330 or 333 and 331 and 332. S-U grades optional. T R 12:20-1:25 and R 12:20-1:30; disc R 1:25-2:15 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 chromosomes and cell cycle control, embryonic development, pathogen resistance in plants, and human genetics.

**BIOGD 485 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. Students will be placed on the role of full genome knowledge in mediating variation in disease risk, will be explored in depth. Methods such as genome-wide association and whole-genome sequencing will be examined. The course will be conducted as a series of lectures with classroom discussion. Assignments will include a series of problem sets and a term paper.

**BIOGD 680 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. Lee, M W F 10:10-11:00. Offered alternate years. C. F. Aquadro, A. G. Clark.
An in-depth exploration of current areas of research in sensory genetics. Readings primarily from recent books and the recent literature. Specific topics are announced from the previous fall and in the division's catalog supplement. Format includes lectures, discussion, and presentations by students.

**BIOGD 681 Advanced Bacterial Genetics (BIOMI 485)**
Fall. 2 credits. Limited to graduate students in Biological Sciences; see BIOMI 485. Prerequisites: BIOGD 281 or equivalent, BIOMI 332, 330 or 333, and BIOMI 385 or permission of instructor. Lecs. R 2:30-4:25. Offered alternate years. M. F. Wolflner.
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. Lec. T 2:30-4:25. Offered alternate years. C. F. Aquadro, A. G. Clark.
An in-depth exploration of current areas of research in population genetics. Readings primarily from recent books and the recent literature. Specific topics are announced from the previous fall and in the division's catalog supplement. Format includes lectures, discussion, and presentations by students.

**BIOGD 685 Advanced Bacterial Genetics**
Spring. 2 credits. Limited to graduate students in Biological Sciences; see BIOMI 485. Prerequisites: BIOGD 281 or equivalent, BIOMI 330 or 331-332 or equivalent, and permission of instructor. Recommended: BIOMI 290 or equivalent. Lecs. M W 7:30-9:25; disc. R 10:10-11:00. Staff.
For course description, see BIOMI 485.

**BIOGD 687 Developmental Genetics**
Fall. 2 credits. Limited to 20 students. Prerequisites: BIOGD 281 and 385 or their equivalents. S-U grades optional. Lec TBA. Offered alternate years. 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, sexual 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

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. 2 credits. 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 optional, 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. Staff

An introduction to the research literature in selected areas through weekly problem sets and discussions.

BIOGD 782-783 Current Genetics/Development Topics
Spring. 1/2 or 1 credit for each topic. May be repeated for credit. S-U grades only. Lectures and seminars on specialized topics to be announced. Hours TBA. Staff.

BIOMI 291 Seminar in Genetics and Development
Fall and spring. 1 credit. Limited to and required of second-, third-, and fourth-year graduate students in Genetics and Development. S-U grades only. Sem, TBA. Staff.

Each graduate student presents a seminar per year based on his or her thesis research. The student then meets with the thesis committee members for an evaluation of the presentation.

BIOMI 292 General Microbiology
Fall or spring. 2 credits. Summer (6-week session). 2 or 3 credits (2 credits if taken after BIOMI 192). Prerequisites: 1 year of introductory biology for majors and 1 year of college chemistry, or equivalent. Recommended: concurrent registration in BIOMI 291. Lecs. M, W 14:30—15:20; labs, M—W 12:25—1:15 E. L. Madsen.

BIOMI 293 General Microbiology Laboratory

A study of the basic principles and techniques of laboratory practice in microbiology, and fundamentals necessary for further work in the subject.

BIOMI 294 Advanced Microbiology Laboratory

A laboratory course that illustrates basic principles of experimental microbiology. The course is organized into four modules which last three weeks each: (1) ecology, (2) physiology, (3) genetics, and (4) structure and function. Students are encouraged to take this course during their third year of study.

BIOMI 394 Applied and Food Microbiology (also FOOD 394)
Fall. 2—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.

BIOMI 397 Environmental Microbiology (also CSS 398)
Fall. 3 credits. Prerequisites: BIOEE 261 or BIOMI 290 or CSS (SCAS) 260 or permission of instructor. Lecs. M W F 10:10. E. L. Madsen.

The biological properties, evolution, and behavior of microorganisms in natural systems are discussed in relation to past and present environmental conditions on Earth and other living planets. 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 F 10:10; sem, F 10:10. Offered alternate odd years. D. Debie.

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 and environment, including immunity to bacterial and fungal, 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 408 Viruses and Disease I (also BIOG 408) VETMI 408
Spring. 2 credits. Prerequisites: BIOMI 290, 291, BIOG 305; and permission of instructor. Recommended: BIOGD 281. Lecs. M
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. Madsen.
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 791 Advanced Topics in Microbiology
Fall. 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. 1/2 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. Lects 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.

W 7:30 p.m. Offered alternate even years. J. Casey.
The course covers basic concepts in virology with emphasis on virus-host interactions. Special attention is given to those aspects of bacterial metabolism not normally studied in microbiology. Consideration is given to chemical structure, replication and assembly are studied with particular emphasis on virus-host cell interactions. Vaccination, chemotherapy and evolution of viruses are also discussed.

BIOMI 409 Viruses and Disease II (also VETMI 409)
This course is complementary to BIOMI 408, Viruses and Disease I, but is complete in its own right. As such, completion of BIOMI 408 is not a requirement. The structure and classification of viruses, virus entry, genome replication and assembly are studied with particular emphasis on virus-host cell interactions. Vaccination, chemotherapy and evolution of viruses are also discussed.

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, and 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 498 and instructor's permission, and BIOMI 330 or 331 and 332. Lecs, M W F 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 macromolecule sequence-based methods to assess community diversity and microbial activity in a variety of ecosystems. Other topics discussed include bacterial growth and survival, population biology, and microbial interactions.

BIOMI 420 Microbial Genomics
Spring. 2 credits. Prerequisites: BIOMI 290, BIO G 261, BIOMI 330, or equivalent. Lecs, T R 10:10–11:00. Offered alternate odd years. J. P. Shapleigh and J. D. Helmann.
Genomic information is revolutionizing biotechnology. 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)
Fall. 2 credits. Graduate students, see BIOMI 685. Prerequisite: BIOGD 281. Recommended: BIOMI 290 and BIOBM 330 or 331 and 332 or 333. Lecs, W 7:30–9:25. P. Staff.
Concepts and principles of formal genetic analysis applied to prokaryotes, with emphasis on enterobacteria and their viruses. Topics include mutagenesis and isolation of mutants; genetic exchange, recombination and mapping; complementation, epistasis and suppression; transposons; gene expression and regulation; and genetics of bacterial pathogenesis.

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.
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 652 (Section 02) Molecular Plant-Microbe Interactions (also BIOPL 652, Sec 02, PL PA 664)
Spring. 1 credit. Prerequisites: BIOGD 281, BIOMI 330 or 331, or BIOMI 653 (section 01) or their equivalents. S–U grades optional. Lecs, M W F 12:20 (12 lecs) Jan. 26-Feb. 20. Offered alternate even years. S. C. Winans.
For course description, see BIOPL 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 assemblages of macromolecules that together define the structure of the prokaryotic cell. This includes external structures, such as cell wall, flagella, pili, and peptidoglycan and internal structures such as specialized vesicles and other large complexes.

Section 2—Microbial Genetics
Fall. J. D. Helmann.
Reviews the fundamental concepts of microbial genetics including mutations and their analysis, plasmids, conjugation, transformation, transduction, recombination, repair, and mutagenesis.
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 (Food Science 607)
- Advanced Immunology, Lectures (Biological Sciences [BIO G] 705 and Veterinary Microbiology 705)
- Advanced Work in Bacteriology, Virology, or Immunology (Veterinary Microbiology 707)
- Bacterial Plant Diseases (Plant Pathology 647)
- Basic Immunology, Lectures (Biological Sciences [BIO G] 305 and Veterinary Microbiology 315)
- Ecology of Soil-Borne Pathogens (Plant Pathology 644)
- Food Microbiology, Laboratory (Food Science 395)
- Food Microbiology, Lectures (Food Science 394)
- Immunology of Infectious Diseases and Tumors (Biological Sciences [BIO G] 706 and Veterinary Microbiology 719)
- Introduction to Scanning Electron Microscopy (Biological Sciences [BIO G] 401)
- Introductory Mycology (Plant Pathology 309)
- Light and Video Microscopy for Biologists (Biological Sciences [BIO G] 450)
- Limnology: Ecology of Lakes, Lectures (Biological Sciences [BIOEE] 457)
- Magical Mushrooms, Mischievous Molds (Plant Pathology 201)
- Microbiology for Environmental Engineering (Civil and Environmental Engineering 451)
- Plant Virology (Plant Pathology 645)
- Principles of Biogeochemistry (Biological Sciences [BIOEE] 668)
- The Soil Ecosystem (Crop and Soil Science 366)

**NEUROBIOLOGY AND BEHAVIOR (BIONB)**

**BIONB 111 Brain Mind and Behavior**
*(also PSYCH 111 and COGST 111)*
Spring. 3 credits. No prerequisites. 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 major. Letter grades only. Lecs, M W F 9:05. E. Adkins Regan and R. R. Hoy.
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; 5 credits with two discussions per week and participation in the Writing in the Majors program). 4- or 5-credit option required of students in the neurobiology and behavior program of study. Each 4-credit discussion section is limited to 20 students, with preference given to students studying neurobiology and behavior. Enrollment in the 5-credit option is limited to 12 students. Students may not preregister for the 5-credit option; interested students complete an application form on the first day of class. Not open to freshmen. Prerequisite: 1 year of introductory biology for majors. May be taken independently of BIONB 222. S-U grades optional. Lecs, M W F 12:20. disc TBA. T. D. Seeley and 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 221 Neurobiology and Behavior I: Introduction to Behavior**
Summer. 3 or 4 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 p.m. 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 requires of students studying neurobiology and behavior. Each discussion limited to 20 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. Lecs, M W F 12:20; disc TBA. C. Linster 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, synaptic mechanisms, neurochemistry, 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 BIONB 222, or one year of introductory biology plus a course in psychology. Letter grades only. Graduate students see PSYCH 722. Lec M W F 11:15. E. Adkins Regan. See PSYCH 322 for description.

**BIONB 323 Methods in Animal Behavior**
Fall. 4 credits. Prerequisites: BIONB 221 and permission of instructor (must fill out an application available in W365 Mudd Hall). Letter grades only. Lec, M W F 1:25–2:15; labs M W 2:15–4:25. Offered alternate years. S. L. Veihrencamp and J. W. Bradbury.

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 is on experimental design and basic statistical techniques. Some lab work with live insects included. Additional lab time often needed to complete experiments.

**BIONB 324 Biopsychology Laboratory**
*(also PSYCH 324)*
Fall. 4 credits. Limited to 20 juniors and seniors. Prerequisites: PSYCH 223 or BIONB 221 or 222, and permission of instructor. Labs, T R 1:25–4:25. T. J. DeVoeogd. See PSYCH 324 for description.

**BIONB 325 Neurodiseases—Molecular Aspects**
Fall. 3 credits. Prerequisites: two courses from BIONB 222, BIOGD 281, BIOM 330, or 341; co-registration in one of the two is acceptable. S-U grades optional. Lecs, T R 9:05; disc T, 1:25, 2:30, or 3:35. T. R. Podleski.

The intent of this course is to teach students how to use recombinant DNA techniques for the study of neurodiseases. How are genes responsible for diseases identified and how are the functions of these genes studied? Attention is focused on those neural diseases in which significant advances have been made using these techniques, for example, Alzheimer's, Huntington's, prion diseases, schizophrenia, depression, disorders affecting ion channels, and muscular dystrophy. Emphasis is placed on how these studies provide a useful approach to studying the mammalian nervous system by exposing the functions of genes that would be difficult to identify in other ways.

**BIONB 326 The Visual System**
Spring. 4 credits. Prerequisite: BIONB 222 or BIOAP 311, or permission of instructor. S-U grades optional. Lecs, M W F 10:10; disc, 1 hour each week TBA. Offered alternate years. H. C. Howland.

The visual systems of vertebrates are discussed in breadth and depth as well as some aspects of invertebrate vision. Topics covered include the optics and anatomy of eyes, retinal neurophysiology, structure and function of higher visual centers, ocular motility and ocular and visual system development.

**BIONB 327 Evolutionary Perspectives on Human Behavior**
Fall. 3 credits. Prerequisites: BIONB 221 and permission of instructor required. Letter grades only. M W 2:55–4:10. S. T. Emlen.
A Socratically taught, discussion-based course dealing with evolutionary perspectives on human behavior. Topics include genes and behavior, the evolutionary environment of adaptation, the evolutionary function of emotions, human mating system, parenting strategies, and cooperation and conflict within family-based societies. All class members read and discuss primary papers and recent books. Each student is responsible for leading multiple discussions, for writing an original paper, and for peer-reviewing papers of other class members.

**BIONB 328 Biopsychology of Learning and Memory**
*(also PSYCH 332)*
Spring. 3 credits. Prerequisites: 1 year of biology and either a biopsychology class or BIONB 222. S-U grades optional. Limited to 60 students. Graduate students see PSYCH 632. Lecs, M W F 11:15. T. J. DeVoeogd. See PSYCH 332 for description.
BIONB 329 Ecology of Animal Behavior (also BIOBM 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 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty. See BIOBM 329 for description.

BIONB 330 Introduction to Computational Neuroscience (also PSYCH 330, COGST 330 and BME 330)  
Fall. 3 or 4 credits (4 credits includes a laboratory providing additional computer simulation exercises). Limited to 25 students. Prerequisites: BIONB 222 or permission of instructor. S-U grades optional. Lecs. T R 2:55-4:10. Offered alternate years. C. Linster. This course covers the basic ideas and techniques involved in computational neuroscience. It 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 10:10-11:25; disc TBA. Offered alternate years. 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 psychoactive 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 BIOGD 394 and ENTOM 394)  
Fall. 2 credits. Prerequisite: ENTOM 212, or BIOGD 261, or BIONB 221 or 222, or permission of instructor. S-U grades optional. Lect. W 7:30-9:10 p.m. Offered alternate years. J. Ewer. For description, see ENTOM 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, biopsychology, cognitive science, neuroscience, or perception. Students are expected to have knowledge of elementary physics, chemistry, and biology or psychobiology, plus a second course in behavior. S-U grades optional. Lecs. M W F 10:10. Offered alternate years. Not offered 2003-2004. B. P. Halpern. See PSYCH 396 for description.

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. Staff 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 biology. T R 10:10-11:25. B. P. Halpern. 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 (Office: W309 Mudd Hall, phone: 254-4352). This course is open to advanced undergraduates and graduate students. S-U grades optional. Lecs. 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 or biological systems of interest or to extend pre-existing models in novel directions. The Mathematica software program is used as a modeling tool in the accompanying computer lab (no prior experience with computers required).

BIONB 424 Neuroethology (also PSYCH 424)  
Spring. 4 credits. Prerequisites: BIONB 221 or 222, or 1 year of introductory biology for majors and permission of instructor. S-U grades optional. M W F 11:15; disc, T 1:25 or R 3:35. Offered alternate years. C. D. Hopkins. Neuroethologists take a comparative and evolutionary approach to study the nervous system. They ask, how do brains of animals compare and how did they come about through the process of evolution? How are neural circuits adapted to species-typical behavior? What is the hope and interest in the study of a large diversity of animals, compared to a specialized look at just a few mammalian species? Can we hope to understand how animals with specialized behaviors have specialized nervous systems? What is the sensory world of a real animal and how does it vary from species to species? These and other questions derive this introductory survey of neuroethology including: exotic senses; amazing motor programs; surprising integration.

BIONB 425 Molecular Neurophysiology  
Spring. 3 credits. Prerequisite: BIONB 222 or permission of instructor. S-U grades optional. T R 2:55-4:10. Offered alternate years. D. P. McCobb. The course covers ion channels, the primary proteins generating cellular electrical signals function in nerve cells and other excitable cells (e.g., muscle, heart, glands). The latest electrophysiological and molecular genetic experiments are reviewed. Diversity of electrophysiology deriving from structure and expression patterns is considered in the contexts of behavior and behavioral plasticity (learning), neural development, and channel evolution. Course format includes written and oral presentations, reviewing scientific literature in selected areas, and proposing new experiments.

BIONB 426 Animal Communication  
Spring. 4 credits. Prerequisites: BIONB 221. Letter grade only. T R 2:55-4:10; disc, 1 hour each week TBA. Offered alternate years. J. W. Bradbury, S. L. Vehrencamp. An integrated approach to animal communication, organized into three parts: 1) the physics and physiology of producing, transmitting, and receiving signals; 2) optimal strategies for encoding information, using information to make decisions, and designing signals; and 3) the behavioral ecology of signal evolution.

BIONB 427 Animal Social Behavior  
Fall. 4 credits. Limited to 30 students. Prerequisites: BIONB 221 and BIOEE 261 or 278, and advance permission of instructor. Letter grade only. Lecs and discs, T R 2:30-4:25. Offered alternate years. P. W. Sherman. 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 429 Offaction and Taste: Structure and Function (also PSYCH 420)  
Spring. 3 or 4 credits. (4-credit option requires a term paper or research project. The research project can but does not need to study nonhuman vertebrates.) Preference given to junior and senior psychology and biology majors and graduate students. Graduate students, see PSYCH 629. Prerequisite: one 300-level course in biopsychology or equivalent. Lecs. T R 9:05. Offered alternate years. B. P. Halpern. See PSYCH 429 for description.

BIONB 430 Experimental Molecular Neurobiology (also BIOBM 443)  
Spring. 2 credits variable. Limited to 12 students. Prerequisites: co-meeting with BIOBM 443 lab. Mandatory registration via web page: www.mbg.cornell.edu/courses.html. Letter grade only. Dates: 1 hour each week on day other than lab day; Lab T or R all day, or M and W afternoons, to be coordinated with other BIOBM 430 sections. Offered alternate years. D. L. Detcheverry. See BIOBM 443 for description.
BIONB 440 Electromics in Neurobiology
Fall. 4 credits. Limited to juniors, seniors, and graduate students. Prerequisites: a calculus course. S-U grades optional. Lecs, T R 8:40-9:55, lab, W 1:25-4:25. Offered alternate years. B. R. Land.
The course emphasizes understanding of the electrical functioning of the nervous system and enables students to build instrumentation to study the nervous system. It is taught by mathematical formulation, and construction of circuit examples drawn from practical neurobiological instrumentation problems and the electronic basis of neurons.

BIONB 441 Computers in Neurobiology
Fall. 4 credits. Limited to juniors, seniors, and graduate students. Prerequisites: a calculus course. S-U grades optional. Lecs, T R 8:40-9:55, lab, W 1:25-4:25. Offered alternate years. B. R. Land.
This course is an introduction to computer instrumentation techniques and data reduction. It gives a basic understanding of the techniques used for coupling a biological experiment to a computer. It includes techniques to convert raw data to scientific visualization. Some computer modeling examples drawn from practical neurobiological problems are done.

BIONB 470 Biophysical Methods (also A&EP 470 and VETPR 470)
Spring. 5 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. Lecs, M W 2:55-4:10. M. Lindau.

BIONB 491 Principles of Neurophysiology
Fall. 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. Lecs, M W 10:10, lab, M or T 12:20-4:25. B. R. Johnson.
A laboratory-oriented course designed to teach the theory and techniques of modern cellular neurophysiology including computer acquisition and analysis of laboratory results. Lecture time is used to introduce laboratory exercises and discuss results, to supplement laboratory topics, and for discussion of primary research papers. Extracellular and intracellular recording and voltage clamp techniques are used to analyze motor neuron and sensory receptor firing properties, and examine the cellular basis for resting and action potentials and synaptic transmission. Invertebrate preparations are used as model systems. (See A&EP 470 web site: http://www.nbb.cornell.edu/neurobio/bionb491/bionb491.html.)

BIONB 492 Sensory Function (also PSYCH 492 and 692)
Spring. 4 credits. Limited to 25 students. Prerequisite: a 300-level course in biophysics, BIONB 222, or BIOM 311, or equivalent. Students are expected to have knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Graduate students see PSYCH 692. Lecs, M W F 10:10. Offered alternate years. B. P. Halpern, H. C. Howland. See PSYCH 492 for description.

BIONB 493 Developmental Neurobiology
Fall. 3 credits. Prerequisite: BIONB 222 or permission of instructor. S-U grades optional, with permission of instructor. Lecs, M W 2:55-4:10. Offered alternate years. B. R. Land.
Lectures covering the development of the nervous system, taking examples from both vertebrates and invertebrates. Emphasis is on cellular and molecular issues, that is, how do nervous systems differentiate, grow morphologically and biochemically? The role of cues such as hormones and developmental genes in neural development is discussed. Readings are taken from original journal articles.

BIONB 494 Brain Evolution and Behavior
Spring. 3 credits. Intended for juniors, seniors, and graduate students. Prerequisite: BIONB 222 or equivalent. S-U grades optional. Lecs, T R 8:40-9:55. Offered alternate years. A. H. Bass.
Organization and evolution of neuroanatomical pathways as substrates for species-typical vertebrate behaviors will be studied in three major sections: development, general principles of brain organization, and co-evolution of vertebrate brain and behavior.

BIONB 495 Molecular and Genetic Approaches to Neuroscience
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: BIONB 222 and BIORM 300 or 332. Letter grade only. Lecs, T R 2:55-4:10. Offered alternate years. D. L. Deitche.
Focus of the course is on how different molecular and genetic approaches have led to major advances in neuroscience. Lectures, student presentations, and discussions examine original research articles. Topics include ligand-gated channels, potassium channels, seven membrane spanning receptors, development of the neuromuscular junction, neurotransmitter release, second messengers, and learning and memory.

BIONB 496 Bioacoustic 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 PHY 207-208. Letter grades only. Lecs, M W 9:05, lab TBA. Offered alternate years. C. W. Clark and R. R. Hoy.
Humans and animals live in a world of sound. Mechanisms for sound production and perception are extremely varied. Acoustic signals mediate social interactions and are used to scan the environment for food and to aid in navigation. For many species acoustic sensing plays a critical role in predator detection and avoidance. This course studies 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” exercises 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.

BIONB 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 4:30-5:30 P.M. S. Edelman and H. Segal. See COGST 531 for description.

BIONB 600 Development of Sensory Systems (also BIOGD 600)
Spring. 2 credits. Prerequisites: Introduction to biology (genetics, development, and neurobiology) required, or permission of instructor. S-U grades only. M 7:00-8:40 P.M. M. 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 on 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.

BIONB 623 Chemical Communication (also CHEM 622)
Fall. 3 credits. Primarily for research-oriented students. Limited to 30 students. Prerequisites: 1 year of introductory biology for majors or equivalent, course work in biochemistry, and CHEM 358 or equivalent. S-U grades optional. Lecs, M W 10:10; disc, F 10:10. Offered alternate years. J. Meinwald and T. Eisner.
The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Studies of insects are emphasized. Specific topics to be covered vary each year and may place emphasis on chemical, biochemical, ecological, behavioral, and evolutionary principles.

BIONB 720 Seminar in Advanced Topics in Neurobiology and Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional. Sem TBA. Staff and students. Designed to provide several study groups each semester on specialized topics. A group may meet for whatever period is judged adequate to enable coverage of the selected topics. Ordinarily, topics are selected and circulated during the preceding semester. Discussion of current literature is encouraged. Suggestions for topics submitted by faculty or students to the chair of the Department of Neurobiology and Behavior.

BIONB 721 Introductory Graduate Survey in Neurobiology and Behavior
Fall. 2 credits. Required of graduate students majoring in neurobiology and behavior. Concurrent registration in BIONB 221 and 222 not required. S-U grades only. Lecs and discs, W 4:00-6:00 P.M. H. K. Reeve and staff. Lectures, readings, and discussion introduce first-year graduate students to the research activities of the faculty in the Graduate Field of 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 format of an NSF 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)

Cognitive Neuroscience (PSYCH 425)

Developmental Biopsychology (PSYCH 422)

Evolution of Human Behavior (PSYCH 526)

Insect Behavior Seminar (ENTOM 662)

Topics on Primates and Evolution: The Evolution of Language (ANTHR 490)

Primate Behavior and Ecology (ANTHR 390)

Teaching Experience (Biological Sciences [BIO G] 498)

The Brain and Sleep (PSYCH 440/640)

Undergraduate Research in Biology (Biological Sciences [BIO G] 498)

OTS Undergraduate Semester Abroad Programs

Shoals Mariner 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 R 9:05; lab, M T W or R 1:25-4:25, or M W 7:30-10:30 PM.

K. J. Niklas.

Introductory botany for those interested in the plant sciences. Emphasizes structure, reproduction, and classification of angiosperms and the history of life on earth. Laboratory emphasizes development of skills in handling plant materials, including identification. First and second weeks of laboratory are field trips, starting with the first day of classes. Those who register for an evening laboratory are still required to attend the afternoon field trips.

**BIOPL 242 Plant Function and Growth**

Spring. 3 credits. S-U grades optional. Primarily for undergraduates in agricultural sciences, but also for any biological sciences students wanting to know about plant function. Suitable as a second-year course for nonmajors to satisfy the biology distribution requirement. Prerequisites: 1 year of introductory biology and/or BIOPL 241. Recommended: 1 year of introductory chemistry. Concurrent enrollment in BIOPL 244 required of plant science undergraduates and highly recommended for other science majors. May not be taken for credit after BIOPL 342 except by written permission of instructor. Evening prelims Feb. 26 and Apr. 1. Lecs, M W F 10:10-10:40. P. J. Davies.

How plants function and grow. Examples deal with crop plants or higher plants where possible, though not exclusively. Topics include cell structure and function; plant metabolism, including photosynthesis, light relations in crops; plant-water relations, water uptake, transport, and transpiration; irrigation of crops; sugar transport; mineral nutrition; growth and development—hormones, responses to light, flowering, fruiting, dormancy, and abscission; stress; tissue culture; and genetic engineering of plants.

**[BIOPL 243 Taxonomy of Cultivated Plants (also HORT 243)]**

Fall. 4 credits. Prerequisite: 1 year of introductory biology or written permission of instructor. May not be taken for credit after BIOPL 246. Lecs, M W F 9:00, lab, M or W 2:00-4:25. Offered alternate years. Not offered 2003-2004. M. A. Luckow. A study of the plants and their relationships, and their classification into families and genera, emphasizing cultivated plants. Typical topics include, but are not limited to, plant-water relations, membrane properties and processes, stress; tissue culture; and genetic engineering of plants.

**[BIOPL 244 Plant Function and Growth, Laboratory]**

Spring. 2 credits. Limited to 14 students per section. Prerequisite: concurrent enrollment in BIOPL 242. May not be taken for credit after BIOPL 344. Disc and lab, M T or W 12:20-4:25. T. Silva. Experiments exemplify concepts covered in BIOPL 242 and offer experience in a variety of biological and biochemical techniques, from the cellular to whole plant level. Students must take lab and discussion on same day.

**BIOPL 245 Plant Biology**

Summer (6-week session). 3 credits. Limited to 24 students. Lecs, M-F 11:30-12:45, labs, M W 2:00-5:00. T. Silva. Introductory botany, including plant identification. Emphasizes structure, reproduction, and classification of flowering plants. Much of the laboratory work is conducted outdoors taking advantage of several outstanding natural areas which are available for study. Those who lack college-level biology are expected to work closely with the instructor on supplemental instructional materials.

**[BIOPL 247 Ethnobiology]**

Fall. 3 credits. S-U grades optional. Lecs, T R 11:15; disc, R 12:20-1:25 or F 12:20. Not offered 2003-2004. Offered alternate years. D. M. Bates. 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 lay societies with their plants and animals, as a means of understanding the place and future of humans in the biosphere. Traditional medicines, undeniﬁed organisms, resource management, and ownership of nature, and methodology are among the topics covered.

**[BIOPL 248 Taxonomy of Vascular Plants]**

Spring. 4 credits. Prerequisite: 1 year of introductory biology. May not be taken for credit after BIOPL 243. S-U grades optional. Lecs, M W F 9:05, lab, W or R 1:25-4:25. Offered alternate years. J. I. Davis. An introduction to the classification of vascular plants, with attention to the goals of taxonomy, the processes of plant evolution, and the mechanisms of analyzing evolutionary relationships among plants. The laboratory concentrates on 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**

Spring. 2 credits. Prerequisites: Intro Biology (BIOG 101-104) required. Completion or concurrent enrollment in organic chemistry, recommended. TBA. Offered alternate years. E. Rodriguez. Student participants learn and apply methodologies in ethnobotany, chemical ecology and zoopharmacognosy as they apply in a multidisciplinary fashion to chemical prospecting. The use of techniques in the chemistry of natural products and biological and chemical techniques are described. Classical examples of drug development, from quinine to taxol, in the course of chemical prospecting are discussed. An overall medicinal medicinal perspective 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 242 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, plant water relations, membrane properties and processes, photosynthesis, plant respiration, mineral and organic nutrition, stress physiology, control of growth and development, and responses to the environment. Emphasis is on the relationship between structure and function from the molecular to the whole-plant level.

**BIOPL 343 Molecular Biology and Genetic Engineering of Plants**

Spring. 2 credits. Prerequisite: 1 year general 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 towards 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 344 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 biological and biochemical 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 course in botany. Lecs, M W 9:05; labs, M W 2:00–4:25. Offered alternate years. Not offered 2003–2004. 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**

**BIOPL 422 Plant Development**
Fall. 2 credits. Lecs, T R 9:05–9:55. Prerequisites: coursework in molecular biology (e.g., BIOBM 331, 332, or 333), or genetics (e.g., BIOGD 281), or permission of instructor. S-U grades optional. J. Hu. An introduction to plant development, study of 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. Not offered 2003–2004. 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**
Fall. 2 credits. Limited to 12 students. Prerequisite: permission of instructor. S-U grades optional. Lec/disc, W 2:30–4:25. Offered alternate years. D. M. Bates. 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 one-credit modules on specialized topics in systematics. Topics and instructors vary each semester. May not be taught every semester. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

**BIOPL 444 Plant Cell Biology**
Fall. 4 credits. Limited to 24 students. Prerequisite: 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 interaction of the cell with its environment, and the processes that give rise to multicellular differentiated plants are investigated.

**BIOPL 447 Molecular Systematics**
Fall. 3 credits. Prerequisite: BIOEE 278 or BIOG 281 or BIOBM 330, or written permission of instructor. Lecs, T R 8:30–9:55. Offered alternate years. J. D. 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 organellar genomes is described from the standpoint of their suitability for systematic and evolutionary studies.

**BIOPL 449 Green Signals and Triggers—The Plant Hormones (also HORT 449)**
Fall. 1 credit. S-U grades optional. Prerequisite: 1 year of introductory biology and plant physiology (BIOPL 242 or 342) or permission of instructor. F 1:25–2:15. Offered alternate years. 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.

**BIOPL 452 Systematics of Tropical Plants**
Fall. 3 credits. Prerequisite: BIOPL 243 or BIOPL 248. Letter grades only. Lecs, M W; lab, T 1:25–4:25. Offered every three years. K. C. Nixon. The families of plants encountered solely or chiefly in tropical regions are considered in a phylogenetic context in lectures, discussions, and laboratory, with the aim of providing basic points of recognition for, and an understanding of, diversity and relationships in these families.

**BIOPL 453 Principles and Practice of Historical Biogeography (also ENTIM 453)**
Fall. 3 credits. Prerequisite: a course in systematic or permission of instructors. S-U grades optional. Lecs, T R 10:10; lab T 1:25–4:25. Offered alternate years. J. K. Liebherr and M. A. Luckow. A survey of techniques in historical biogeography, and the development of modern biogeographic theory in the context of classical, ecological, and phylogenetic 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.

**BIOPL 454 Systematics of Tropical Plants: Field Laboratory**
Spring. 1 credit. Limited to 15 students. Prerequisite: prior enrollment in BIOPL 452 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. 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-biology" context. Two-week field trip over winter break.
BIOL 456 Biomechanics of Plants (also BEE 456)

BIOL 482 Plant Biochemistry
Spring. 3 credits. Prerequisites: BIOL 242 or 342 or equivalent and BIOLBM 330 or 331 or equivalent or permission of instructor. Letter-grade only. Lecs, M W F 9:05. J. Rose, 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 641 Laboratory in Plant Molecular Biology (also BIOLBM 641)
Fall. 4 credits. Prerequisites: BIOLB 281 or equivalent, BIOLBM 330 or 331 or equivalent, and permission of instructor. S-U grades with permission of instructor. Lab, T R 12:20–1:25. J. B. Nasrallah, M. R. Hanson. 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 642 Plant Mineral Nutrition (also CSS 642)
Spring. 3 credits. Prerequisite: BIOL 342 or equivalent. Lecs, M W F 10:10. Not offered 2003–2004. Offered alternate years. L. V. Kochian, R. M. Welch. A detailed review of the processes by which plants acquire and use mineral nutrients from the soil. Topics include: the uptake, translocation, and compartmentation of mineral elements; root-soil interactions; the metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and the nutrition of plants adapted to extreme environmental stresses (e.g., acidic soils). Specific mineral elements are emphasized to illustrate these topics.

BIOL 647 Seminar in Systematic Botany
Fall of 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 649 Solute Transport in Plants (also BEE 649)

BIOL 651 Water Transport in Plants (also BEE 647)
Fall. 2 credits. Letter only. Lecs T R 10:10. Offered alternate years. R. M. Spanswick. See BEE 647 for description.

BIOL 652 Plant Molecular Biology II Spring. 4 credits. Prerequisites: BIOLG 281 and BIOLBM 330 or 332, or their equivalents. Recommended: BIOLBM 331, 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) Jan. 26–Feb. 20. A. C. Miller, S. G. Lazarowitz, G. Martin, B. G. Turgeon. An examination of the molecular and cellular factors that control plant-pathogen interactions from the perspectives of pathogen biology and plant responses to pathogen infection. Beginning spring 2004, alternate years will focus on: (I) plant perception of microbial pathogens and pathogens defense genes, apoptosis responses that limit infection, and RNA interference; and (II) 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 BIOLBM 652, PL PA 664)
1 credit. S-U grades optional. Lecs, M W F 12:20 Jan.–Feb. 20 (12 lecs). Offered alternate years. S. C. Winans. Course focuses on the interactions of Agrobacterium and Rhizobia with plants. Topics include: regulation of nitrogenase activity and expression, and the operation of the vegetative shoot apical meristem. The module is a companion to BIOL 653, Sec 04 (Plant Development I).

Section 03 Molecular Aspects of Plant Development II
1 credit. S-U grades optional. Lecs, M W F 10:10 (12 lecs) Mar. 29–Apr. 23. T. Brutnell. The molecular genetics of plant development. This module focuses on vegetative development and includes topics such as the development of the shoot, root, and vascular system, and the operation of the vegetative shoot apical meristem. The module is a companion to BIOL 653, Sec 04 (Plant Development I).

Section 04 Plant Gene Evolution and Phylogeny
1 credit. Lecs, M W F 1:25 (12 lecs). Offered alternate years. J. D. Doyle. Practical applications of molecular systematics/evolution for plant molecular biologists and other non-systematists. The course focuses on basic issues, methods and principles for inferring relationships among genes and the use of data to hypothesize relationships among plants. Evolutionary patterns and processes of genes and gene families are discussed, as well as rates of sequence evolution, paralogy and orthology, the effects of recombination and concerted evolution of gene phylogenies, and the implications of using gene or allele phylogenies to infer organismal evolutionary patterns.

Section 05 Molecular Biology of Plant Organelles (also BIOLBM 652.5)
1 credit. S-U grades optional. Lecs, M W F 10:10 (12 lecs) Feb. 23–Mar. 19. M. R. Hanson, 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 mitochondrial- and cytoplasmic-encoded cytoplasmic male sterility, transformation and expression of foreign genes in chloroplasts, and the use of genetics to investigate nucleus-organelle interactions.

Section 06 Proteomics in Plant Biology
1 credit. S-U grades optional. Lecs, M W F 1:25 (12 lecs) Mar. 29–Apr. 23. K. van Wijk. Introduction to proteomics and mass spectrometry and its application in Plant Biology. Course includes discussions of protein separation, protein tagging and visualization techniques; principles of biological mass spectrometry and interpretation; and bioinformatics tools in proteomics, comparative proteomics, phosphorylation 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 07 Plant Cell Walls: Structure to Proteome
1 credit. S-U grades optional. Lecs, M W F 10:10 (12 lecs) Mar. 29–Apr. 23. 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; cell wall structure and composition, regulation of cell expansion and differentiation; defense against 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, apopotic responses that limit infection, and RNA interference; and the genetic and molecular mechanisms of microbial pathogenesis, with an emphasis on fungal and bacterial virulence proteins, toxins, and their deployment systems.

BIOL 653 Plant Molecular Biology I
Fall. 1–5 credits (1 credit per section). Prerequisites: BIOLG 281 and BIOLBM 330 or 332, or their equivalents. Recommended: BIOLBM 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 PLPA 663.01, PLPA 663.02)
2 credits. Lecs, M W F 10:10 (24 lecs) Sept. 3–Oct. 29. S. R. McCouch, J. Giovannoni, J. Rose. This is an introductory module that provides a broad overview of molecular biology concepts relevant to the plant sciences. This section serves as a prerequisite to other modules in the BIOL 653 (fall) and BIOL 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 proteomics approaches to the analysis of plant proteins, protein-protein interactions, and metabolic profiling through emerging methods and technologies. This course will consist of 2 lectures and 1 day of discussion/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 Plant Biotechnology (also PLBR 653.2 and PLPA 663.2)
1 credit. Lecs, M W F 1:25 (12 lecs) Oct. 1-Oct. 29. M. Zaitlin, 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 03 Plant Genome Organization and Function (also PLBR 653.3)
1 credit. Lecs. M W F 10:10 (12 lecs). Not offered 2003–2004. Offered alternate years. S. D. Tanksley. This section 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) Oct. 31–Nov. 26. J. H. 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 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 II).

Section 05 Molecular Breeding (also PLBR 653.6)
1 credit. Lecs. M W F 10:10 (12 lecs). Oct. 1-Oct. 29. Offered alternate years. S. D. Tanksley. Application of DNA markers to the identification, manipulation and isolation of genes important to plant and animal productivity using molecular genetic techniques. Students learn how to design and execute experiments to identify quantitative trait loci (QTLs), as well as how to apply molecular markers to plant and animal breeding programs.

BIOPL 654 Botanical Nomenclature
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Lees. 1 credit. TBA. Offered alternate years. Not offered 2003–2004. Staff. An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.

BIOPL 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. Not offered 2003–2004. 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.

BIOPL 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.

BIOPL 741 Problems in Plant Cell and Molecular Biology
Spring. 2 credits. Limited to first- and second-year graduate students in the Plant Cell and Molecular Biology Program. Disc TBA. Staff. An introduction to the research literature in plant molecular and cellular biology through weekly problem sets and discussions.

BIOPL 742 Current Papers in Plant Biology
Fall or spring. 1 credit. Enrollment is limited. Primarily for graduate students, with preference given to majors or minors in plant molecular biology; written permission of instructor required for undergraduates. S-U grades only. Sem. 1 hour each week TBA. Staff.

BIOPL 743 Faculty Research in Plant Cell and Molecular Biology
Fall. 1 credit. Limited to graduate students; written permission from a member of the Plant Cell and Molecular Biology Program or by permission of coordinator required for undergraduates. Disc TBA. Staff. An introduction for graduate students to the research being conducted by Cornell faculty in the Plant Cell and Molecular Biology Program.

BIOPL 744 Graduate Research in Plant Cell and Molecular Biology
Fall or spring. 1 credit. Seminar R 12:20. Staff. Required of, and limited to, second-, third-, and fourth-year graduate students in Plant Cell and Molecular Biology. Each student presents one seminar per year on his or her thesis research, and then meets with the thesis committee members for evaluation.

BIOPL 745 Current Topics in Systematics
Fall. 1 credit. Limited to graduate students, except by permission of instructor. S-U grades optional. Disc. T 12:20. Bailey Hortorum staff. A seminar with presentations and discussion by students of original research papers in systematic biology.

BIOPL 746 Research Seminar in Systematics
Spring. 1 credit. Limited to graduate students, except by permission of instructor. Disc. T 12:20. Bailey Hortorum staff. A student-led seminar presentation based on his or her thesis research or a related topic.

BIOPL 749 Graduate Research in Botany
Fall or spring. Variable credit. May be repeated for credit. S-U grades optional. Staff. Similar to BIO G 499 but intended for graduate students who are working with faculty members on an individual basis.

Related Courses in Other Departments
Introductory Mycology (Plant Pathology 309)
Marine Botany: Ecology of Marine Plants (Biological Sciences [BIOSM] 449)
Mycology Conferences (Plant Pathology 649)
Physiological Plant Ecology, Lectures and Laboratory (Biological Sciences [BIOEE] 466 and 468)
Phytomycology (Plant Pathology 709)
Plant Ecology and Population Biology, Lectures and Laboratory (Biological Sciences [BIOEE] 463 and 465)
Plant Ecology Seminar (Biological Sciences [BIOEE] 669)
Plant Cytogenetics Laboratory (Plant Breeding 448)
Teaching Experience (Biological Sciences [BIO G] 498)
Undergraduate Research in Biology (Biological Sciences [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 web site, www.mml.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 of study requirements, students in marine biology are encouraged to enroll in the following courses:

1) BIOSM 154, The Sea: An Introduction to Oceanography
2) BIOSM 364, Field Marine Science, BIOSM 375 Field Marine Biology and Ecology, and/or at least one 400-level BIOSM field course at the Shoals Marine Laboratory
3) BIOEE 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 interdisci-
pilary 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) BIOEE 373 Biology of the Marine Invertebrates
2) BIOEE 457 Limnology
3) BIOEE 462 Marine Ecology
4) BIOEE 478 Ecosystem Biology
5) BIOEE 490 Topics in Marine Biology
6) BIOSM 303 Ecology of Marine Fishes
7) BIOSM 308 Marine Microbial Ecology
8) BIOSM 309 Climates and Ecosystems
9) BIOSM 329 Ecology of Animal Behavior
10) BIOSM 364 Field Marine Science
11) BIOSM 365 Underwater Research
12) BIOSM 374 Field Ornithology
13) BIOSM 375 Field Marine Biology and Ecology
14) BIOSM 413 Research in Marine Biology
15) BIOSM 418 Tropical Marine Science
16) BIOSM 449 Seaweeds, Plankton and Invertebrates
17) BIOSM 367 Marine Invertebrate Zoology (note: not the same as BIOEE 373)
18) BIOSM 477 Marine Vertebrates
19) EAS 375 Sedimentology and Stratigraphy
20) EAS 455 Geochemistry
21) EAS 475 Special Topics in Oceanography
22) EAS 479 Paleobiology
23) NTRRES 306 Coastal and Oceanic Law and Policy

Sea Semester
BIOEES 366 SEA: Introduction to Oceanography
BIOEES 367 SEA: Introduction to Maritime Studies
BIOEES 368 SEA: Introduction to Nautical Science
BIOEES 359 SEA: Practical Oceanography I
BIOEES 370 SEA: Practical Oceanography II

Students in both marine science specializations are exposed to an integrated program of study, emphasizing a natural progression of topics and laboratories. 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 provide fertile ground for lively discussions.

Credit courses at Shoals Marine Laboratory are full-time, intensive learning experiences. Courses may be taken sequentially, but not concurrently. A typical day combines lecture sessions, laboratory and field work, field trips to nearby islands and the mainland, and collective and research excursions aboard the Laboratory's 47-foot research vessel, John M. Kingsbury or the 36-foot research vessel, John B. Heiser. Field experience is an integral component of all courses, using Appledore Island'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 not only based 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 the marine sciences, maintains a browsing library with updated information on graduate study and career opportunities as well as on marine programs at other institutions, 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, the Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, contact the SML office, G14 Stimson Hall or the Sea Education Association office at P.O. Box 6, Woods Hole, MA, 02543. Daily lectures, labs, and fieldwork for 2 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 2-week course offered in cooperation with Rider University at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, contact the SML office, G14 Stimson Hall. Daily lectures, labs, and fieldwork for 2 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 and intertidal marshes.

**BIOSM 162 Marine Environmental Science**

Summer. 3 credits. Prerequisite: open to high school students who have successfully completed two high school science courses. A special 12-day course offered at Cornell's 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, lab and field work for 12 days. SML faculty.

Environmental studies have become an integral component of high school programs 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. Laboratory exercises and field work 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 oceanographic sampling exercises and field trips to seabird and whale foraging grounds. Lectures and discussions will expose MEP students to topics ranging from fishes to plankton, kelp beds 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 204 Biological Illustration**

Summer. 2 credits. A special 1-week course offered at Cornell's 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 1 week. SML faculty.

General discussion of scientific publishing, illustration labeling, color techniques, and...
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 and mating behaviors, defense and escape, 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. Prerequisites: 1 year of college-level biology. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G-14 Stimson Hall. Daily lecs, labs, and fieldwork for 2 weeks. Offered 2004. SML faculty.


BIOSM 374 Field Ornithology  
Summer. 4 credits. Prerequisites: 1 year of introductory biology and permission of instructor. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G-14 Stimson Hall. Daily lecs, labs, and fieldwork for 3 weeks. Offered alternate years. SML faculty.

Focuses on field work 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 point counts, transects, 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 Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details or an application, consult the SML Office, G-14 Stimson Hall. Daily lecs, labs, and fieldwork for 4 weeks. SML faculty.

Focuses on field work 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 point counts, transects, territory mapping, banding, behavioral observations, and creating a field notebook.

BIOSM 376 Marine Invertebrate Zoology  
Summer. 6 credits. Prerequisites: 1 year of introductory biology and permission of instructor. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G-14 Stimson Hall. Daily lecs, labs, and fieldwork for 2 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, the ecology, behavior, physiology, chemical ecology, and natural history of invertebrates. Appledore 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 377 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 Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G-14 Stimson Hall. Daily lecs, labs, and fieldwork for 2 weeks. Offered alternate years. Not offered 2004. SML faculty.

An introduction to the biology of marine pollutants, including sources and control/treatment; the effects of marine pollution upon coastal ecosystems; and federal and state water pollution regulatory programs. 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 nutrients, BOD, dissolved oxygen, and toxicity.
BIOSM 418 Tropical Marine Science
Summer. 6 credits. Limited to 15 students. Prerequisites: Daily labs; SML faculty. A three-week course offered in Akumal, Mexico. For more details, contact Shools Marine Laboratory, G-14 Stimson Hall, 255-3717.

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 Caribbean coast of the Yucatan Peninsula. Housing will be provided by the Centro Ecologico Akumal, a local organization dedicated to the conservation 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 Research in Marine Biology
Summer. Credits variable (2 credits/7 days on site). For more details and an application, consult the SML office, G-14 Stimson Hall. See Schedule: Independent Biological Research: Independent study with a member of the Shools Marine Laboratory core faculty, based on student faculty interest and available facilities. A short proposal of research must be sent with application materials.

BIOSM 497 Special Topics in Oceanography: Satellite Remote Sensing in Biological Oceanography
Summer. 4 credits. Prerequisite: Concurrent enrollment 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 Cornell’s Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G-14 Stimson Hall. Daily labs, and fieldwork for 4 weeks. Offered alternative years. Not offered 2004. 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 four principal parts, each taught by a separate team of instructors at two different locations: Part 1 (nine days) will be conducted at Shools Marine Laboratory and aboard the RV Kingsbury in waters surrounding the Isles of Shoals. Part 2 (19 days) will be devoted to the theory and measurement of seawater optical properties, emphasizing the dependence 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/I data in order to address questions of biological-physiological interactions.

BIOSM 477 Marine Vertebrates
Summer. 6 credits. Prerequisite: A course in vertebrate biology. S-U grades optional. A special 3-week course offered at Cornell’s Shools Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details or an application, consult the SML office, G-14 Stimson Hall. Daily labs, and fieldwork for 3 weeks. SML faculty. Topics in marine vertebrate biology emphasize laboratory studies, field collections or observations, and readings from the current literature. Topics covered include: systematics of lives of the Gulf of Maine; elasmobranch physiology, interpretation of life history and parameters from oolitic microstructure; teleost skeleton structure and function; population biology and the contemporary Gulf of Maine fishery; Marine reptiles, the biology of sea turtles in cold water; colonization in sea birds; avian adaptations to life at sea; evolution and systematics of marine mammals; diving physiology; and ecology and conservation of existing marine mammal populations. Dissection of vertebrate animals is a part of one or more laboratory sessions.

BIOSM 495 Research Methods in Marine Biology
Summer 1 credit. Prerequisite: concurrent enrollment in BIOSM 497, or permission of instructor. Primarily for undergraduates. A special 3-week course offered at the Shools Marine Laboratory (SML). For more details or an application, consult the SML office, G-14 Stimson Hall. Weekly seminars for 8 weeks. J. G. Morin and M. J. Shulman. Seminar course on research methodology, experimental design, 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, G-14 Stimson Hall. See Schedule: Independent Biological Research: Independent study with a member of the Shools Marine Laboratory core faculty, based on student faculty interest and available facilities. A short proposal of research must be sent with application materials.

Research Experiences for Undergraduates (REU)
5 credit. The National Science Foundation (NSF) Research Experiences for Undergraduates (REU) program provides support for undergraduates to pursue supervised, independent research projects at the Shools Marine Laboratory. Nine students will be selected from a competitive, national pool to participate in the eight-week summer program. For more information and an application, please contact the SML office, G-14 Stimson Hall, or visit SML’s web site at: www.sml.cornell.edu.

BIOSM 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 Cornell's Shools Marine Laboratory (SML) on an island off Portsmouth, NH. For more details, or an application, consult the SML office, G-14 Stimson Hall. Daily lectures and field work for one week. 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. Field work is emphasized, with numerous excursions to the rocky intertidal and with off-shore ocean sampling. Lectures will focus on biodiversity, adaptations, predator-prey interactions, environmental sustainability, and how to engage and motivate students with aquatic projects.

EAS 213 Marine and Coastal Geology
Summer. 4 credits. Prerequisite: An introductory course in geology or ecology or permission of the instructor. A special 2-week course offered at Cornell’s Shools Marine Laboratory (SML) on an island off Portsmouth, NH. For more details or an application, consult the SML office, G-14 Stimson Hall. Daily labs, and fieldwork for 2 weeks. SML faculty. The Isles of Shoals and western Gulf of Maine offer a unique opportunity to investigate the geologic origin of marine and terrestrial environments and how these influences present-day ecological habitats and communities. This course develops two themes: (1) Using field and laboratory methods, the marine geology of the Paleozoic rocks that form the islands is examined. (2) Using ship-based geophysical
Shore Component (six weeks)

BIOSM 366 SEA Introduction to
Oceanography
3 credits. Prerequisite: concurrent enrollment in BIOSM 366. 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. Prerequisite: 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 359, 370 and 372 take place aboard the SSV Robert C. Seamans, a 134-foot auxiliary-powered brigantine schooner built in 2001, or the SSV Cornith Cramer, a 134-foot steel auxiliary-powered brigantine built in 1953 for SEA. Students are put to sea aboard the SSV Robert C. Seamans or the SSV Cornith Cramer. Enrollment is open to both men and women judges 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, orcall 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.

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. Students are introduced to the tools and techniques of the practicing oceanographer. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment, in the methodologies involved in the collection, reduction, and analysis of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel.

BIOSM 370 SEA Practical Oceanography II
4 credits. Prerequisites: BIOSM 366 and 369. Building on the concepts of Practical Oceanography I, students assume increasing responsibility for conducting oceanographic research and overseeing operations of the vessel. The individual student is ultimately responsible directly to the chief scientist and the master of the vessel for the safe and orderly conduct of research activities and related operations of the vessel. Each student undertakes an individual research project designed during the shore component.

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 sailing an oceanographic research vessel. Group research projects are completed.
Jagendorf, André T., Ph.D., Yale U. 
Liberty

Naylor, Harry B., Ph.D., Cornell U. 
Emeritus, Microbiology

Fiechter, Alexander S., Ph.D., U. of Maryland. 
Assoc. Prof., Ecology and Evolutionary Biology

Klas, Karl J., Ph.D., U. of Illinois. 
Prof., Plant Biology

Fox, Thomas D., Ph.D., Harvard U. 
Prof., Molecular Biology and Genetics

Nixon, Kevin C., Ph.D., U. of Texas at Austin. 
Assoc. Prof., Plant Biology (Bailey Hortorum)

Fu, Jianhua, Ph.D., U. Pittsburgh. 
Asst. Prof., Molecular Biology and Genetics

Owens, Thomas G., Ph.D., Cornell U. 
Assoc. Prof., Plant Biology

Gi bson, Jane A., Ph.D., U. of London (England). 
Prof., Emeritus, Molecular Biology and Genetics

Gibbs, William C., Ph.D. 
Assoc., Rensselaer Polytechnic Inst.

Ghorai, William C., Ph.D. 
Rensselaer Polytechnic Inst.

Goldberg, Michael L., Ph.D., Stanford U. 
Prof., Molecular Biology and Genetics

Ghodadra, Michael J., Ph.D., Harvard U. 
Prof., Molecular Biology and Genetics

Harassam, Patricia R., Ph.D., Harvard U. 
Prof., Molecular Biology and Genetics/Liberty Hyde

Harrison, Richard G., Ph.D., Cornell U. 
Prof., Ecology and Evolutionary Biology

Hargreaves, Jane A., Ph.D., Stanford U. 
Prof., Neurobiology and Behavior

Harris-Warrick, Ronald M., Ph.D., Stanford U. 
Prof., Neurobiology and Behavior

Hattori, Kazuo, Ph.D., Tokyo U. 
Assoc., Plant Biology

Hay, Anthony, Ph.D., U. of California. 
Asst. Prof., Molecular Biology

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

Hiscox, Donald D., Ph.D., Rockefeller U. 
Prof., Neurobiology and Behavior

Howarth, Robert W., Ph.D., Massachusetts 
Inst. of Technology/Woods Hole Oceanographic Institution. 
David K. Atkinson Professor in Ecology and Environmental Biology. 
Ecology and Evolutionary Biology/Earth and Atmospheric Sciences

Hu, Jian, Ph.D., California Inst. 
Of Technology. Asst. Prof., Plant Biology

Ingram, John W., Ph.D., U. of California 
At Berkeley. Prof. Emeritus, Plant Biology (Bailey Hortorum)

Jagendorf, André T., Ph.D., Yale U. 
Liberty

Kempheus, Kenneth J., Ph.D., Indiana U. 
Prof., Molecular Biology and Genetics

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

Asst. Prof., Ecology and Evolutionary Biology/Laboratory of Ornithology

Lukow, Melissa A., 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

Mackey, Eugene L., Ph.D., Cornell U. 
Assoc. Prof., Microbiology

Marks, Peter L., Ph.D., Yale U. 
Prof., Ecology and Evolutionary Biology

McCone, Amy R., Ph.D., Yale U. 
Assoc. Prof., Ecology and Evolutionary Biology

Morin, James G., Ph.D., Harvard U. 
Prof., Ecology and Evolutionary Biology

Mottlough, Robert P., Ph.D., U. of Illinois. 
Prof., Emeritus, Microbiology

Nassahall, James H., Ph.D., Cornell U. 
Prof., Plant Biology

Nassahall, Mikhail E., Ph.D., Cornell U. 
Prof., Plant Biology

Nassahall, Michael E., Ph.D., Cornell U. 
Prof., Plant Biology

Nassahall, Michael E., Ph.D., Cornell U. 
Prof., Plant Biology
Aquadro, Charles F., Ph.D., U. of Georgia. Prof., Molecular Biology and Genetics/Ecology and Evolutionary Biology

Bass, Andrew H., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior

Blackler, Antonie W., Ph.D., U. of London (England). Prof., Molecular Biology and Genetics

Boozer, Ronald, Ph.D., Princeton U. Assoc. Prof., Neurobiology and Behavior

Bretscher, Anthony P., Ph.D., Leeds U. (England). Prof., Molecular Biology and Genetics

Brown, William J., Ph.D., U. of Texas Health Science Center at Dallas. Prof., Molecular Biology and Genetics

Capranica, Robert R., Sc.D., Massachusetts Inst. of Technology. Prof. Emeritus, Neurobiology and Behavior

Chen, Rey-Huei, Ph.D., Harvard U. Asst. Prof., Molecular Biology and Genetics

Clark, Andrew G., Ph.D., Stanford U. Prof., Molecular Biology and Genetics/Ecology and Evolutionary Biology

Detrich, David H., Harvard Med. School Asst. Prof., Neurobiology and Behavior

Ellner, Stephen P., Ph.D., Cornell U. Prof., Ecology and Evolutionary Biology

Feigenson, Gerald W., Ph.D., California Inst. of Technology. Prof., Molecular Biology and Genetics

Finlay, Barbara, Ph.D., Massachusetts Inst. of Technology. Prof., Neurobiology and Behavior/Psychology

Geer, Mortimer, Ph.D., U. of Utah. Assoc. Prof., Ecology and Evolutionary Biology

Gibson, Quintin H., Ph.D./D.Sc., Queen's U. (Northern Ireland). Greater Philadelphia Professor Emeritus in Biological Sciences, Molecular Biology and Genetics

Goodale, Christine L., Ph.D., U. of New Hampshire. Asst. Prof., Ecology and Evolutionary Biology

Greene, Harry W., Ph.D., U. of Tennessee. Prof., Ecology and Evolutionary Biology


Halpern, Bruce P., Ph.D., Brown U. Prof., Neurobiology and Behavior/Psychology

Heppel, Leon A., Ph.D., U. of California at Berkeley. Prof. Emeritus, Molecular Biology and Genetics

Hess, George P., Ph.D., U. of California at Berkeley. Prof., Molecular Biology and Genetics

Hinkle, Peter C., Ph.D., New York U. Prof., Molecular Biology and Genetics

Howland, Howard C., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Biomedical Sciences

Hoy, Ronald R., Ph.D., Stanford U. Prof., Neurobiology and Behavior

Huffaker, Tim C., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Molecular Biology and Genetics

Kennedy, Kenneth A. R., Ph.D., U. of California at Berkeley. Prof., Ecology and Evolutionary Biology

Leonard, Samuel L., Ph.D., U. of Wisconsin. Prof. Emeritus, Molecular Biology and Genetics

Lintner, Christine, Ph.D., Pierre and Marie Curie U. Asst. Prof., Neurobiology and Behavior

Liu, Jun, Ph.D., Cornell U. Asst. Prof., Molecular Biology and Genetics

McCobb, David, Ph.D., U. of Iowa. Asst. Prof., Neurobiology and Behavior

MacDonald, June M. Fessenden, Ph.D., Tufts U. Assoc. Prof. Emeritus, Molecular Biology and Genetics/Program on Science, Technology, and Society

McFarland, William N., Ph.D., U. of California at Los Angeles. Prof. Emeritus, Ecology and Evolutionary Biology

Nicholson, Linda, Ph.D., Florida State U. Asst. Prof., Molecular Biology and Genetics

Podleski, Thomas R., Ph.D., Columbia U. Prof. Emeritus, Neurobiology and Behavior

Power, Alison G., Ph.D., U. of Washington. Prof., Ecology and Evolutionary Biology/Science and Technology Studies

Provine, William B., Ph.D., U. of Chicago. Charles A. Alexander Professor of Biological Sciences, Ecology and Evolutionary Biology/History

Seeley, Thomas D., Ph.D., Harvard U. Prof., Neurobiology and Behavior

Sherman, Paul W., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior

Sparks, Jed P., Ph.D., Washington State U. Asst. Prof., Ecology and Evolutionary Biology

Turgeon, Robert, Ph.D., Carleton U. (Canada). Prof., Plant Biology

Wallace, Bruce, Ph.D., Columbia U. Prof. Emeritus, Molecular Biology and Genetics

Whithlock, 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


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

Baustian, Mark D., Ph.D., Cornell U. Prof., Biomedical Sciences

Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Biomedical Sciences

Catalifano, James, M.S., Ph.D., Union College. Sr. Res. Assoc., Population Medicine and Diagnostics Services

Farin, Cornelia E., D.V.M., Ph.D., U. of Wisconsin-Madison. Prof., Biomedical Sciences

Fortune, Joanna E., Ph.D., Cornell U. Prof., Biomedical Sciences

Gilmore, 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

Houpt, Katherine A., V.M.D., Ph.D., U. of Pennsylvania. Prof., Clinical Sciences

Houpt, T. Richard, V.M.D., Ph.D., U. of Pennsylvania. Prof. Emeritus, Biomedical Sciences

Kothkoff, 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

Lorr, 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 M., Ph.D., Washington U. (St. Louis). Prof., Biomedical Sciences

Osvald, Robert, Ph.D., Vanderbilt U. Prof., Molecular Medicine

Quaroni, Andrea, Ph.D., U. of Pavia (Italy). Prof., Biomedical Sciences

Rawson, Richard E., D.V.M., Ph.D., U. of Minnesota. Senior Lecturer, Biomedical Sciences

Roberson, 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. Prof., Biomedical Sciences

Woodson, 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

Webb, Watt W., Prof., Applied and Engineering Physics/Biological Sciences

Biological Sciences

Joint Appointees

Snedeker, Suzanne M., Asst. Prof., Center for the Environment/Biological Sciences

Division of Nutritional Sciences

Joint Appointees

Arion, William J., Prof., Nutritional Sciences/Molecular Biology and Genetics

Bensadoun, Andre, Prof., Nutritional Sciences/Physiology

Kazzarino, Michael N., Assoc. Prof., Nutritional Sciences/Molecular Biology and Genetics

Wright, Lemuel D., Ph.D., Oregon State Coll. Prof., Emeritus, Nutritional Sciences/Molecular Biology and Genetics

*Joint appointment with the College of Arts and Sciences.

†Joint appointment with the College of Veterinary Medicine.

‡Joint appointment with the College of Agriculture and Life Sciences.

§Joint appointment with the College of Engineering.
MISSION

The faculty of Computing and Information Science (CIS) offers courses and programs campuswide in various academic disciplines in which computing is integral. The faculty associated with CIS programs hold joint appointments with CIS and another Cornell academic unit. The FCIS has, so far, focused its interdisciplinary efforts in the areas of computational biology, computational science and engineering, digital arts and graphics, and information science. Each area of interest is in a different stage of development, with information science leading the way.

COMPUTATIONAL SCIENCE AND ENGINEERING

Another FCIS area of activity is computational science and engineering. Numerous courses are taught throughout the university. Topics include numerical methods, modeling and simulation, and real-time computing and control. The FCIS itself 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.

DIGITAL ARTS AND GRAPHICS

The FCIS is working to develop research programs and curriculum in the digital arts. Several courses already exist in this area (ART 372, ART 391, MUSIC 120, COM S 465, 467, 468), and more can be expected in the near future.

RELATIONSHIP WITH COMPUTER SCIENCE

FCIS programs have connections to computer science, the study of computation in all of its forms. Computation is both abstract and physical, both artificial and natural, and its study is a unique combination of fundamental science, applied science, and enabling technology. The curriculum covers the theory of algorithms and computing and its many applications in science, engineering, and business. Students learn the algorithmic method of thinking and how to bring it to bear on a wide range of problems. They also study the elements of computing and information technology such as system design, problem specification, programming, system analysis and evaluation, and complex modeling. Research areas include programming languages, compilers, computing systems, artificial intelligence, natural language processing, computer graphics, computer vision, databases, networks, bioinformatics, the theory of algorithms, scientific computing, and computational logic.

Undergraduate majors in Computer Science are offered in the College of Engineering and the College of Arts and Sciences. A minor in Computer Science is available to undergraduates in the College of Engineering. These programs are administered by the Department of Computer Science, whose professors are members of both the College of Engineering and the College of Arts and Sciences.

There is also a one-year Master of Engineering Program in Computer Science and a Ph.D. program in Computer Science. These degree programs are administered by the Graduate Field of Computer Science.
THE INFORMATION SCIENCE
CONCENTRATION/MINOR

A concentration/minor in Information Science is available to students in the Colleges of Arts and Sciences; Engineering; Agriculture and Life Sciences (CALS); Human Ecology; and Architecture, Art, and Planning (AAP; available to Architecture, Art, and Planning students), and the School of 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.cis.cornell.edu/infoscience/concentration.htm 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.

**Human-Centered Systems**

- COGST 101 Introduction to Cognitive Science
- PSYCH 205 Perception
- PSYCH 214 Cognitive Psychology
- COMM 240 Communication and Information Technology
- COMM 245 Psychology of Social Computing
- PSYCH 280 Introduction to Social Psychology
- COMM 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
- COM S 465 Introduction to Computer Graphics
- COMM 440 Advanced Human-Computer Interaction Design
- COMM 450 Language and Technology

**Social Systems**

- STS 250 Technology in Society
- STS 292 Inventing an Information Society
- ECON 301 Microeconomics*
- ECON 313 Intermediate Microeconomic Theory*
- SOC 304 Social Networks and Social Processes
- STS 349 Media Technologies
- STS 355 Computers: From Babbage to Gates
- STS 387 The Automatic Lifestyle: Consumer Culture and Technology
- LAW 410 Limits on and Protection of Creative Expression—Copyright Law and Its Close Neighbors
- STS 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
- ECON 467 Game Theory*

*Only one of ECON 301 and ECON 313 can be taken for IS credit. Only one of OR&IE 435 and ECON 467 can be taken for IS credit.

**Information Systems**

- CIS 130 Creating Web Documents*
- COM S 211 Computers and Programming*
- CIS 230 Intermediate Web Design*
- CIS 330 Applied Databases
- LING 424 Computational Linguistics
- CIS 430 Information Discovery
- CIS 431 Web Information Systems
- CIS 432 Introduction to Database Systems
- COM S 465 Computer Graphics I
- LING 474 Introduction to Natural Language Processing
- OR&IE 474 Statistical Data Mining
- COM S 478 Machine Learning
- OR&IE 480 Information Technology
- CIS 501 Software Engineering
- ECE 562 Fundamental Information Theory
- COM S 574 Language Technologies
- COM S 578 Empirical Methods in Machine Learning and Data Mining

*CIS 130 cannot be taken for Information Science credit by Engineering students. Computer Science majors cannot use CIS 130 or CIS 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&IE).

**CIS COURSES**

Courses offered under the CIS rubric are of particular interest to students in the computing and information sciences.

**CIS 130 Introductory Web Programming (also COM S 130)**

Fall, summer. 3 credits. No prerequisites. Interactive online media such as the World Wide Web are revolutionizing the way we communicate. This course introduces students having little or no computer background to tools and techniques for creating interactive documents. Questions of both design and technical issues are emphasized. Students must think seriously about digital graphic
impact and must learn how to do some relatively simple programming with a scripting language (such as JavaScript). Topics covered include HTML, JavaScript, interaction techniques (including DHTML), ways of coping with slow connections; the incorporation of sound, video, and images in web documents; animation techniques (Flash 5); ethics; and e-commerce.

CIS 191 Media Arts Studio I (also ART 391, THETR 391)
Fall. 3 credits. Prerequisite: one of the following: ART 171, THETR 277, 377, MUSIC 120, or equivalent; must be a junior and have permission of the instructor. Lab fee $50. See ART 391 for description.

CIS 230 Intermediate Web Design (also COM S 230)
Spring. 3 credits. Prerequisite: COM S 130 or equivalent.
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 230 concentrates almost exclusively on the server 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, and then, through a succession of projects, learn how to apply this understanding to the creation of an interactive data-driven site via the use of an integrated web site development tool such as ColdFusion. Also considered are techniques to enhance security, privacy, and reliability, as well as 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.

CIS 330 Applied Database Systems (also COM S 330)
Spring. 3 credits. Prerequisites: COM S 211/ENGRD 211.
An introduction to modern database systems and three-tier application development using database systems. Concepts covered include the relational model, query languages, data modeling, database tuning, three-tier architectures, Internet data formats and query languages, server- and client-side technologies, decision support systems, and an introduction to data mining. The course is targeted at users of database systems and at application development using database systems and includes several programming projects comprising the design and implementation of a database-backed web site.

CIS 387 The Automatic Lifestyle: Consumer Culture and Technology (also ST&S 387)
Spring. 4 credits.
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 are everyday technologies shaped by the demands of consumer culture? What alternatives do we have? In this course, we synthesize history, sociology, and speculative design to answer these questions.

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 more 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. Prerequisite: 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 includes color mapping, 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 or engineer 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 science. This course is intended for students outside of the Department of Computer Science whose work involves a significant amount of computing. Topics include basic data structures as well as more advanced topics. Emphasis is placed on the use of abstract data types and on how best to select appropriate data structures.

CIS 430 Information Discovery (also COM S 430)
Fall. 3 credits. Prerequisite: COM S 211 or equivalent.
This course studies the methods used to search for and discover information in large-scale systems. The emphasis is on information retrieval applied to textual materials, but there is some discussion of other formats. The course includes techniques for searching, browsing and filtering information, and the use of classification systems and thesauruses. The techniques studied include examples from web searching and digital libraries.

CIS 431 Web Information Systems (also COM S 431, formerly CIS/COM S 502)
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 are the subject of current research and development at Cornell, other universities, and in standards organizations such as the World Wide Web Consortium. Course content mixes exploration of current tools for building web information systems such as XML, XSLT, and RDF with broader concepts such as techniques for knowledge representation and description, object models for content representation, and legal and economic impacts of web information. A theme that runs throughout the course is the relationship between traditional information environments, exemplified by libraries, and the distributed information environment of the web.

CIS 490 Independent Reading and Research
Fall, spring. 1–4 credits.
Independent reading and research for undergraduates.

CIS 515 Culture, Law, and Politics of the Internet
Fall. 4 credits.
This course explores the culture, law, and politics of the Internet, everything from "No one will know you are a dog on the Internet" to debates on the constitutionality of the Digital Millennium Copyright Act. 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.

CIS 519 Computer Animation (also ART 372)
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 576 Decision Theory I (also ECON 476, 676)]
Fall. 4 credits. Prerequisites: mathematical sophistication. See ECON 476 for description.

[CIS 577 Decision Theory II (also ECON 477, 677)]
Spring. 4 credits. Prerequisites: Mathematical sophistication. See ECON 476 for description.

[CIS 630 Representing and Accessing Digital Information (also COM S 630)]
Fall. 4 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent. This course covers the representation, organization, and access of digital information with an emphasis on textual information. Topics include structured and semistructured data, information retrieval, natural language processing, and machine learning, with links to work in databases and data mining, and computational linguistics.

[CIS 685 The Structure of Information Networks (also COM S 685)]
Fall. 4 credits. Prerequisite: COM S 482.

[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. Prerequisites: concurrent enrollment in COM S 431 or equivalent experience. S-U grades only. Not offered every year.

COMPUTER SCIENCE
The Department of Computer Science is affiliated with both the College of Arts and Sciences and the College of Engineering. Students in either college may major in computer science. The department is also part of CIS, and its courses are an integral part of its several educational programs.

[COM S 099 Fundamental Programming Concepts]
Fall, summer. 2 credits. No prerequisites. S-U grades only. Credit cannot be applied toward the Engineering degree. Freshmen only.

This course is designed for students who intend to take COM S 100 but are not adequately prepared for that course. Basic programming concepts and problem analysis are studied. An appropriate high-level programming language is used. Students with previous programming experience and students who do not intend to take COM S 100 should not take this course.

[COM S 100 Introduction to Computer Programming]
Fall, spring, summer. 4 credits. An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis and the development of algorithms and programs. There are two versions of the course. Both provide adequate preparation for COM S/ENGRD 211. Both versions are not offered every semester.

[COM S 100M Introduction to Computer Programming]
Corequisite: MATH 111, 191, or equivalent. This version starts with a seven-week introduction to programming in MATLAB. Iteration, functions are introduced. During the second seven weeks of the course students examine how these ideas are handled in the object-oriented framework provided by the Java programming language. Throughout the course, examples and assignments are chosen to give the student an appreciation for computational science and engineering. The pace of the course assumes that the student has no prior programming experience.

[COM S 100J Introduction to Computer Programming]
This course is an introduction to programming using the Java programming language. A two-week unit on MATLAB is included. Topics include algorithms, language concepts, selection, repetition, functions, objects and classes, arrays, strings, and inheritance. Principles of software development and style are emphasized. The course assumes basic high school mathematics (no calculus) but no programming experience.

[COM S 100K Introduction to Computer Programming (also PSYCH 102)]
Fall. 1 credit. Usually weeks 5-8. 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 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 Web Programming (also CIS 130)]
Fall, summer. 3 credits. Prerequisites: ECON 476 or equivalent. Interactive online media such as the World Wide Web are revolutionizing the way we communicate. This course introduces students having little or no computer background to tools and techniques for creating interactive documents. Questions of both design and technical issues are emphasized. Students must think seriously about digital graphic impact and must learn how to do some relatively simple programming with a scripting language (such as JavaScript). Topics covered include HTML, JavaScript; interaction techniques (elementary DHTML); ways of coping with slow connections; the incorporation of sound, video, and images in web documents; animation techniques (Flash 5); ethics; and e-commerce.

[COM S 172 Computation, Information, and Intelligence (also ENGR 172)]
Fall. 3 credits. Prerequisites: some knowledge of calculus. 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, machine translation, and the Turing test. This is not a programming course; rather, "pencil and paper" problem sets will be assigned. Not open to students who have completed the equivalent of COM S 100.

[COM S 201 Cognitive Science in Context Laboratory (also COGST 201 and PSYCH 201)]
Fall, spring, summer. 1 credit. Limited to 24 students. Prerequisites: 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 ENGR 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, subtyping), 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, and Java as 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 113 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++. 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 grade only. Prerequisite: COM S 114 or equivalent. A focus on Unix as an 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 with 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. 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 Web Design (also CIS 230)
Spring, 3 credits. Prerequisite: COM S 130 or equivalent. 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, and then, through a succession of projects, learn how to apply this understanding to the creation of an interactive data-driven site via the use of an integrated web development tools. 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, 4 credits. Prerequisite: 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 calculi; combinatorics; matrices; covering manipulation of sums, recurrence relations, and generating-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 lists, sets, trees, maps, persistent data structures, Church numerals, lambda calculus, lazy evaluation, and continuations.

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. 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 321 Numerical Methods in Computational Molecular Biology (also BIO BM 321 and ENGRD 321)
Fall. 3 credits. Prerequisites: at least one course in calculus, such as MATH 106, 111, or 119 and a course in linear algebra, such as MATH 221 or 294 or BTBY 417. COM S 100 or equivalent and some familiarity with iteration, arrays, and procedures. An introduction to numerical computing using MATLAB organized around five applications: the analysis of protein shapes, dynamics, protein folding, score functions, and field equations. Students become adept at plotting, protein folding, score functions, and field equations. Students become adept at plotting, interpolation, 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 will also be 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, or 421.

COM S 322 Introduction to Scientific Computation (also ENGRD 322)
Spring, summer. 3 credits. Prerequisites: COM S 100 and (MATH 222 or MATH 294). An introduction to elementary numerical analysis and scientific computing. Topics include interpolation, quadrature, linear and nonlinear equation solving, least-squares fitting, and ordinary differential equations. The MATLAB computing environment is used. Vectorization, stability, and cache 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 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 CIS 330)
Spring, 3 credits. Prerequisite: COM S 211/ENGRD 211. COM S 330 majors may use only one of the following toward their degree: CIS/COM S 330 or COM S 433. An introduction to modern database systems and three-tier application development using database systems. Topics covered include the relational model, data modeling, database tuning, three-tier architectures, transaction processing, and distributed database systems. The course is targeted at users of database systems and at application development using database systems and includes several programming projects comprising the design and implementation of a database-backed web site.

COM S 381 Introduction to Theory of Computation
Fall, summer. 4 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 411 Programming Languages
Fall. 4 credits. Prerequisite: COM S 312 or permission of instructor. An introduction to the theory, design, and implementation of programming languages. Topics include: operational semantics, type systems, higher-order function, scope, lambda calculus, laziness, exceptions, side effects, continuations, objects, and modules. Also discussed are logic programming, concurrency, and distributed and persistent programming.

COM S 412 Introduction to Compilers
Spring. 3 credits. Prerequisites: COM S 312 (or permission of instructor) and COM S 314. Corequisite: COM S 415. 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. 3 credits. Prerequisite: COM S 211, 212, 312 (or permission of instructor), and 314. Corequisite: COM S 415 in spring only. An introduction to the implementation of modern operating systems, with emphasis on the design and implementation of modern 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 415 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 421 Numerical Analysis
Fall. 4 credits. Prerequisites: MATH 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming.
Modern algorithms for systems of 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 preparation than COM S 222.
COM S majors and minors may use only one of the following toward their degree: COM S 321, 322 or 421.

COM S 426 Introduction to Computational Biology
Fall. 3 credits. Prerequisites: COM S/ENGRD 211, COM S 280.
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 for 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, better understand cellular "computations," and aid in the development of new therapeutic agents for 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. Pre- or corequisite: 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 software suite for sequence comparison or analysis of gene expression data, etc.

COM S 430 Information Discovery (also CIS 430)
Fall. 3 credits. Prerequisite: COM S 211 or equivalent.
This course studies the methods used to search for and discover information in large-scale systems. The emphasis is on information retrieval applied to textual materials, but there is some discussion of other formats. The course includes techniques for searching, browsing, and ranking information and the use of classification systems and thesauri. The techniques are illustrated with examples from web searching and digital libraries.

COM S 431 Web Information Systems (also CIS 431; formerly CIS/COM S 502)
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 mixes exploration of current tools for building web information systems such XML, XSLT, and RDF with broader concepts such as techniques for knowledge representation and description, object models for content representation, and the legal and economic impacts of web information. A theme that runs throughout the course is the relationship between traditional information environments, exemplified by libraries, and the distributed information environment of the web.

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++.
An introduction to modern relational database systems. Conceptual data models 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 may use only one of the following toward their degree: CIS/COM S 330 or COM S 433.
An introduction to building web-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: CIS/COM S 333 or COM S 433.

COM S 465 Computer Graphics I (also ARCH 374)
Fall. 3 credits. Prerequisite: COM S/ENGRD 211. May not be taken after completion of CIS/COM S 474.
An introduction to the principles of computer graphics in two and three dimensions. Topics include human visual perception, digital images, rasterization and anti-aliasing, 2D and 3D affine geometry, perspective and 3D viewing, splines, elementary 3D surface modeling, and ray tracing. Homework assignments require some programming.

COM S 467 Computer Graphics II
Spring. 3 credits. Prerequisite: COM S 465.
This course covers the principles of computer graphics in detail. A wide variety of topics are covered, including 3D transformations, the hardware graphics pipeline, advanced texturing and shading, visual perception and color science, rendering algorithms including global illumination, animation, user interfaces, visualization, and 3D surface modeling.

COM S 468 Computer Graphics Practicing
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. 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/ENGRD 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, heuristics, 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 COGST 472, LINL 474)
Fall 4 credits. Prerequisites: 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.
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 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.
COM S 482 Introduction to Analysis of Algorithms
Spring or 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 481)
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. Independent reading and research for undergraduates.

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 I (also CEE 504, ECE 512, M&A 591, OR&E 512, SYS 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 supervised by an instructor. For description, see M&A 591.

COM S 505 Applied Systems Engineering II (also CEE 505, ECE 513, M&A 592, OR&E 513, SYS 520)
Spring. 3 credits. Prerequisite: Applied System Engineering I (CEE 504, COM S 504, ECE 512, M&A 591, OR&E 512). For description, see M&A 592.

COM S 513 System Security
Spring. 4 credits. Prerequisites: COM S 414 or 519 and familiarity with JAVA programming language.
This course discusses security and survivability for computers and communications networks. 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 comprise "trustworthiness" in a computing system. Topics for authorization and authentication as well as cryptographic protocols are covered.

COM S 514 Intermediate Computer Systems
Fall. 4 credits. Prerequisites: 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 519 Computer Networks
Spring. 4 credits. Prerequisites: COM S 314 or permission of instructor. Not offered every year.
Introduction to computer networks with an emphasis on evolving Internet standards. Detailed introduction to networking protocols for reliable data transfer, flow control, congestion control, naming and addressing, routing, error control, and multiple access. Fundamentals of layered protocols and techniques for protocol design and implementation. This course is project-oriented and requires substantial programming experience.

COM S 522 Computational Tools and Methods for Finance
Spring. 4 credits. Prerequisites: knowledge of financial economics, stochastic processes, and probability.
A broad introduction to current algorithms and models for risk management, including some of the following: artificial intelligence, scheduling, queueing, computational economics, traffic planning, algorithm design, and application to real-world learning and decision-making tasks. The course also covers experimental methods for comparing learning algorithms, for understanding and explaining their differences, and for exploring the performance under which each is most appropriate.

COM S 572 Heuristic Methods for Optimization (also CEE 509)
Spring. 3 or 4 credits. Prerequisites: COM S 401 or 412 or permission of instructor.
This course describes a variety of heuristic search methods including simulated annealing, tabu search, genetic algorithms, derandomized evolution strategy, random walk, and direct search algorithms. Algorithms are used to find values of discrete and/or continuous variables arising in optimization and model fitting.
Applications are discussed in a range of areas including some of the following: artificial intelligence, scheduling, queueing, computational economics, traffic planning, algorithm design, and application to real-world learning and decision-making tasks. The course also covers experimental methods for comparing learning algorithms, for understanding and explaining their differences, and for exploring the performance under which each is most appropriate.

COM S 574 Language Technologies
Fall. 3 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent. Not offered every year.
This course focuses on computational techniques for large-scale text-processing applications, including information retrieval, text classification, information extraction, document clustering, document ranking, summarization, topic detection and tracking, and question answering. The course focuses on statistical and machine learning approaches to these natural language processing tasks as well as methods for their empirical evaluation.

COM S 578 Empirical Methods in Machine Learning and Data Mining
Fall. 4 credits. Prerequisites: COM S 280 and 312 or equivalent.
This implementation-oriented course presents a broad introduction to current algorithms and approaches in machine learning, knowledge discovery, and data mining and their application to real-world learning and decision-making tasks. The course also covers experimental methods for comparing learning algorithms, for understanding and explaining their differences, and for exploring the performance under which each is most appropriate.

COM S 601 System Concepts
Fall. 3 credits. Prerequisites: open to students enrolled in the COM S Ph.D. program. Not offered every year.

COM S 611 Advanced Programming Languages
Fall. 4 credits. Graduate standing or permission of instructor.
A study of programming paradigms: functional, imperative, concurrent, and logic programming. Models of programming languages, including the lambda calculus. Type systems, polymorphism, modules, and other object-oriented constructs. Program transformations, programming logic, and applications to programming methodology.

COM S 612 Compiler Design for High-Performance Architectures
Spring. 4 credits. Prerequisites: COM S 314 and 412 or permission of instructor.
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COM S 613 Concurrent Programming
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor. Not offered every year.

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 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 Adaptive Systems
Fall. 4 credits. Prerequisite: COM S 614 recommended.
This course broadly examines self-organization in distributed systems, with particular emphasis on peer-to-peer and mobile ad hoc networks. Students read recent research papers on particular hybrid and hybrid routing protocols for ad hoc networks, system support for mobility, peer-to-peer systems and their applications.

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.
Finite difference methods for the solution of ordinary and partial differential equations. A fast-moving course that begins with a three-week survey of numerical methods for ODEs, then moves on to Fourier analysis and methods for PDEs, especially parabolic and hyperbolic equations. Other topics covered include numerical stability, finite element methods, Hamiltonian problems, and computational issues such as mesh generation and sparse matrix computation for PDEs.

COM S 626 Computational Molecular Biology
Spring. 4 credits. Prerequisites: familiarity with linear programming, numerical solutions of ordinary differential equations, and nonlinear optimization methods. Problems and algorithms in computational molecular biology. Topics include sequences (alignment, scoring functions, complexity of searches and alignment, secondary structure prediction, families, and function), the protein folding problem (lattice models, lattice searches, the HP model, chemical potentials, statistical potentials, funnels, complexity and model verification, global optimization, homology, threading), and the dynamics of complex biomolecules (the Molecular Dynamics method, long-range forces, statistics of flexible systems, reduced models).

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.
No longer offered.
This is a graduate-level course in computational biology that focuses on machine learning models and their application to computational problems in biology. Some topics covered are unsupervised and supervised learning (Support Vector Machines, Hidden Markov Models, deterministic and probabilistic suffix trees) and supervised learning (embedding, PCA, ICA, clustering) learning in computational biology, advanced statistical analysis of sequences, analysis of microarrays, and modeling of complex systems (Bayesian Belief Networks, DEA).

COM S 630 Representing and Accessing Digital Information (also CIS 630)
Fall. 4 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent.
This course covers the representation, organization, and access of digital information with an emphasis on textual information. Topics include structured and semistructured data, information retrieval, natural language processing, and machine learning, with links to work in databases, data mining, and computational linguistics.

COM S 632 Advanced Database Systems
Spring. 4 credits. Prerequisite: COM S 472 or 578 or the equivalent.
A variety of advanced issues ranging from transaction management to query processing to data mining. Involves extensive paper reading and discussion. Development of a term project with research content is required.

COM S 644 Machine Vision
Fall. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and MATI 221 or equivalent.
An introduction to computer vision, with an emphasis on discrete optimization algorithms and 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 655 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 computer graphics. Offered fall 2003.
This course covers advanced topics in realistic rendering with a focus on fast/interactive techniques. Topics include light transport and global illumination, Monte-Carlo ray tracing and radiosity, hardware rendering, and image-based rendering.

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. 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 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 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. Not offered 2003–2004. 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. Prerequisites: 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, NPh-completeness, and randomized reducibilities. Also covers topics such as parallel algorithms and efficient data structures.

[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. 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 Approximation and Network Algorithms]
Fall. 4 credits. Prerequisites: COM S 681 or permission of instructor. Not offered every year.

[COM S 685 The Structure of Information Networks (also CIS 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 applications 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. 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. Discussion of contemporary issues in the design and analysis of computing systems. Emphasis is on the proper use of nger, 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 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. Not offered every year; semester TBD. 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 series discussing timely topics in computational molecular biology. The course addresses methodological approaches to sequence and structure analysis, function prediction, studies of evolutionary relationships, and analysis of large biological systems. Statistical and deterministic computational approaches are covered, and specific and detailed biological examples are discussed. For 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 physical sciences. We aim 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, MAAE 650)]
Fall. 4 credits. Prerequisite: programming experience or permission of instructor. Not offered every year.

[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 (also CIS 752)]
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. 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 482 or 681, COM S 682, elementary logic (MATH 481 or 681), algebra (MATH 432) recommended. Kleene algebra is a 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 schematology, 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, 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.
ADMINISTRATION
W. Kent Fuchs, dean
Michael Spencer, associate dean for research, graduate studies and professional education
Zellman Warhaft, associate dean for diversity and faculty recruitment
Deborah Cox, assistant dean for strategic planning, assessment, and new initiatives
Cathy Long, assistant dean for administration
Marsha Pickens, assistant dean for alumni affairs and development
David Gries, associate dean for undergraduate programs
Betsy East, assistant dean for student services

FACILITIES AND SPECIAL PROGRAMS
Most of the academic units of the College of Engineering are on the Joseph N. Pew, Jr. Engineering Quadrangle. Facilities for the School of Applied and Engineering Physics are located in Clark Hall on the College of Arts and Sciences campus, and facilities for the Department of Biological and Environmental Engineering are centered in Rilev-Robb Hall on the campus of the New York State College of Agriculture and Life Sciences.

Special university and college facilities augment the laboratories operated by the various engineering schools and departments, and special centers and programs contribute to opportunities for study and research.

Cornell programs and centers of special interest in engineering include the following:
Center for Applied Mathematics. A cross-disciplinary center that administers a graduate program.
Center for Nanoscale Systems in Information Technologies. A National Science Foundation Nanoscale and Technology Center whose mission 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.
Center for Radiophysics and Space Research. An interdisciplinary unit that facilitates research in astronomy and the space sciences.
Center for Theory and Simulation in Science and Engineering. A supercomputer facility used for advanced research in engineering and the physical and biological sciences.
Cornell High Energy Synchrotron Source (CHESS). A high-energy synchrotron radiation laboratory operated in conjunction with the university's high-energy storage ring. Current research programs at CHESS are in areas of structural biology, chemistry, materials science, and physics.

Cornell Nanofabrication Facility (part of the National Science Foundation-funded National Nanofabrication Users Network). A center that provides 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. A research, teaching, and extension program within the Center for Environmental Research that addresses the environmental, technical, and economic issues associated with solid waste; one facility sponsored by the institute is the Combustion Simulation Laboratory in the Sibley School of Mechanical and Aerospace Engineering.

Institute for the Study of the Continents. An interdisciplinary organization that 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-telescope facility, operated by Cornell in Arecibo, Puerto Rico.

National Earthquake Engineering Research Center. A facility recently established by the National Science Foundation and a group of universities in New York State to study response and design of structures in earthquake environments.

Nanobiotechnology Center. A National Science Foundation Science and Technology Center whose mission is to develop nanoscale tools for use in the life sciences. The facilities of this center are distributed between Clark Hall, Kimball Hall, and the Biotechnology Center.

National Institutes of Health/National Science Foundation Developmental Resource in Biophysical Imaging and Optoelectronics. A resource that develops novel measurement and optical instrumentation for solving biophysical problems.

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 Biomedical Engineering. An interdisciplinary field that administers the graduate field of Biomedical Engineering.

Program of Computer Graphics. An interdisciplinary research center that operates one of the most advanced computer-graphics laboratories in the United States.

Program on Science, Technology, and Society. A cross-disciplinary unit that 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, master of engineering (with field designation), master of science, and doctor of philosophy.

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 the master of science and doctor of philosophy 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. The professional Master of Engineering programs and cooperative programs with the Johnson Graduate School of Management are described below.

UNDERGRADUATE STUDY
Bachelor of science (B.S.) degrees are offered in the following areas:

Biological Engineering
Chemical Engineering
Civil Engineering
Computer Science
Electrical and Computer Engineering
Engineering Physics
Earth and Atmospheric Sciences
Independent Major
Materials Science and Industrial Engineering
Mechanical Engineering
Operations Research and Industrial Engineering

Students in the College of Engineering begin their undergraduate studies in the Common Curriculum, which is administered by the faculty members of the College Curriculum Governing Board (CCGB) through the associate dean for undergraduate programs and Engineering Advising. Subsequently most students enter field programs, which are described separately for each academic area. Criteria for entrance into the field programs are described in the section titled "Affiliation with a Field Program." Alternatively students may enter the Independent Major (described
below), which permits them to pursue a course of study adapted to individual interests.

Students interested in bioengineering may arrange a suitable curriculum through the bioengineering option, the bioengineering minor, the biomedical engineering minor, or the Independent Major. Students interested in supplementing their field program with formal study in another traditional area of engineering may wish to consider one of the engineering minors offered by the college. Information about both the bioengineering option and engineering minors is available in Engineering Advising, 167 Olin Hall. Students interested in environmental engineering and science may pursue the environmental option offered by the School of Civil and Environmental Engineering and the Department of Biological and Environmental Engineering, or the science of earth systems (SES) option offered by the Department of Earth and Atmospheric Sciences.

*Biological engineering, chemical engineering, civil engineering, electrical engineering, engineering physics, materials science and engineering, and mechanical engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

†To major in biological engineering, students normally enroll in the College of Agriculture and Life Sciences for the first three years, and jointly in that college and the College of Engineering for the final year. Students initially enrolled in the College of Engineering, however, may affiliate with the field of biological and environmental engineering and complete the degree solely within that college.

Requirements for Graduation

To receive the Bachelor of Science degree, students must meet the requirements of the Common Curriculum, as set forth by the College of Engineering, including the requirements of the field program, as established by the school or department with which they become affiliated. Students must meet the Common Curriculum as explained below. (Further explanation of the revised Common Curriculum and field flow charts are provided in the 2003–2004 edition of The Engineering Undergraduate Handbook.)

Course Category    Credits
1) Mathematics       16
2) Physics (depending on field) 8–12
3) Chemistry (depending on field) 4–8
4) First-year writing seminar* 6
5) Computer programming 4
6) Engineering distribution (3 courses)
   a. One Introduction to Engineering (ENGRD) 3
   b. Two other engineering distribution courses (ENGRD) 6
7) Liberal studies distribution 18 (min.)
8) Approved electives 6
9) Field program
   a. Field required courses 30 cr. min.
   b. Field approved electives 9
   c. Courses outside the field 9

*One writing-intensive technical course or a course in technical or scientific writing must also be taken; this course may simultaneously satisfy some other requirement.

From 123 to 133 credits are required for graduation; the specific number of required credits varies depending on which field program is chosen (see field curricula for specific field requirements). Two terms of physical education must be taken in the freshman year, and students must demonstrate proficiency in swimming to satisfy a university requirement.

Mathematics

The normal program in mathematics includes MATH 191 (or 190), 192, 293, and 294. Every student must attain a grade of at least C- in MATH 191 (or 190), 192, 293, and 294, or other courses that may be approved as substitutes for these courses. If this requirement is not met the first time a course is taken, the course must be repeated immediately and a satisfactory grade attained before the next course in the sequence may be taken. Failure to achieve at least a C- the second time around will generally result in withdrawal from the engineering program. Courses that are taken a second time in order to meet this requirement do not yield additional credit toward a degree.

Physics

The normal program in physics includes PHYS 112, 213, and 214 or the corresponding honors courses (PHYS 116, 217, and 218). Engineering students are required to have attained a minimum grade of C- in MATH 191 or equivalent before taking PHYS 112. *The same minimum grade is required in each subsequent mathematics course before taking the physics course for which it is a prerequisite (e.g., C- in MATH 192 before taking PHYS 215, or C- in MATH 293 before taking PHYS 214). Students in the fields of BEE, CHEM, CEE, COM S, EAS (geoscience and SES options), or OR&IE may substitute CHEM 208 for PHYS 214.

Chemistry

CHEM 211 or 207 is required for all students. CHEM 211 is a course designed for students who do not intend any further study in chemistry. Typically, CHEM 211 is taken during the freshman year, but students who wish to complete the physics program (PHYS 112, 213, and 214) first may postpone CHEM 211 until the sophomore year.

In general, students intending to affiliate with the following departments and schools usually take CHEM 211: Applied and Engineering Physics, Computer Science, Electrical and Computer Engineering, Materials Science and Engineering, Mechanical and Aerospace Engineering, and Operations Research and Industrial Engineering. Students considering Chemical Engineering must take CHEM 207 in the fall of their freshman year, to be followed by CHEM 208 in the spring term. All students considering the environmental option in Civil Engineering, the science of earth systems option in Earth and Atmospheric Sciences, or a health-related career such as medicine, should take the CHEM 207–208 sequence.

First-Year Writing Seminars

Each semester of the 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 assume beginning students the benefits of a small class.

Technical Writing

Cornell's engineering college has an upper-level technical-writing requirement that students can fulfill by choosing one of the six options below. More information about some of these options is available at www.engineering.cornell.edu/ECP/index.htm.

1) ENGR 350 or ENGR 355, 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
   • CHE 432
   • MSE 403 & 404 (both)
   • MSE 405 & 406 (both)
   • MAE 427
   • BEE 450 with co-registration either in ENGR 301, a one-credit attachment that extends the writing done in this course (by permission of 450 instructor), or in BEE 493
   • BEE 473 with co-registration in ENGR 301 (by permission of 473 instructor) or in BEE 493
   • BEE 489 with co-registration in ENGR 301 (by permission of 489 instructor) or in BEE 493.

4) ENGR 302, a one-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/her course for a given semester so that it will fulfill the technical-writing requirement. With the approval of the CGCB's Subcommittee on Technical Writing, the instructor may have students co-register in ENGR 302. May be taken more than once, with different courses. By permission of engineering instructor.

5) COM 260, 263, or 352, taught by the Department of Communication (in the College of Agriculture and Life Sciences)

6) A petition. Occasionally, a student realizes that he/she will be doing a significant amount and variety of technical writing elsewhere in the engineering college. It may be appropriate for the student to submit a petition to the College Curriculum Governing Board's Subcommittee on Technical Writing, asking for permission to use his/her upcoming writing (not past writing) to
meet the technical-writing requirement. More information on criteria and submitting a petition is available at www.engineering.cornell.edu/ECIP/Information.html.

Computing
To fulfill the computer programming requirement, students normally take COM S 100, Introduction to Computer Programming, during their freshman year. Before taking COM S 100, some students choose to take COM S 099, Fundamental Concepts of Computer Programming, offered in the fall semester. COM S 099 is a two-credit S-U course designed for students with virtually no programming experience. Basic programming concepts and problem analysis are studied. An appropriate high-level programming language is used. Students with previous programming experience should not take this course. COM S 099 may not be used as credit toward graduation.

Engineering Distribution
Three engineering distribution courses (nine credits) are required. One course must be an Introduction to Engineering course (designated by ENGRD) to be taken by the student during his/her freshman year. The Introduction to Engineering 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.

The other two distribution courses 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 321, 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

Students in the field program in Engineering Physics may substitute A&EIP 333 for ENGRD 203.

4) Probability and statistics
   ENGRD 270, Basic Engineering Probability and Statistics

Students in the field program in Electrical and Computer Engineering may substitute ECE 310 for ENGRD 270. Students in the field program in Engineering Physics may substitute ECE 310 or MATH 471 for ENGRD 270. Students in the field program 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&EIP 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 fields require a specific engineering distribution course as a prerequisite for the upperclass course sequence. These requirements are:

- Biological and Environmental Engineering: ENGRD 202
- Chemical and Biomolecular Engineering: ENGRD 219
- Civil Engineering: ENGRD 202
- Computer Science: ENGRD 211 (co-enrollment in COM S 212 strongly recommended)
- Electrical and Computer Engineering: ENGRD 230
- Earth and Atmospheric Sciences: ENGRD 201
- Materials Science and Engineering: ENGRD 261
- Mechanical Engineering: ENGRD 202
- Operations Research and Engineering: ENGRD 270

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. A minimum of six courses (totaling at least 18 credits) is 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, IA).

Please refer to the web site of Cornell Engineering Advising (www.engineering.cornell.edu/studentServices/advising.cfm) for access to a complete listing of acceptable courses in those groups, or a list of courses is available in Engineering Advising, 167 Olin Hall.

1. Cultural Analysis (CA)
Courses in this area study human life in particular cultural contexts through interpretive analysis of the 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).

2. Historical Analysis (HA)
Courses in this area 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.

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.

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

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, conflict resolution).

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
- Approved electives—six credits required (approved by the academic adviser)

Because these courses should help develop and broaden the skills of the engineer, advisers will generally accept the following as approved electives:

1. One Introduction to Engineering course (ENGRD).
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 field program 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.)

Field-approved electives—nine credits (approved by engineering field program faculty and field faculty advisers). Students should refer to the field program curricula for descriptions of courses that meet this category.

- To ensure breadth of engineering studies, field programs will also include nine credits of courses outside the field.

Social Issues of Technology

It is important for engineers to realize the social and ethical implications of their work. Consequently, in selecting their humanities, social sciences, 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 an important perspective on their studies and their future careers.

Engineering Advising

From the time students enter the college as freshmen until they are affiliated with a major field (normally prior to the second semester of the sophomore year), they are 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

By the end of the freshman year, engineering students are expected to have completed (or received credit for) the following core requirements:

- MATH 191 (or 190) and MATH 192
- Two of the following: CHEM 211, 207, 208, PHYS 112, 213, 214
- COM S 100
- Two First-Year Writing Seminars
- One Introduction to Engineering course (ENGRD designation)
- Two Physical Education courses

Students with an interest in pre-med (or other health-related careers), Chemical Engineering, the environmental option in Civil Engineering, or the science of earth systems option in Earth and Atmospheric Sciences should enroll in the CHEM 207–208 sequence during their freshman year.

Affiliation with a Field Program

Students must apply for affiliation with a field program during the first term of their sophomore year, although earlier affiliation may be granted at the discretion of the field. This is done by visiting the undergraduate field consultant’s office in the field of their choice and completing the Application for Field Affiliation form. To affiliate with a field program, students must (1) have a 2.0 cumulative grade point average and (2) have satisfied the field’s course and grade requirements as specified below:

(If the student’s courses may impose alternative affiliation requirements for students applying for affiliation later than the first semester of the sophomore year.)

Field Program Courses and Minimum Grade Requirements

<table>
<thead>
<tr>
<th>Field Program</th>
<th>Courses and Minimum Grade Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Engineering</td>
<td>No more than one grade below C- in mathematics and science courses and BEE 151 or its equivalent</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>No more than one grade below C- in chemistry, mathematics, physics, or chemical engineering courses and a 2.2 GPA in mathematics, science, and chemical engineering courses</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>A 2.0 GPA in all engineering and science courses and a grade of C- or better in ENGRD 202 (for students in the environmental option who do not take ENGRD 202 prior to affiliation, a grade of C- or better in CHEM 208 is required)</td>
</tr>
<tr>
<td>Computer Science</td>
<td>All potential affiliates are reviewed on a case-by-case basis relative to the following criteria:</td>
</tr>
<tr>
<td>a grade of C or better in all completed critical MATH courses</td>
<td></td>
</tr>
<tr>
<td>a GPA of 2.7 or better in all completed critical COM S courses and critical MATH courses</td>
<td></td>
</tr>
</tbody>
</table>

Students must be affiliated or conditionally affiliated by the end of their fourth semester or they will be withdrawn from the College of Engineering, unless allowed to participate in a terminal semester.

SPECIAL PROGRAMS

Dual Degree Option

A special academic option, intended for superior students, is the dual degree program, in which both a Bachelor of Science and either a Bachelor of Arts or Bachelor of Fine Arts degree can be earned in about five years. Students registered in the College of Engineering, the College of Arts and Sciences, or the College of Agriculture and Life Sciences may apply and, after acceptance of their application, begin the dual degree program in their second or third year. Those

Critical COM S courses:
- COM S 211, 212, 280, 312, 314, 321, 322, 414, 421, 381, 481, and 482

Critical MATH courses:
- MATH 112, 122, 192, 221, 222, 223, 224, 293, 294, 356, 356 and ENGRD 270

Courses used to determine affiliation may be repeated if the original course grade is below a “C.” The most recent grade is used when a course is repeated. Qualifying courses must be taken at Cornell.

Electrical & Computer Engineering
- A grade of B- or better in all required mathematics and physics courses

Geological Sciences
- Good academic standing in the College of Engineering

Materials Science & Engineering
- A grade of C- or better in all physics and chemistry courses and a grade of C- or better in ENGRD 201 or ENGRD 262

Mechanical Engineering
- A grade of C- or better in mathematics and science courses and ENGRD 202

Operations Research & Engineering
- A grade of C- or better in MATH 191, 192, ENGRD 270 and a 2.0 GPA in all mathematics, science, and engineering courses (both overall and in the term immediately prior to affiliation)

Students must be affiliated or conditionally affiliated 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.
recognizes formal study of a particular technical subject area in engineering normally outside the student's major. Therefore, it may be necessary for some students choosing to complete the requirements for an engineering minor to spend more than the traditional eight semesters to complete their studies at Cornell. In many cases, however, courses fulfilling minor requirements may also satisfy other degree requirements (e.g., distribution courses, approved electives, or field-approved electives). Students undertaking a minor are expected to complete their requirements during the time of their continuous undergraduate enrollment at Cornell.

To complete an engineering minor, an undergraduate engineering student must:

- be enrolled in a major field program that approves the participation of its affiliates in the desired minor.
- successfully complete all the requirements for a bachelor of science degree in engineering.
- satisfactorily complete six courses (18 credit minimum) as stipulated in a college-approved minor.

Students may apply for certification of an engineering minor at any time after the necessary course work has been completed in accordance with published standards. Students who receive certification in an approved engineering minor will be recognized by means of an official notation on their Cornell transcript following graduation.

The College of Engineering currently offers minors in the following areas (offering departments are indicated in parentheses):

- **Applied Mathematics (T&AM)**
- **Biological Engineering (BEE)**
- **Biomedical Engineering (BME)**
- **Civil Infrastructure (CEE)**
- **Computer Science (COM S)**
- **Electrical and Computer Engineering (ECE)**
- **Engineering Management (CEE)**
- **Engineering Statistics (OR&IE)**
- **Environmental Engineering (BEE/CEE)**
- **Geological Sciences (EAS)**
- **Industrial Systems and Information Technology (OR&IE)**
- **Information Science (COM S)**
- **Materials Science and Engineering (MS&E)**
- **Mechanical Engineering (M&AE)**
- **Operations Research and Management Science (OR&IE)**

Additional information on specific minors can be found in the departmental sections of this publication, the Engineering Undergraduate Handbook, the undergraduate field office of the department offering the minor, and Engineering Advising.

**Minor in Applied Mathematics**

To complete the minor, the student must take at least six (6) courses beyond MATH 294, to be chosen as follows:

a) At least 3 courses must be chosen from groups 5 and 6.

b) At least 1 course must be chosen from groups 1, 2, 3, or 4.

c) No more than 1 200-level course may be chosen.

d) No more than 1 course may be chosen that is offered by the student's major department.

1. **Analysis**

   - **T&AM 310 Advanced Engineering Analysis I**
   - **MATH 311 Introduction to Analysis**
   - **MATH 420 Differential Equations and Dynamical Systems**
   - **OR&IE 321 Mathematical Physics I**

2. **Computational methods**

   - **COM S 322 Introduction to Scientific Computation**
   - **CEE 241 Engineering Computation**
   - **OR&IE 320 Optimization I**

3. **Probability and Statistics**

   - **OR&IE 270 Basic Engineering Probability and Statistics**
   - **OR&IE 350 Engineering Probability and Statistics II**
   - **EE 310 Introduction to Probability and Random Signals**
   - **CEE 304 Uncertainty Analysis in Engineering**

4. **Applications**

   - **A&EP 333 Mechanics of Particles and Solid Bodies**
   - **CHE 323 Fluid Mechanics**
   - **CEE 331 Fluid Mechanics**
   - **CEE 371 Structural Behavior**
   - **EE 425 Digital Signal Processing**
   - **M&AE 323 Intro to Fluid Mechanics**
   - **MS&E 303 Thermodynamics of Condensed Systems**

5. **Advanced Courses**

   Only one of the following three may be chosen:

   - **T&AM 311 Advanced Engineering Analysis II**
   - **MATH 422 Applied Complex Analysis**
   - **A&EP 322 Mathematical Physics II**

   Only one of the following two may be chosen:

   - **EE 411 Random signals**
   - **OR&IE 361 Introductory Engineering Stochastic Processes I**

   Only one of the following two may be chosen:

   - **COM S 381 Introduction to Theory of Computing**
   - **COM S 481 Introduction to Theory of Computing**

   Only one of the following two may be chosen:

   - **M&AE 571 Applied Dynamics**
   - **T&AM 570 Intermediate Dynamics**

   **Also, you can choose from:**

   - **COM S 482 Introduction to the Design of Algorithms**
   - **OR&IE 321 Optimization II**
OR&IE 431 Discrete Models
OR&IE 435 Introduction to Game Theory
OR&IE 462 Introductory Engineering Stochastic Processes II
EE 522 Nonlinear Systems
T&AM 578 Nonlinear Dynamics and Chaos
T&AM 610 Methods of Applied Math I
T&AM 611 Methods of Applied Math II

6. Math Courses
Any 300+ level course offered by the Mathematics Department in algebra, analysis, probability/statistics, geometry or logic, with the following exceptions:

i) MATH 311 or MATH 420, if any course from group 1 is chosen.
ii) MATH 422, if T&AM 311 or A&EP 322 are chosen from group 5.

Academic Standards: A letter grade of C or better for each course in the minor.

Required Courses
COM S/ENGRD 211 Computers and Programming
COM S 321 Numerical Methods in Computational Biology
or COM S/ENGRD 322 Introduction to Scientific Computing
or COM S 421 Numerical Analysis

The Bioengineering Option and the Biological Engineering and Biomedical Engineering Minors
Students wishing to apply the concepts and methods of the engineering, computational and physical sciences to living systems or health issues may pursue one of three courses of study:

(1) the bioengineering option, requiring completion of two to three bioengineering courses and one to two biological sciences courses (12 credit hours minimum) and one credit hour of Bioengineering Seminar (BMEP 501). The student will receive official notification on their transcript. Further information is available in Engineering Advising, 167 Olin Hall.

(2) the biological engineering minor, requiring six courses (18 credit hours minimum) including BEE 550, two analysis courses, two application courses, and one basic science course. This minor provides the student an opportunity to further their understanding of living systems and the basic transport processes that occur in these systems. Further information is available from the BEE Program Coordinator, 207 Riley-Robb Hall.

(3) the biomedical engineering minor, requiring six courses (18 credit hours minimum) from at least four of five different groups—Introductory Biology, Advanced Biology, Molecular and Cellular BME, BME Analysis of Physiological Systems, BME Applications. Further information is available from the Biomedical Engineering Program coordinator, 270 Olin Hall.

International Programs
All 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.

An international perspective, sensitivity to other cultures, and the ability to read and speak a second language are increasingly important to 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 further information on these and other opportunities to add an international dimension to your undergraduate education, see the staff in Engineering Advising, 167 Olin Hall. Students who seek advice on obtaining an international co-op work experience should visit the Engineering Cooperative Education and Career Services office, 201 Carpenter Hall.

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. Information about the ECP's courses and annual prizes, as well as the college's technical-writing requirement, is available at www.engineering.cornell.edu/ECP/index.htm. 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 having 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 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. Besides teaching its courses, members of the ECP are available to consult with the faculty teaching the officially designated "writing-intensive" technical courses. They oversee the communications component of the Writing-Intensive Co-op, sit on the College Curriculum Governing Board's Subcommittee on Technical Writing and the Subcommittee on Liberal Arts, and occasionally give talks to alumni/ae and student groups.

If you have any questions, please call 255-8558, come by the ECP's office (Hollister 425), or stop at any ECP member's office on the fourth floor of Hollister.

Engineering Cooperative Education Program
A special program for engineering undergraduates is the Engineering Cooperative Education Program, which 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.

To be eligible, a student must have been enrolled at Cornell for four semesters prior to working, with a cumulative GPA of 2.7 or higher. (Students in Computer Science and Biological and Environmental Engineering are eligible, even though they may not be registered in the College of Engineering.) Applicants are interviewed by representatives of participating employers and select their work assignments from among those they receive. Those students who are offered assignments and elect to join the program usually take their fifth-term courses at Cornell during the summer following their sophomore year and begin the first co-op work assignment that fall. They return to Cornell to complete term six with their classmates and then undertake a second work assignment with the same employer the following summer. Co-op students return to campus for their senior year and graduate with their class.

Further information may be obtained from the Engineering Cooperative Education and Career Services office, 201 Carpenter Hall.

MASTER OF ENGINEERING DEGREE PROGRAMS
One-year Master of Engineering (M.Eng.) programs are offered in 14 fields. These programs are discussed in this announcement in connection with the corresponding upperclass engineering field programs because the curricula are integrated. Cornell baccalaureate engineering graduates frequently continue their studies in the M.Eng. program, although the program is also open to qualified graduates of other schools. Prospective students interested in additional information should contact the graduate education office in the College of Engineering or visit the Master of Engineering web site (www.engineering.cornell.edu/grad) for program specifics. The M.Eng. degree fields and their academic departments under which they are administered are listed below.

M.Eng. (Aerospace): Mechanical and Aerospace Engineering
M.Eng. (Agricultural and Biological): Biological and Environmental Engineering
M.Eng. (Chemical): Chemical and Biomolecular Engineering
M.Eng. (Civil & Environmental): 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. (Geology): Earth and Atmospheric Sciences
M.Eng. (Materials): Materials Science and Engineering
M.Eng. (Mechanical): Mechanical and Aerospace Engineering
M.Eng. (Nuclear): Nuclear Science and Engineering
M.Eng. (OR&EE): Operations Research and Industrial Engineering

M.Eng. (Systems): Systems Engineering

Admission:

Requirements for admission vary by field and prospective students should contact the appropriate field. In general, the standard M.Eng. application requirements include:

- Statement of Purpose
- Complete transcripts from each college or university you have attended
- At least two letters of recommendation
- Graduate Record Examinations (GRE) scores—may not be required by all fields

Many fields waive the GRE requirement and one of the letters of recommendation for students with Cornell Engineering B.S. degrees. Students should check with the appropriate field office for specific program requirements. A list of M.Eng. field links and general admission information is posted on the web at www.engr.cornell.edu/grad/meng/app.html.

The following M.Eng. options are offered:

- The Bioengineering Option
- The Financial Engineering Option
- The Manufacturing Option
- The Engineering Management Option
- The Systems Engineering Option

Each option is available to M.Eng. students in specific fields. The Master of Engineering Options web page, www.engr.cornell.edu/grad/meng/options.html, lists specific details including availability and contact information.

Cooperative Programs with the Johnson Graduate School of Management:

The Lester Knight Scholarship Program is designed to assist and encourage Cornell Engineering students and alumni interested in combining their engineering training with a business degree.

The Knight Scholarship Program offers three options or categories of financial support:

- The Alumni Knight Scholarship Option
- The Undergraduate Knight Scholarship Option
- The 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 careers. Participation in the Knight Scholarship 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. Refer to the Knight Scholarship web site (www.engr.cornell.edu/grad/knight) for program specifics or contact the Office of Research, Graduate Studies, and Professional Education, 146 Olin Hall.

Early Admission Program:

Superior Cornell students who will have between one and eight credits remaining in their last undergraduate semester may petition the appropriate field representative for early admission to the M.Eng. program.

Program Options:

Cornell's Master of Engineering Program allows students to supplement their field curriculum with a program option. Students who choose a program option enroll in courses that satisfy elective requirements.

BIOMEDICAL ENGINEERING PROGRAM

Michael L. Shuler, director, Donald L. Bartel, associate director; William Lee Olbricht, director of graduate studies.

The Biomedical Engineering Program's (BMEP) charge 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 Biomedical Engineering Graduate Field and program faculty represent 12 departments and six colleges (including Well Medical College). The BME field offers research opportunities in biomedical mechanics; biomaterials; drug delivery, design, production, and metabolism; biomedical instrumentation and diagnostics; and system biology.

The BMEP currently administers the Biomedical Engineering Graduate Field and the M.S./Ph.D. degree programs. A Master of Engineering program in Biomedical Engineering (BME) is in the process of approval and is anticipated to be offered as early as fall 2004.

Minor in Biomedical Engineering

The BMEP also 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 BMEP. Students graduating in 2004 and 2005 may elect to complete the requirements in the Biomedical Engineering Minor offered by Theoretical and Applied Mechanics (T&AM).

Offered by: Biomedical Engineering Program

Administered by: Biomedical Engineering Program Director, 270 Olin Hall; Michael L. Shuler, 270 Olin Hall, mls50@cornell.edu, 255-7577

Eligibility: All undergraduates in the College of Engineering are eligible to participate in the Biomedical Engineering minor unless they are also 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.

Requirements

Required Course: BMEP 501, Bioengineering Seminar (1 credit)

To complete the minor, the student also must take at least six (6) courses (minimum of 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. At least four of the six courses must be from outside the student’s major.

Students who are considering the BME minor are asked to register with the Biomedical Engineering Program Office (270 Olin). A BME faculty adviser will be assigned and will approve the student's BME minor plan.

1. Introductory Biology (maximum of 4 credits and one course towards BME minor)
   - BIOG 110 and ENGR 101—Biological Principles and Introduction to Biomedical Engineering Analysis
   - BIOG 101, 102, 103, and 104—Biological Sciences
   - BIOG 105 and 106—Introductory Biology
   - BIOG 107 and 108—General Biology
   - A "5" on AP Biology Test

2. Advanced Biology
   - BIOG 330—Principles of Biochemistry, Individualized Instruction
   - BIOG 334—Principles of Biochemistry, Proteins, Metabolism, and Molecular Biology
   - BIOG 331 and 332—Principles of Biochemistry, Proteins and Metabolism and Principles of Biochemistry, Molecular Biology
   - BIOP 311—Introductory Animal Physiology Lectures
   - BIOGD 281—Genetics
   - BION 222—Introduction to Neurobiology
   - BION 290—General Microbiology Lectures
   - BIOGD 389—Embryology

3. Molecular and Cellular Biomedical Engineering
   - BMEP 301 (CHME 401)—Molecular Principles of Biomedical Engineering
   - BMEP 302 (CHME 402)—Cellular Principles of Biomedical Engineering
   - A&EP 252—The Physics of Life
   - BEE 350—Molecular and Cellular Bioengineering

4. BME Analysis of Physiologic Systems
   - BMEP 401—Biomedical Engineering of Metabolic and Structural Systems
M&AE 464—Orthopaedic Tissue Mechanics
M&AE 465—Neuromuscular Biomechanics
BEE 454—Physiological Engineering
CHEME 481—Biomedical Engineering
BIOLB 330—Introduction to Computational Neuroscience

5. Biomedical Engineering Applications
A&EE 470—Biophysical Methods
BEE 450—Biomaterials
BEE 453—Computer-Aided Engineering; Applications to Biomedical Processes
BEE 459—Bioengineering and Biomedical Techniques
Com S 321—Numerical Methods in Computational Molecular Biology
ECE 402—CDE in Biomedical System Design
ECE 338—Nanofabrication
ECE 578—Computer Analysis of Biomedical Images
BEE 365—Properties of Biological Materials
MS&E 265 OR TXA 439—Biological Materials and Their Synthetic Replacements OR Biomedical Materials and Devices for Human Body Repair
M&AE 565—Biomechanical Systems—Analysis and Design

A new M.Eng. degree in BMEF is currently being planned for Fall 2004 pending New York State approval. The recommended sequence for admission to the M.Eng. BME will be BIOG 110 and ENGRG 101; any category 2 course; BMEF 301, 302, 401, and 402. The M.Eng. BME program will require knowledge of molecular and cellular BME, and of BME analysis of physiological systems.

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 (CIEE);
(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 prior to 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:

(1) They may enroll in a more advanced course in the same subject right away.
(2) They may substitute an elective course from a different area.
(3) They may 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, 293, and 294 are required.

First-term math (MATH 191): AP credit may be earned by:
- a score of 3, 4, or 5 on the CEEB BC exam, or
- a score of 5 on the CEEB AB 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 mathematics 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 299.

PHYS 213: Students receiving a 5 on the Electricity and Magnetism portion of the C exam may choose to accept AP credit for PHYS 213 or placement in PHYS 217 with no AP credit for PHYS 213. For advice or more information contact the departmental representative at 607 255-6016.

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 are successful in obtaining AP credit for CHEM 207 and who are considering majors 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 advisor.

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 of engineering students, although it is a popular option as an elective, especially for students who intend to pursue health-related careers. AP credit may be earned as follows:
- eight credits will be offered to students who receive a 5 on the CEEB AP exam;
- six credits will be offered to students who receive a 4 on the CEEB AP.

Those who want to study more biology should contact the Office of Undergraduate Biology, 200 Stimson Hall, to discuss proper placement.

First-Year Writing Seminar: Two First-Year Writing Seminars (for a total of six credits) 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 will be offered three credits which may be applied toward the Humanity/History category (a) of the Liberal Studies distribution requirement. Students who earn a score of 4 on the AP English Language and Composition exam will be offered three credits which may be applied toward the Expressive Arts (d) category of the Liberal Studies distribution requirement.

Liberal Studies Distribution: Six courses beyond two First-Year Writing Seminars are required. Students may earn AP credit toward the liberal studies distribution by taking College Entrance Examination Board (CIEE) 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 (CIEE) 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 three credits. In order to qualify for the CASE exam, the student must score at least 550 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 three credits, and a score of 3 entitles the student to six 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 advisor.

Advanced Placement and Credit for International Credentials
Students who have successfully completed either a General Certificate of Education (GCE) Advanced ("A") Level Examination or an International Baccalaureate (IB) Higher Level Examination may be eligible for advanced placement credit in the College of Engineering as follows:

General Certificate of Education Advanced Level Examination (GCE: "A")
Hong Kong Advanced Level examinations and the joint examination for the Higher School...
<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>A</td>
<td>8 credits (CHEM 207 and 208)</td>
</tr>
<tr>
<td></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></td>
<td>6</td>
<td>6 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 Science</td>
<td>6 or 7</td>
<td>4 credits</td>
</tr>
<tr>
<td>Mathematics</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."

**General Policies for Advanced Placement**

The general policies in the College of Engineering governing awards of AP credit are as follows:

1. AP credit will not be offered in any subject area without a documented examination.
2. All AP examinations are normally taken and scored before fall-term classes begin. Students who take CEEB AP tests in high school should have an official report of their scores sent directly to Cornell as soon as possible. Students who have completed either GCE "A" Level or IB Higher Level Examinations must present the original or a certified copy of their examination certificate to Engineering Advising, 167 Olin Hall. Those who wish to take departmental examinations should do so during Orientation Week; permission to take these tests after the start of fall-term classes must be requested in a written petition to the college's Committee on Academic Standards, Petitions, and Credit (ASPAC). A more detailed description of the college's policies concerning advanced placement credit and its use in developing undergraduate programs may be found in the pamphlet Advanced Placement and Transfer Credit for First-Year Engineering Students, which may be obtained from Engineering Advising, 167 Olin Hall.

**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, students must complete and submit a Transfer Credit Form (one form for each request), accompanied by a course description. (Transfer Credit Forms are available from Engineering Advising or the Registrar's Office and should be submitted prior to 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.
- To apply for transfer credit, a student must receive approval from the department offering an equivalent course at Cornell. The department certifying the course may require course materials, textbooks used, etc., in addition to the course description before approving the course.
- Departmental approval is not required to apply for transfer credit that satisfies liberal studies distribution requirements. The course will be reviewed for approval by a representative of the Committee on Academic Standards, Petitions, and Credit (ASPAC) in Engineering Advising.
- Cornell does not award credit for courses taken during a semester credit load ranges from approximately 15 to 17 credits. Failure to meet these standards will result in a review by the Committee on Academic Standards, Petitions, and Credit (ASPAC), and the actions of warning, stern warning, required leave of absence, or withdrawal from the College of Engineering may be taken.

1. At least 12 credits passed, including at least two courses from mathematics, science, and/or engineering
2. A C- or better in the mathematics course
3. A semester average of 2.0 or higher
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 standards will result in a review by the Committee on Academic Standards, Petitions, and Credit (ASPAC), and the actions of warning, stern warning, required leave of absence, or withdrawal from the College of Engineering may be taken.

1. At least 14 credits passed in courses that meet engineering degree requirements (normally at least two courses from mathematics, science, or engineering courses)
2. A C- or better in the mathematics course
3. A semester average of 2.0 or higher
4. No F, U, or INC grades

**Academic Progress**

The total number of credits required for graduation range from 125 to 135, depending on the field program. Therefore, an average semester credit load ranges from approximately 15 to 17 credits.

Because mathematics is pivotal to the study and practice of engineering, students must earn a grade of C- or better in MATH 191 (or 190), 192, 293, and 294. Those who fail to meet this standard are allowed to repeat a course once in the following semester. Failure to achieve at least a C- the second time will generally result in withdrawal from the
College of Engineering. Physics and advanced mathematics courses often have mathematics prerequisites, and having to repeat the prerequisite course may delay progress in the physics and mathematics curricula. Students are expected to continue the core engineering math courses each semester until completed.

Dean's List
Dean's List citations are presented each semester to engineering students with exemplary academic records. The criteria for this honor are determined by the dean of the college. For 2003–2004, the requirement is a semester average of 3.4 or higher (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 Program

Graduating with Distinction
Meritorious students graduating with a bachelor of science 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 all engineering students with an overall GPA ≥ 3.5. Cum laude will also be awarded to all engineering students who received a semester GPA ≥ 3.5 in each of the last four semesters of attendance 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 all engineering students with an overall GPA ≥ 3.75 (based on all credits taken at Cornell).
- Summa cum laude will be awarded to all engineering students with an overall GPA ≥ 4.0 (based on all credits taken at Cornell).

Note: All GPA calculations are minimums and are not rounded.

Field Honors Program
To be eligible for field honors, a student must enter a program with and maintain a cumulative GPA of ≥ 3.5. If the student's major field has an approved honors program and both the GPA and program requirements are fulfilled, the faculty of the field may recommend that a student graduate with the additional diploma and transcript notation of “With Honors.” For more specific information, see the field program outline in this catalog.

S-U Grades
Many courses offered by the university may be taken either for a letter grade or for an S-U (satisfactory or unsatisfactory) grade designation. Under the S-U option, students earning the letter grade equivalent of C- or better in a course will receive a grade of S; those earning less than C receive a grade of U. (Any 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 have previously 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 approved elective in the engineering curriculum.
- Students may only elect to enroll S-U in one course with a 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 initially made 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 they were 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 an engineering field. Students who entered the college as a second-semester sophomore or later must meet specific conditions, established at the time of this report. Under the S-U option, students earning a U grade is received does not count toward graduation requirements.

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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 may apply at Engineering Advising—application forms are available in 167 Olin Hall. It is preferred that a student apply in the semester in which he/she is completing affiliation criteria for the desired field. Students who would enter the college as a second-semester sophomore or later must be accepted by a field program 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 field affiliation but must be sponsored by a field program.

Students who hope to transfer into engineering should take courses in mathematics, chemistry, computer science, physics, and engineering that conform to the requirements of the Common Curriculum. Interested 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, students must petition for a leave of absence for a specified period of time and receive written approval.

Affiliated students request leave through their fields. Unaffiliated students request leave through Engineering Advising; the first step is to interview to establish eligibility to suspend their studies. To do this, students must petition for a leave of absence for a specified period of time and receive written approval.

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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 student 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 the semester makes better academic sense than continuing without the necessary background. In many cases, the leave is dictated by courses that are only offered in the fall or the 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 field should request permission to rejoin in a letter to Engineering Advising; affiliated students should contact their field 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 engineering degree program sever all connection with the college. Unaffiliated students who wish to withdraw should do so through Engineering Advising. Affiliated students should contact their field office. If a withdrawal is requested during the semester, courses in which the student is enrolled must be dropped in accordance with applicable regulations.

Any 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 intra-university transfer process should be followed.

If students who have withdrawn subsequently wish to return, they 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 field.

**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 only withholds them 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 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 (see separate entry under the Engineering Special Programs section). 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 services to pursue permanent or summer employment opportunities. Students seeking co-op opportunities must meet specific requirements. Further information on all services is available from the Engineering Cooperative Education and Career Services Office, 201 Carpenter Hall (255-5000), and on the web at www.engineering.cornell.edu and www.engr.cornell.edu/coop.

**APPLIED AND ENGINEERING PHYSICS**


**Bachelor of Science Curriculum**

The undergraduate engineering physics curriculum 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 mathematics fundamentals, both experimental and theoretical, that are available 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 good background in a conventional area of engineering or applied science.

The industrial demand for engineering physics graduates with baccalaureate is highly, and many students go directly to industries where they work in a variety of areas that either combine, or are in the realm of various other more conventional areas of engineering. Recent graduates have included bioengineering, computer technology, electronic-circuit and instrumentation design, energy conversion, energy 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 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, mechanical engineering, medical physics, mathematics, medicine, nuclear engineering, oceanography, and physics. The undergraduate program can also serve as an excellent preparation for medical school, business school, or specialization in patent law.

The Engineering Physics program fosters the 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, The Laser and Its Applications in Science, Technology, and Medicine (a freshman Introduction to Engineering course); ENGR/A&EP 130, Introduction to Nanoscience and Nanotechnology (a freshman Introduction to Engineering course), 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, Electronic Circuits (a sophomore/junior course), PHYS 410, Advanced Experimental Physics; and A&EP 438, Computational Engineering Physics (a senior computer laboratory). Undergraduates who plan to enter the field program in Engineering Physics are advised to arrange their Common Curriculum with their developing career goals in mind. Students are also encouraged to take PHYS 112 or PHYS 116 during their first semester (if their advanced placement credits permit) and are recommended to satisfy the technical writing requirement with the engineering distribution course ENGRD 264. Engineering Physics students need to take only two engineering distribution courses, since A&EP 333, which they take in their junior year, counts as a third member of this category. Engineering Physics students are advised to take A&EP 363 in the spring semester of the sophomore year. Students with one semester of advanced placement in math, who have received a grade of A- or better in MATH 129, may wish to enroll in mathematics courses that are available during the sophomore year. For advice in this option, consult with the A&EP associate director.
In addition to the requirements of the Engineering Common Curriculum, the upper-class core requirements of the field program are as follows:

**Course** | **Credits**
--- | ---
A&EP 333, Mechanics of Particles and Solid Bodies | 4
A&EP 355, Intermediate Electromagnetism | 4
A&EP 356, Intermediate Electrodynamics | 4
A&EP 361, Introductory Quantum Mechanics | 4
A&EP 363, Electronic Circuits | 4
A&EP 423, Statistical Thermodynamics | 4
A&EP 434, Continuum Physics | 4
PHYS 410, Advanced Experimental Physics | 4
A&EP 321, Mathematical Physics I, or MATH 421 (applied mathematics) | 4
A&EP 322, Mathematical Physics II, or MATH 422 (applied mathematics) | 4
Six field-approved electives (18-23 credits), of which five must be technical. The technical electives are expected to be upper-level courses (300 or above). Total field credits=58 credit hours minimum.

The Engineering Common Curriculum allows students to take only four courses each semester of their freshman year if they so desire. This course load is fully consistent with the requirements of the EP major, but entering students with strong preparation are encouraged to consider taking an additional course during one or both semesters of the freshman year 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 four credits of PHYS 410 required for the BS degree in Engineering Physics can be satisfied by successfully completing A&EP/PHTS 330. The remaining two credits of PHYS 410 can be satisfied by taking PHYS 400 for two credits, provided that the experiments completed in PHYS 400 do not overlap with those in A&EP/PHTS 330. (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/PHTS 330 may also count as a technical elective, provided the remaining three technical electives are four credits each.

**Choosing elective courses.** A distinctive aspect of the Engineering Physics curriculum is the strong opportunity it provides students to develop individual programs of study to meet their particular educational and career goals. These can include the pursuit of a dual major or the development of a broad expertise in one or more of a number of advanced technical and scientific areas. With at least seven technical and approved electives in the sophomore, junior, and senior years, Engineering Physics majors are encouraged to work closely with their adviser to develop a coherent academic program that is in accordance with those goals. For those students who look toward an industrial position after graduation, these 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 Applied and Engineering Physics, Clark Hall. Students interested in these options are advised to consult with their EP adviser, a professor active in their area of interest, or with the associate director of the school, Professor Bruce Kusse.

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 similarly equivalent courses to the listed required courses.

The Engineering Physics program requires that a minimum of B- or better be attained in each physics and mathematics courses taken by a student before entering the Engineering Physics field unless approval is obtained from the A&EP associate director. To remain in good standing in the field, the engineering physics student is expected to pass every course for which he or she is registered, to earn a grade of C- or better in specifically required courses, and to attain each semester a grade-point average for that semester of at least 2.3.

**Engineering Physics Honors Program**

**Eligibility**

The bachelor of science degree with honors will be conferred upon those students who, while completing the requirements for a bachelor degree, have satisfactorily completed the honors program in the Department of Engineering Physics and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA of 3.5.

**Content**

1. Complete at least eight credits of field-approved electives at the 400-level or higher and receive a minimum grade of an A- in each of the courses taken to fulfill this eight-credit requirement. These eight credits are in addition to the credits obtained by completing the senior thesis or special project requirement as discussed in item 2.
2. Enroll in A&EP 490 or an equivalent course over two semesters for the purpose of completing an independent research project or senior thesis under the supervision of a Cornell engineering or science faculty member. The minimum enrollment is to be two credits in the first semester and four credits in the second. The level of work required for a successful completion of this project or thesis is to be consistent with the amount of academic credit granted.

**Timing**

All interested students must complete a written application no later than the end of the third week of the first semester of their senior year, but are encouraged to make arrangements with a faculty member during the second semester of their junior year. A student must be in the program for at least two semesters before graduation.

**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 proposed project or thesis and a faculty supervisor's written comments. The proposal is to be in the form of a technical paper with, for example, an abstract, introduction, methods section, results section, conclusions section, references, and figures. This report will be evaluated by the faculty supervisor and the chair of the A&EP Honors Committee. Following the 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, following the oral presentation and after consultation with the chair of the Honors Committee. A minimum grade of A- is necessary for successful completion of the honors requirement.

**Master of Engineering (Engineering Physics) Degree Program**

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, nanotechnology science and technology, device physics, materials characterization, or software engineering. A 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 in this specialty include the microcharacterization of materials and the microprocessing and microfabrication of materials (A&EP 662). The design project may focus on such areas as semiconductor materials, device physics, nanotechnology, or optoelectronics. Another area of study may be applied optics where core courses can be chosen from applied physics, electrical engineering, and photography. Each individual program is planned by the student in consultation with the program chair. The objective is to provide a...
an appropriate program in the Department of Mathematics or one of the departments in the College of Engineering.

A list of selected graduate courses in applied mathematics may be found in the description of the Center for Applied Mathematics, in the section "Interdisciplinary Centers and Programs."

**BIOLOGICAL AND ENVIRONMENTAL ENGINEERING**


**Bachelor of Science Curriculum**

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 undergraduate engineering program in the Department of Biological and Environmental Engineering 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. The program leads to a bachelor of science degree and is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Two concentrations in Biological and Environmental Engineering are offered: biological engineering and environmental engineering. Students take courses in mathematics, statistics, computing, physics, chemistry, biology, and advanced biology, and fundamental engineering sciences (mechanics, thermodynamics, fluid mechanics, and transport processes), engineering applications, and design. Students select upper-level courses in the department in areas that include bioprocessing, soil and water management, biotechnology applications, bioinstrumentation, engineering aspects of animal physiology, environmental systems analysis, and waste treatment and disposal. Students strengthen their programs by selecting additional courses in the College of Engineering. They may complete minors of a second engineering major. Students planning for medical school also take additional laboratory-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. Many undergraduate students participate in honors programs, undergraduate teaching and research, independent study, assistantships, research assistantships, design teams, Engineering Cooper, and study abroad. Students completing the BEE major should have a strong aptitude for the sciences and mathematics and an interest in the complex social issues that surround technology.

Career opportunities cover the spectrum of private industry, public agencies, educational institutions, and graduate and professional programs in engineering, science, medicine, law, and other fields. 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. The Department of Biological and Environmental Engineering is educating the next generation of engineers to meet these challenges.

The Department of Biological and Environmental Engineering is located in Riley-Robb Hall and operates specialized facilities that are among the largest and most complete of their kind in the world. For further details see the department's undergraduate programs publication, available at the BEE Student Service Office, 207 Riley-Robb Hall, or contact the field's advising coordinator, Professor Jim Bartsh, at 255-2800.

The field program requirements for those students joining the program in 2003–2004 are outlined.

**Basic Subjects**

**Credits**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculus for Engineers and Engineering Mathematics</td>
<td>16</td>
</tr>
<tr>
<td>PHYS 112, 213</td>
<td>8</td>
</tr>
<tr>
<td>General Chemistry (207 or 211 or 215)*</td>
<td>4</td>
</tr>
<tr>
<td>Organic Chemistry (257 or 357)*</td>
<td>3</td>
</tr>
</tbody>
</table>

**Computer Programming**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEE 151, Introduction to Computing</td>
<td>4</td>
</tr>
<tr>
<td>Biological Sciences*</td>
<td>15</td>
</tr>
<tr>
<td>Introductory</td>
<td>4–8</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>4–5</td>
</tr>
<tr>
<td>Advanced Biology</td>
<td>5–2</td>
</tr>
</tbody>
</table>

**Engineering Field Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEE 200, The BEE Experience</td>
<td>1</td>
</tr>
<tr>
<td>ENGRD 202, Mechanics of Solids</td>
<td>4</td>
</tr>
<tr>
<td>BEE 251 or BEE 260, ENGR Applications</td>
<td>3</td>
</tr>
<tr>
<td>BEE 350, Bio &amp; Environ Transport Proc.</td>
<td>3</td>
</tr>
<tr>
<td>BEE 222, Thermodynamics and Kinetics</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Statistics and Probability</td>
<td>3</td>
</tr>
<tr>
<td>Fluid Mechanics (CEE 351 or M&amp;AE 323 or CHEM 323)</td>
<td>3–4</td>
</tr>
<tr>
<td>Upper-Level BEE courses (3 courses numbered 450–490, at least one of these must be an approved capstone design course)</td>
<td>9</td>
</tr>
</tbody>
</table>

**APPLIED MATHEMATICS**

The Center for Applied Mathematics administers a broadly based interdisciplinary graduate program that provides opportunities for study and research in a wide range of the mathematical sciences. For detailed information on opportunities for graduate study in applied mathematics, 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 application-oriented mathematics may select
Technical Engineering Electives
(200 level or above; at least one of these must be an approved laboratory experience course) 18–19
Liberal Studies (two freshmen seminars and at least two courses in humanities or history) 24
Approved Electives 6
Total (minimum) 126

*Basic accredited curriculum. Specializations (options or pre-professional study) may be accommodated by selecting additional courses in the indicated areas). For further information, please contact the BEE Student Services Office, 207 Riley Robb Hall, or contact the undergraduate program director, Professor Jim Bartsch, at jab35@cornell.edu.

Biological and Environmental Engineering Honors Program

Eligibility

The bachelor of science degree with honors will be granted to engineering students who, in addition to having completed the requirements for a bachelor's degree, have satisfactorily completed the honors program in the Department of Biological and Environmental Engineering and have been recommended for the degree by the honors committee of the department. An honor's program student must enter with and maintain a cumulative GPA ≥ 3.5.

Content

A BEE honors program shall consist of at least nine credits beyond the 126 credit minimum required for graduation in BEE. These nine credits shall be drawn from one or more of the following with at least four credit hours of research in the first category:

- A significant research experience or honors project under the direct supervision of a BEE faculty member using BEE 499, Undergraduate Research. A written senior honors thesis must be submitted as part of this component.
- 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.
- Advanced or graduate courses. These additional courses must be technical in nature, i.e., in engineering, mathematics, biology, chemistry, and physics at the 400+ and graduate level.

Note: no research, independent study, or teaching for which the student is paid may be counted toward the honors program.

Timing

All interested students must complete a written application no later than the end of the third week of the first semester of their senior year, but are encouraged to make arrangements with a faculty member during the second semester of their junior year. A student must be in the program for at least two semesters before graduation.

Procedures

Applications are available in the BEE Student Services office, 207 Riley Robb.

Each applicant to the BEE honors program must have a BEE faculty adviser to supervise the honors program. Written approval of the faculty member who will direct the research is required.

Option in Environmental Engineering

The Environmental Engineering Option provides BEE students the opportunity to follow a structured environmental engineering curriculum. The curriculum was developed and approved jointly by the faculty of BEE and Civil and Environmental Engineering (CEE). The Environmental Engineering Options in BEE and CEE share a common core of courses.

Students complete a prescribed program of courses within the framework of the BEE curriculum.

Chemistry/microbiology: Students must take at least two semesters of chemistry (CHEM 211/257 or CHEM 207/208). They must also satisfy the BEE 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

Microbiology: CEE 451 or BIOMI 250

Fluid Mechanics: CEE 331

Probability and Statistics: CEE 304

Environmental Engineering: CEE 351

Environmental Quality Engineering: CEE 453

Laboratory Experience in Environmental Engineering: BEE 473 or 475. Watershed Engineering or Environmental Systems Analysis

Inquiries regarding this option should be addressed to the student's adviser or to Jim Bartsch, undergraduate program director, at jab35@cornell.edu.

Minor in Biological Engineering

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the Biological Engineering minor: A&EP, CEE, CHEME, COM S, EAS, ECE, M&AE, MS&E, and OR&IE. (Students may participate in either the Bioengineering Option or the Biological Engineering minor, but not both.)

Note: Students should meet with the BEE Program Director as soon as they decide to pursue the minor. Then they will receive a BEE faculty adviser, who will assist them in completing the minor program.

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.

Requirements

To complete the minor, the student must take at least six (6) courses (minimum of 18 credits), which meet the following requirements:

- Required course: BEE 350, Biological & Environmental Transport Processes

I. Analysis: Require two (2) from the following courses:

- MS&E 304 (3) Kinetics, Diffusion, and Phase Transformations
- CHEME 313 (3) Chemical Engineering Thermodynamics
- CHEME 390 (3) Reaction Kinetics and Reactor Design
- CEE 437 (3) Experimental Methods in Fluid Dynamics
- BEE 685 (4) Biological Engineering Analysis

II. Application: Require two (2) from the following courses:

- BEE 450 (4) Bioinstrumentation
- BEE 453 (3) Computer-Aided Engineering Applications to Biomedical and Food Processes
- BEE 454 (3) Physiological Engineering
- BEE 459 (4) Biosensors and Bioanalytical Techniques
- BEE 655 (3) Thermodynamics and Its Applications
- CHEME 643 (3) Introduction to Bioprocess Engineering

III. Basic Sciences: One (1) from the following courses:

- BIOBM 233 (3) Introduction to Biomolecular Structure
- BIOI 290 (3) General Microbiology
- BIOBM 350-333 Principles of Biochemistry (2-4)
- BIOBM 434 (3) Applications of Molecular Biology
- BIONB 470 (3) Biophysical Methods

Academic Standards: A letter grade of C- or better for each course in the minor.

Minor in Environmental Engineering

(Offered in cooperation with the School of Civil and Environmental Engineering)

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the environmental engineering minor: A&EP, CHEME, COM S, EAS, ECE, M&AE, MS&E, and OR&IE. 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 use and quality of water in our aquifers, streams, estuaries, and coastal areas. This minor encourages engineering students to learn about the scientific,
Requirements

To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows.

Students must select courses from the following group listings, with at least one course from each group.

**Group A. Environmental Engineering Processes:**

- CEE 351 Environmental Quality Engineering
- CEE 352 Water Supply Engineering
- CEE 451 Microbiology for Environmental Engineering
- CEE 453 Laboratory Research in Environmental Engineering
- BEE 476 Solid Waste Engineering
- BEE 478 Ecological Engineering
- CEE 644 Environmental Applications of Geotechnical Engineering
- BEE 651 Bioremediation
- CEE 653 Water Chemistry for Environmental Engineering
- CEE 655 Pollutant Transport and Transformation in the Environment
- CEE 658 Sludge Treatment, Utilization, and Disposal
- CEE 654 Aquatic Chemistry

**Group B. Environmental Systems:**

- ENGRI 113 Introduction to Environmental Systems (May count only if taken before the student’s junior year.)
- BEE 475 Environmental Systems Analysis
- CEE 529 Water and Environmental Resources Problems and Policies
- 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 (CHEM 323 or M&AE 323 may be substituted for CEE 331)
- CEE 332 Hydraulic Engineering
- BEE 371 Hydrology and the Environment
- CEE 431/ BEE 471 Geohydrology
- CEE 432 Hydrology
- CEE 435 Coastal Engineering

**Master of Engineering (Agricultural and Biological) Degree Program**

The program for the M.Eng (Agricultural and Biological) degree is intended primarily for those students who plan to enter engineering practice. The curriculum is planned as an extension of an undergraduate program in biological and environmental engineering but can accommodate graduates of other engineering disciplines. The curriculum consists of 30 credits of courses intended to strengthen the students’ fundamental knowledge of engineering and develop their design skills. At least three to nine of the required 30 credits are earned for an engineering design project that culminates in a written and oral report.

The program is designed to be flexible so that the candidate may concentrate in any of a variety of specialty 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 and design project. Courses in technical communication, mathematics, biology, and the physical sciences may also be taken as part of a coherent program. Master of Engineering students in Biological and Environmental Engineering 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 topic areas. More information is available from the BEE Student Services Office, 207 Riley Robb Hall (255-2173), or by e-mail at BEE.gradfield@cornell.edu.

**Semester 3 Credits**

- MATH 293, Engineering Mathematics 4
- PHYS 213, Electricity and Magnetism 4
- CHEM 389, Physical Chemistry I (engineering distribution) 4
- ENGRD 219, Mass and Energy Balances (engineering distribution) 3
- Humanities or social sciences 3

**Semester 4 Credits**

- MATH 294, Engineering Mathematics 4
- CHEM 323, Fluid Mechanics 3
- CHEM 290-391, Physical Chemistry (field) 6
- Biology elective 3
- Humanities or social sciences 3

**Semester 5 Credits**

- CHEM 357, Introductory Organic Chemistry 3
- CHEM 251, Organic Chemistry Laboratory 2
- CHEM 313, Chemical Engineering Thermodynamics 4
- CHEM 324, Heat and Mass Transfer 3
- Humanities or social sciences 3

**Semester 6 Credits**

- Advanced Science elective 3
- CHEM 301, Nonresident Lectures 1
- CHEM 332, Analysis of Separation Process 3
- CHEM 372, Introduction to Process Dynamics and Control 1
- CHEM 390, Reaction Kinetics and Reactor Design 3
- Humanities or social sciences 3

**Semester 7 Credits**

- CHEM 432, Chemical Engineering Laboratory 4
- Electives* 9
- Humanities or Social Sciences 3

**Semester 8 Credits**

- CHEM 462, Chemical Process Design 4
- Humanities or social sciences 3
- Electives* 3
- Approved elective 3

**CHEMICAL AND BIOMOLECULAR ENGINEERING**


**Bachelor of Science Curriculum**

The undergraduate field program 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 field program take CHEM 208 during the freshman year. The program for the last three years, for students who have taken an Introduction to Engineering course during the first year, is as follows.

**Semester 3 Credits**

- MATH 293, Engineering Mathematics 4
- PHYS 213, Electricity and Magnetism 4
- CHEM 389, Physical Chemistry I (engineering distribution) 4
- ENGRD 219, Mass and Energy Balances (engineering distribution) 3
- Humanities or social sciences 3

**Semester 4 Credits**

- MATH 294, Engineering Mathematics 4
- CHEM 323, Fluid Mechanics 3
- CHEM 290-391, Physical Chemistry (field) 6
- Biology elective 3
- Humanities or social sciences 3

**Semester 5 Credits**

- CHEM 357, Introductory Organic Chemistry 3
- CHEM 251, Organic Chemistry Laboratory 2
- CHEM 313, Chemical Engineering Thermodynamics 4
- CHEM 324, Heat and Mass Transfer 3
- Humanities or social sciences 3

**Semester 6 Credits**

- Advanced Science elective 3
- CHEM 301, Nonresident Lectures 1
- CHEM 332, Analysis of Separation Processes 3
- CHEM 372, Introduction to Process Dynamics and Control 1
- CHEM 390, Reaction Kinetics and Reactor Design 3
- Humanities or social sciences 3

**Semester 7 Credits**

- CHEM 432, Chemical Engineering Laboratory 4
- Electives* 9
- Humanities or Social Sciences 3

**Semester 8 Credits**

- CHEM 462, Chemical Process Design 4
- Humanities or social sciences 3
- Electives* 3
- Approved elective 3
CIVIL AND ENVIRONMENTAL ENGINEERING


Bachelor of Science Curriculum

The School of Civil and Environmental Engineering (CEE) offers an accredited undergraduate program in civil engineering and permits students to pursue one of two options leading to the B.S. degree: civil engineering or environmental engineering. Within civil engineering, while it is not necessary to do so, students may concentrate in structural engineering, geotechnical engineering, fluid mechanics and hydrology, water resource systems, or transportation. The environmental engineering curriculum emphasizes study of environmental engineering, water resources, and biophysical systems. Sample curricula are available in the CEE Undergraduate Program Office, 231 Hollister Hall.

Requirements for Admission to the Field:

Students planning to enter the field program in Civil and Environmental Engineering are required to complete the following courses before or during the first semester of the sophomore year with a grade of C- or better: ENGRD 201, Introduction to the Physics and Chemistry of the Earth, ENGRD 211, Computers and Programming, for students interested in transportation,

Field Program:

Civil Engineering Option

For the field program in Civil Engineering, students may elect to 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
3
ENGRD 241, Engineering Computation*
3
CEE 304, Uncertainty Analysis in Engineering
4
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 field-approved electives and three design electives from an approved list of courses that is available in the school office. In addition, students must complete one technical communications course from among the courses designated ENGRD or approved communications courses. If the technical communications course is taken as an expressive art, then students must take an additional approved elective from a department or school other than Civil and Environmental Engineering.

*ENGRD 241 can be used to satisfy a field program requirement. If a student elects to use this course as a second distribution course, the student must take an additional field-approved elective to fulfill the core course requirements.

**ENGRD 270 may be accepted (by petition) as a substitute for 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 field-approved electives.

Environmental Engineering Option

These option requirements apply to all students in the Classes of 2002 and later. For the field program in Environmental Engineering, students must take CHEM 208 in place of PHYS 214. The following nine courses are required in addition to those required for the Common Curriculum:
Core Courses | Credits
--- | ---
Introductory Biology (BIO G 101 & 103, BIO G 105, or BIO G 107) | 4
ENGRD 241, Engineering Computation* | 4
CEE 304, Uncertainty Analysis in Engineering | 4
CEE 323, Engineering Economics and Management | 4
CEE 331, Fluid Mechanics | 4
CEE 341, Introduction to Geotechnical Engineering and Analysis | 4
CEE 351, Environmental Quality Engineering | 4
CEE 451, Microbiology for Environmental Engineering§ | 4
CEE 453, Laboratory Research in Environmental Engineering | 4
BEE 475, Environmental Systems Analysis | 3

Additional requirements include one field-approved elective and three design electives from a list of approved courses in the CEE Undergraduate Program. In addition, students must complete one technical communications course from among the courses designated ENGR 496 or approved communications courses. If the technical communications course is taken as an express art, then students must take an additional approved elective.

*ENGRD 241 can be used to satisfy the program requirement. If a student elects to use this course as a second distribution course, the student must take an additional field-approved elective to fulfill the core course requirements.

§The requirement for students prior to the class of 2002 is two field-approved electives and no requirement for a core course in introductory biology.

Civil and Environmental Engineering Honors Program
Eligibility
The bachelor of science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor's degree, have satisfactorily completed the honors program in Civil and Environmental Engineering and have been recommended for the degree by the faculty of the school. An honors program student must enter with and maintain a cumulative GPA of 3.5.

Content
A CEE honors program shall consist of at least nine credits beyond the minimum required for graduation in CEE. These nine credits shall be drawn from one or more of 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.

2. A significant teaching experience under the direct supervision of a faculty member 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 two. No research, independent study, or teaching for which the student is paid may be counted toward the honors program.

Timing
All interested students must apply no later than the beginning of the first semester of their senior year, but are encouraged to apply as early as the first semester of their junior year. All honors program students must be in the program for at least two semesters prior to graduation.

Procedures
Each applicant to the CEE honors program must have a faculty adviser to supervise the student's individual program. The student must submit a letter from the student describing the specific honors proposal and include the name of the faculty adviser. Each program must be approved by the CEE Curriculum Committee, although the committee may delegate approval authority to the associate director for all but unusual proposals.

Engineering Minor Programs
The School of Civil and Environmental Engineering currently offers three engineering minor programs: civil infrastructure, engineering management, and environmental engineering (offered in cooperation with the Civil and Environmental Engineering Undergraduate Programs Offices, 221 Hollister Hall). Descriptions and requirements for each program follow:

Minor in Civil Infrastructure
Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the engineering management minor: BEE, A&EP, CHEME, COM S, EAS, ECE, M&AE, MS&E, OR&IE.

The minor in civil infrastructure is intended to introduce engineering undergraduates to the professional and management aspects of civil engineering and construction, including topics such as design, construction, and project management. The requirements for the civil infrastructure minor are outlined below. For further details, consult the Civil and Environmental Engineering Undergraduate Programs Office, 221 Hollister Hall.

Requirements
To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows:

1. Required Courses (3):
   - CEE 304 Uncertainty Analysis in Engineering
   - ENGRG 270 Basic Engineering Probability and Statistics

II. Additional Courses: choose any 5 (groupings are for information only)*

Geotechnical Engineering
- CEE 341 Introduction to Geotechnical Engineering and Analysis
- CEE 640 Foundation Engineering
- CEE 641 Retaining Structures and Slopes
- CEE 644 Environmental Applications of Geotechnical Engineering

Structural Engineering
- CEE 371 Modeling of Structural Systems
- CEE 376 Physical and Computational Material Simulation
- CEE 472 Fundamentals of Structural Mechanics
- CEE 473 Civil Infrastructure Design I
- CEE 474 Civil Infrastructure Design II
- CEE 481 LRFD-Based Engineering of Wood Structures
- CEE 672 Fundamentals of Structural Mechanics
- CEE 673 Advanced Structural Analysis

Other Related Courses
- CEE 332 Hydraulic Engineering
- CEE 361 Introduction to Transportation Engineering
- CEE 595 Construction Planning and Operations

*Other CEE courses approved by petition in advance.

Academic Standards: A letter grade of C or better for each course in the minor.

Minor in Engineering Management
Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the engineering management minor: BEE, A&EP, CHEME, COM S, EAS, ECE, M&AE, MS&E.

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.

The requirements for the engineering management minor are outlined below. For further details, consult the Civil and Environmental Engineering Undergraduate Programs Office, 221 Hollister Hall.

Requirements
To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows:

1. Required Course: ENGRD 202 Mechanics of Solids
2. Additional Courses: choose any 5 (groupings are for information only)*

Geotechnical Engineering
- CEE 341 Introduction to Geotechnical Engineering and Analysis
- CEE 640 Foundation Engineering
- CEE 641 Retaining Structures and Slopes
- CEE 644 Environmental Applications of Geotechnical Engineering

Structural Engineering
- CEE 371 Modeling of Structural Systems
- CEE 376 Physical and Computational Material Simulation
- CEE 472 Fundamentals of Structural Mechanics
- CEE 473 Civil Infrastructure Design I
- CEE 474 Civil Infrastructure Design II
- CEE 481 LRFD-Based Engineering of Wood Structures
- CEE 672 Fundamentals of Structural Mechanics
- CEE 673 Advanced Structural Analysis

Other Related Courses
- CEE 332 Hydraulic Engineering
- CEE 361 Introduction to Transportation Engineering
- CEE 595 Construction Planning and Operations

*Other CEE courses approved by petition in advance.

Academic Standards: A letter grade of C or better for each course in the minor.

Minor in Engineering Management
Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the engineering management minor: BEE, A&EP, CHEME, COM S, EAS, ECE, M&AE, MS&E.

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.

The requirements for the engineering management minor are outlined below. For further details, consult the Civil and Environmental Engineering Undergraduate Programs Office, 221 Hollister Hall.

Requirements
To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows:

1. Required Course: ENGRD 202 Mechanics of Solids
2. Additional Courses: choose any 5 (groupings are for information only)*

Geotechnical Engineering
- CEE 341 Introduction to Geotechnical Engineering and Analysis
- CEE 640 Foundation Engineering
- CEE 641 Retaining Structures and Slopes
- CEE 644 Environmental Applications of Geotechnical Engineering

Structural Engineering
- CEE 371 Modeling of Structural Systems
- CEE 376 Physical and Computational Material Simulation
- CEE 472 Fundamentals of Structural Mechanics
- CEE 473 Civil Infrastructure Design I
- CEE 474 Civil Infrastructure Design II
- CEE 481 LRFD-Based Engineering of Wood Structures
- CEE 672 Fundamentals of Structural Mechanics
- CEE 673 Advanced Structural Analysis

Other Related Courses
- CEE 332 Hydraulic Engineering
- CEE 361 Introduction to Transportation Engineering
- CEE 595 Construction Planning and Operations

*Other CEE courses approved by petition in advance.

Academic Standards: A letter grade of C or better for each course in the minor.
or CEE 310 Introduction to Probability and Random Signals
CEE 323 Engineering Economics and Management
OR&IE 350 Financial and Managerial Accounting

II. Additional Courses—choose any 3*

CEE 490 Management Practice in Project Engineering
CEE 506 Civil and Environmental Systems
CEE 593 Engineering Management Methods: Data, Information, and Modeling
CEE 594 Economic Methods for Engineering and Management
CEE 595 Construction Planning and Operations
CEE 597 Risk Analysis and Management
CEE 598 Introduction to Decision Analysis
NBA 507 (formerly 401) Entrepreneurship for Scientists and Engineers
or MAE/ENGRG 461 Entrepreneurship for Engineers
or BEE 489 Engineering Entrepreneurship, Management and Ethics

*Other courses approved by petition in advance.
T&AM 310 may not be substituted for CEE 304.

Academic Standards: a letter grade of C or better for each course in the minor.

Minor in Environmental Engineering
(Offered in cooperation with the Department of Biological and Environmental Engineering)

Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the environmental engineering minor: A&REP, CHEME, COM S, EAS, ECE, M&E, MS&E, OR&IE.

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 use and quality of 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.

The requirements for the environmental engineering minor are outlined below. For further details consult the Civil and Environmental Engineering Undergraduate Programs Office, 221 Hollister Hall, or the Biological and Environmental Engineering Undergraduate Programs Office, 207 Riley-Robb Hall.

Requirements
To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows:

Students must select courses from the following group listings, with at least one course from each group.

Group A. Environmental Engineering Processes:
CEE 351 Environmental Quality Engineering
CEE 352 Water Supply Engineering
CEE 451 Microbiology for Environmental Engineering
CEE 453 Laboratory Research in Environmental Engineering
BEE 476 Solid Waste Engineering
BEE 478 Ecological Engineering
CEE 644 Environmental Applications of Geotechnical Engineering
CEE 651 Bioremediation
CEE 653 Water Chemistry for Environmental Engineering
CEE 654 Aquatic Chemistry
CEE 655 Pollutant Transport and Transformation in the Environment

Group B. Environmental Systems:
ENGRI 113/CEE 113* Solving Environmental Problems for Urban Regions (*May count only if taken before the student’s 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 (CHEME 323 or M&E 323 may be substituted for CEE 331)
CEE 352 Hydraulic Engineering
BEE 371 Hydrology and the Environment
CEE 431/BEE 471 Geohydrology
CEE 432 Hydrology
CEE 436 Case Studies in Environmental Fluid Mechanics
CEE 437 Experimental Methods in Fluid Dynamics
BEE 473 Watershed Engineering
BEE 474 Drainage and Irrigation Systems
CEE 531 Flow and Contaminant Transport Modeling in Groundwater
CEE 533 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

Academic Standards: A letter grade of C- or better in each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

Master of Engineering (Civil) Degree Program
The M.Eng. (Civil) degree program is a 30-credit (usually 10-course) curriculum designed to prepare students for professional practice. There are two options in this program: one in civil and environmental engineering design and one in engineering management. Both options require a broad-based background in an engineering field. Applicants holding an ABET-accredited (or equivalent) undergraduate degree in engineering automatically satisfy this requirement. Those without such preparation will require course work beyond the graduate program’s 30-credit minimum to fulfill the engineering preparation requirement. Both options also require one course in professional (design-option) or managerial (management-option) 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 options indicating an intensive, full-time session between semesters. The general degree requirements and admissions information are described above in the section entitled “Master of Engineering Degree Programs.” Each student’s program of study is designed individually in consultation with an academic adviser and then submitted to the school’s Professional Degree Committee for approval.

For the M.Eng. (Civil) program in civil and environmental engineering design options, the requirements are:

1) Three courses, one in professional engineering practice (CEE 590) and a two-course design project (CEE 501 and 502).
2) Specialization in a major concentration area—three to five courses in either environmental engineering, environmental fluid mechanics/hydraulics, geotechnical engineering, structural engineering, transportation management, or water resources and environmental systems engineering.
3) Technical electives.
4) Study in a related area or areas.

Courses taken as technical electives or in the related subject area(s) may consist of graduate or advanced courses in fields related to the major concentration area, either inside or outside of the school.

For the M.Eng. (Civil) program in the engineering management option, the requirements are:

1) Five courses: Project Management (CEE 590), Engineering Management Methods (CEE 593 and 594), and the Management Project (CEE 591 and 592).
2) One course in finance, accounting, or engineering economics, as appropriate given a student’s background.
3) One course in individual and/or organizational behavior from a recommended list.
4) Three courses from a disciplinary or functional specialization, subject to adviser’s approval.

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 the most current and accurate details, visit our web site at www.cs.cornell.edu/ugrad.

The Major

The bachelor of science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor degree, have:

- qualified for Latin honors in the College of Engineering (basically, a cumulative GPA ≥ 3.5)
- at least two courses (3+ credit hours per course) of COM S course work at or above the 500-level (graded courses only; no seminars or two-credit project courses)
- at least six credits of COM S 490 (independent research) spread over two semesters, with a grade of A- or better each term.

See the COM S undergraduate web site for more information on eligibility: www.cs.cornell.edu/ugrad.

Content

Honors courses may not be used to satisfy the COM S 400+ elective requirement, the COM S project requirement, the math elective, or the specialization.

Timing

Honors determinations are made during the senior year. Students wanting to be considered for field honors should notify the Undergraduate Office in the Department of Computer Science via electronic mail at the following address: ugrad@cs.cornell.edu. The subject line for this message should read “HONORS TRACK.” Related questions may be addressed to the ugrad e-mail alias, or candidates can call or stop by 303 Upson Hall, 255-0982.

Preparation

Arrangements for doing COM S 490 research should be made directly with faculty members in the department. Students are encouraged to discuss potential contacts with their advisers and/or browse the department’s web page at www.cs.cornell.edu for specific leads on research opportunities. The Department of Computer Science reserves the right to make changes to the honors program requirements at any time. Generally speaking, all members of the same graduating class in COM S will be subject to the same honors criteria.

Minor in Computer Science

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the Minor in Information Science: AEP, BEE, CHEM, COM S, EAS, ECE, M&AE, MSE, and ORIE. Information Science is an interdisciplinary field covering 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 of these areas in addition to having a working knowledge of basic probability and statistics necessary for analyzing data occurring in the real world. All courses must be chosen from the course lists below. In addition, a letter grade of C or better is required; S-U courses not allowed.

Requirements

To complete the minor, the student must take at least six courses (18 credit minimum) chosen as follows:

- Statistics: one course
- Information systems (primarily computer science): two courses
- Human-centered systems (human-computer interaction and cognitive science): one course
- Social systems (social, economic, political, cultural, and legal issues): one course.
Elective: one additional course from either human-centered systems or social systems.

Statistics
An introductory course that provides a working knowledge of basic probability and statistics and their application to analyzing data occurring in the real world.

ENG 270 Basic Engineering Probability and Statistics
CEE 304 Uncertainty Analysis in Engineering
ECE 310 Introduction to Probability and Random Signals

Information Systems
COM 211 Computers and Programming*
CIS 230 Intermediate Web Design*
CIS 330 Applied Databases
LING 424 Computational Linguistics
CIS 430 Information Discovery
CIS 431 Web Information Systems
COM 432 Introduction to Database Systems
COM 465 Computer Graphics I
LING 474 Introduction to Natural Language Processing
OR&IE 474 Statistical Data Mining
COM 478 Machine Learning
OR&IE 480 Information Technology
CIS 501 Software Engineering
ECE 502 Fundamental Information Theory
COM 574 Language Technologies
COM 578 Empirical Methods in Machine Learning and Data Mining
*Computer Science majors cannot use CIS 230.
COM 211 cannot be used by majors for which it is a required course, e.g., Computer Science (COM S) and Operations Research and Industrial Engineering (OR&IE)

Human-centered Systems
COGST 101 Introduction to Cognitive Science
PSYCH 205 Perception
PSYCH 214 Cognitive Psychology
COMM 240 Communication and Information Technology
COMM 245 Psychology of Social Computing
PSYCH 280 Introduction to Social Psychology
PSYCH 342 Human Perception: Applications to Computer Graphics, Art, and Visual Display
COMM 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
COMM 440 Advanced Human-Computer Interaction Design
COMM 450 Language and Technology
COM S 465 Computer Graphics I

Social Systems
S&TS 250 Technology in Society
S&TS 292 Inventing an Information Society
ECON 301 Microeconomics*
ECON 313 Intermediate Microeconomic Theory*
SOC 304 Social Networks and Social Processes
STS 349 Media Technologies
S&TS 355 Computers: From Babbage to Gates
S&TS 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
OR&IE 435 Introduction to Game Theory*
STS 438 Minds, Machines, and Intelligence
ECON 467 Game Theory*
ECON 476/576 Decision Theory I and II
*Only one of ECON 301 and ECON 313 may be taken for IS credit. Only one of OR&IE 435 and ECON 467 may be taken for IS credit.

Master of Engineering (Computer Science) Degree Program
The M.Eng. program in computer science is a one-year program that 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 in computer science includes several upper-division and graduate courses and a faculty-supervised project. The course and project requirements are flexible and allow students to build up a program that closely matches their interests. In particular, slightly under half the courses may be taken outside the computer science department (for example, 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 at least one credit and no more than eight credits remaining to complete their undergraduate program. All remaining undergraduate degree requirements must be satisfied by the end of the first semester the student is enrolled in the M.Eng. "early admit" program.

For more information about the M.Eng. program in computer science and the early admission option for Cornell seniors, please consult our web page at www.cs.cornell.edu/grad/meng.

Cooperative Program with the Johnson Graduate School of Management
Undergraduates majoring in computer science may be interested in a program that can lead, in the course of five years, to B.S., M.Eng. (Computer Science), and M.B.A. degrees. This program, which is sponsored jointly by the College of Engineering and the Johnson Graduate School of Management, enables students to study several subjects required for the M.B.A. degree as part of their undergraduate curriculum. Planning must begin early, however, if all requirements are to be completed on schedule.

For further details and assistance in planning a curriculum, students can consult with their adviser, the undergraduate office in 303 Upson Hall, or the Johnson School directly.

Earth and Atmospheric Sciences

EARTH AND ATMOSPHERIC SCIENCES
T. E. Jordan, chair; S. J. Riha, co-chair;
Directors of Undergraduate Studies:
K. H. Cook (Science of Earth Systems),
R. W. Kay (Geological Sciences), and
S. J. Colucci (Atmospheric Sciences);
R. W. Allmendinger, W. D. Allmon,
M. Barzangi, J. M. Bird, L. D. Brown,
L. M. Cashles, J. L. Cisne, A. T. DeGraetano,
L. A. Derry, P. J. Giersch, C. H. Greene,
D. L. Hyseil, B. L. Isacks, S. Mahlburg Kay,
M. C. Kelley, F. H. T. Rhodes, W. M. White,
D. S. Wilks, M. W. Wysocki

Bachelor of Science Curriculum
We live on a planet with finite resources and a finite capacity to recover quickly from human-induced environmental stresses. It is also a powerful planet, with geologic 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 and its resources becomes progressively more important for both future policymakers and ordinary citizens.

Because the human need to understand the earth is so pervasive, we provide our students with three tracks covering the spectrum of modern earth sciences.

The Department of Earth and Atmospheric Sciences offers an undergraduate engineering program which permits students to pursue one of three options leading to a B.S. degree in geological sciences: 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.

An engineering minor is available in one or a combination of these programs.
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, climate, and applications to the important practical problems of 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. The atmospheric science 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.

Students following the atmospheric science option are required to take ENGRD 270 as an engineering distribution course. The field program includes required introductory courses in atmospheric science (EAS 131 and 133) and EAS 250 (Instrumentation and Observations). Many of the upper division field courses require EAS 341 (Atmospheric Thermodynamics and Hydraulics) and EAS 345 (Atmospheric Dynamics) as prerequisites, which are normally taken in the junior year. The additional required field program 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 (General Meteorology). Field-approved electives may be chosen from other EAS courses or from selected upper-division courses offered in other departments.

Geoscience Option

The geoscience option reveals Earth’s turbulent history from the formation of our solar system to the plate tectonic cycles that dominate Earth’s present behavior. That history is highlighted by the co-evolution of life and the Earth from the origin of life to the modern inter-glacial phase during which our species has so proliferated. Topics of study also include the fundamental processes responsible for earthquakes, volcanic eruptions, and mountain building. The geoscience option prepares students for advanced study in geology, geophysics, geochemistry, and geobiology, and careers in mineral and petroleum industries, environmental problems, hydrology, and civil engineering. Students intending to specialize in economic geology or pursue careers in the mining industry should consider including economics courses among their liberal studies distribution courses. Students who want a more general background or want to remain uncommitted with regard to specialty must choose at least two of their field-approved electives from the same field. The field-approved electives outside the field may be chosen from offerings in other science or engineering fields or the liberal arts, but should be at the 300 level or above. Students may request substitution of EAS 491 and 492, Undergraduate Research, for a four-year field-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 in the department are used for processing seismic signals and digital images of the Earth’s surface, instruments for high-precision isotope and element analyses, and extensive libraries of earthquake records, satellite images, and exploration seismic records. High-pressure, high-temperature mineral physics research uses the diamond anvil cell and the Cornell High Energy Synchrotron Source (CHESS). Undergraduates have served as field assistants for faculty members and graduate students in Argentina, British Columbia, the Aleutian Islands, Scotland, Switzerland, Tibet, and Barbados. Undergraduates are encouraged to participate in research activities, frequently as paid assistants.

Science of Earth Systems (SES) Option

The Science of Earth Systems (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 what degree humanities and social sciences can modify or adapt to future change. The SES option is for students interested in careers and/or graduate study in any of the Earth system sciences or a future in environmental law, environmental engineering, science teaching, or environmental policy. The SES option enables students in the College of Engineering to take part in the multidisciplinary, intercollege 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 mathematics 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 introductory biology, and ENGRD 201 (Physics and Chemistry of the Earth) as one of the engineering distribution courses. The option requires a set of three core courses, normally taken in the junior or senior years, which provide breadth and integration. An additional set of five intermediate to advanced courses are selected to provide depth and a degree of specialization. These courses permit the student to specialize in such areas as climate dynamics, biogeochemistry, ocean sciences, environmental geosciences, ecological systems, hydrological sciences, and soil sciences.

The field requirements for the SES option are summarized as follows. CHEM 208 and ENGRD 201/EAS 201 are required. The field program includes BIO G 101/103-102/104 (or BIO G 109–110), BIOEE 261, the three SES core courses listed below, five additional courses selected with the adviser’s approval to provide specialization in one or a combination of the areas covered by SES, and an additional field-approved elective. Two of the specialization courses will count as field-required courses, and three as field-approved electives. At least three of the field-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

Areas of specialization include (but are not limited to) the following:

- Biogeochemistry
- Climate dynamics
- Ecological systems
- Environmental biophysics
- Environmental geology
- Hydrological sciences
- Soil science
- Ocean sciences

In addition to faculty in or associated with the Department of Earth and Atmospheric Sciences, faculty currently associated with the SES program include the following:

W. Brutsaert (CEE); R. Howarth (EEB); J.-Y. Parlange (BEE); J. Yavitt (NTRES).

Earth and Atmospheric Science Honors Program

Eligibility

The bachelor of science degree (in geological sciences) with honors will be granted to students who, in addition to having completed
the requirements for a bachelor's degree, have satisfactorily completed the honors program in Earth and Atmospheric Sciences and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA ≥ 3.5.

Content
In addition to the minimum requirements, a student must

1. take at least nine credits above the minimum required for graduating and approved by the upperclass adviser;
2. have a written proposal of the honors project accepted by his or her faculty adviser and the director of undergraduate studies;
3. complete an honors thesis involving research (EAS 491-492 or 499, two or more credits each) of breadth, depth, and quality.

Timing
A student interested in completing an honors thesis must, by the beginning of the seventh semester, have a written proposal of the honors project accepted by the student's adviser and the director of undergraduate studies.

Procedures
Each applicant to the Earth and Atmospheric Sciences honors program must have a faculty adviser to supervise the honors thesis research. Written approval by the faculty member who will direct the research is required. After the college verifies the student's grade-point average, the student will be officially enrolled in the honors program.

Minor in Geological Sciences
Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the Geological Sciences minor: BEE, A&EP, CEE, CHEM, COM S, ECE, M&AE, MS&E, and OR&IE.

Whereas many engineering students will encounter and have to understand the natural operating systems of Earth in their professions, the tools and techniques used by Earth scientists to understand these solid and fluid systems over the widest scales of space and time are of use to a wide cross-section of engineering students. This minor is designed to give a flexible set of options for students looking to complement training in their major field with a core education in Geological Sciences.

The requirements for the Geological Sciences minor are outlined below. For further details consult the Undergraduate Programs Office, 2122 Snee Hall, or www.eas.cornell.edu.

Requirements
To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows:

I. Choose one or both of these courses:
   - ENGRD 201 Introduction to the Physics and Chemistry of the Earth
   - EAS 210 Introduction to Field Methods in Geological Sciences

II. Choose at least two courses from the following list of core 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 Geotechnics

III. To complete the minor, these three to four courses are to be supplemented with two to three additional EAS courses at the 300 level or higher. These may include, for example, additional courses from the above list of core courses, undergraduate research courses, and outdoor field courses.

Academic Standards: A letter grade of C- or better for each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

ELECTRICAL AND COMPUTER ENGINEERING


Bachelor of Science Curriculum
The Department of Electrical and Computer Engineering offers an undergraduate field program which leads to a B.S. degree in electrical and computer engineering. The curriculum provides a foundation which reflects the broad scope of this engineering discipline.

Concentrations include computer engineering and digital systems; control systems; electronic circuit design; information, communication, and decision theory; microwave electronics; plasma physics; power and energy systems; quantum and optical electronics; radio and atmospheric and space physics; and semiconductor devices and applications.

Electrical and Computer Engineering Field Program
Students planning to enter the field program in Electrical and Computer Engineering must take ENGRD 230 as an engineering distribution course. The fall of the sophomore year is the preferred term for ENGRD 230 for students without advanced standing in mathematics. Electrical and Computer Engineering students with an interest in computer engineering are encouraged to take ENGRD 211 as an engineering distribution course prior to entry into the field program. In addition, the field program normally begins in the spring of the sophomore year, as shown below. All of these courses (except ECE 210 and ENGRD 230) are taught only once each academic year, either spring or fall, as indicated in the course descriptions.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tr>
<td>Field-Required Courses</td>
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<tr>
<td>ECE/ENGRD 210, Introduction to</td>
<td></td>
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<tr>
<td>Circuits for Electrical and</td>
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<td>Computer Engineers</td>
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<tr>
<td>ENGRD 230, Introduction to</td>
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<tr>
<td>Digital Logic Design</td>
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<td>ECE 301, Signals and System I</td>
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<td>ECE 303, Electromagnetic Fields</td>
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<td>and Waves</td>
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<td>ECE/COM S 314, Computer</td>
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<td>Organization</td>
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<td>ECE 315, Introduction to</td>
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<td>Microelectronics</td>
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<td>Field-Approved Electives (32-</td>
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<td>credit minimum in the following</td>
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<td>categories)</td>
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<td>Advanced ECE</td>
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<td>Electives†</td>
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<td>Outside ECE Electives‡</td>
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<td>Total minimum field credits</td>
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<td>ECE 310 can be taken in place</td>
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<td>of ENGRD 270 or T&amp;AM 310 to</td>
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<td>of probability and statistics</td>
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<td>These electives must include</td>
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<td>two 400 level electrical and</td>
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<td>computer engineering</td>
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<td>two additional courses at the</td>
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<td>remaining electives may not</td>
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<td>include independent project</td>
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<td>courses such as ECE 391, 392,</td>
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<td>491, or 492, and must be at</td>
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<td>the 300 level or above in</td>
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<td>Electrical and Computer</td>
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<td>Engineering.</td>
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<td>Courses that meet the CDE</td>
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<td>requirements are described</td>
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<td>in the online ECE Handbook. The</td>
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<td>list is dynamic and changes</td>
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<td>frequently. Always refer to</td>
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<td>the latest information in the ECE</td>
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<td>Web Handbook. All courses must</td>
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<tr>
<td>have a college-level prerequisite.</td>
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</table>

†Must include one course at the 300 level or above (see Electrical and Computer Engineering Web Handbook for details).

All students graduating with a B.S. degree must fulfill the engineering design requirement and the college technical writing requirement. Two culminating design experience (CDE) courses (4 credits each) satisfy the engineering design requirement. The technical writing requirement is discussed in the College of Engineering section of this book.

Undergraduate specialization is achieved through the various electrical and computer engineering elective courses, as well as other courses in related technical fields within engineering, physics, and the analytical biological sciences. The School of Electrical and Computer Engineering offers more than 30 courses that are commonly taken as electives by undergraduates.

An electrical and computer engineering honors program also exists for those students who apply between their fifth and sixth semesters and meet the program entrance requirements. The honors program requires an additional senior ECE course; a required senior year honors project, at the appropriate level, with an ECE faculty member, and completion of the honors seminar in the junior year. Details are available via the electrical and computer engineering homepage located through the web at
Eligibility, Entry, and Continuation
A student must apply to enter the ECE Honors Program and may do so as early as the beginning of the fifth semester or as late as the end of the sixth semester. A student must have a cumulative GPA of at least 3.5 to apply for entry. A student in the honors program whose cumulative GPA falls below 3.5 at the end of any semester will be dropped from the honors program by College of Engineering regulations. There is an additional requirement (see Honors Seminar) for entry into the program after the end of the fifth semester.

Honors Seminar
Any student in the honors program is required to take (or to have taken) an honors seminar during his or her junior year. The Honors Seminar is a two-credit course (offered spring only) consisting of a weekly series of introductory research lectures by Electrical and Computer Engineering faculty members. Each Honors Seminar enrollee will be required to write two short papers on topics covered in the lecture series. Many Electrical and Computer Engineering faculty members will give a lecture or short series of lectures as part of the Honors Seminar. Students in the honors program and students with a cumulative GPA of at least 3.5 who are considering entering the honors program must receive letter grades for the Honors Seminar.

Honors Project
Any student in the honors program is required to accumulate at least three credit hours from a senior year honors project with an ECE faculty member, consisting either of design, or directed reading. 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
Any student in the honors program is required to take at least three credit hours 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 field program.

The program described above requires honors program participants to amass at least nine credit hours over and above the 128 credit hours required for a B.S. degree; thus an honors degree requires a minimum of 157 credit hours.

Minor in Electrical and Computer Engineering
Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the Electrical and Computer Engineering minor: BEE, A&EP, CEE, CHEM, COM S, EAS, M&AE, MS&E*, ORRIE. (*MS&E students planning to pursue this minor must receive prior written approval from both MS&E and ECE, via petition.)

The School of Electrical and Computer Engineering enrolls students who wish to complement their major field by obtaining a background in electrical and computer engineering. The minor offers the opportunity to study analog and digital circuits, signals and systems, electromagnetic fields, and additionally specialize at higher levels in one of several different areas such as circuit design, electronic devices, communications, computer engineering, networks, or space engineering.

The requirements for the Electrical and Computer Engineering minor are outlined below. For further details consult the Electrical and Computer Engineering Undergraduate Programs Office, 222 Phillips Hall.

Requirements
To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows:

I. Required Courses:
- ECE/ENGRD 210 Introduction to Circuits for Electrical and Computer Engineers (4 credits)
- ENGRD 230 Introduction to Digital Logic Design

II. Two of the following:
- ECE 301 Signals and Systems I
- ECE 303 Electromagnetic Fields and Waves
- ECE/CS 314 Computer Organization
- ECE 315 Introduction to Microelectronics

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)

Academic Standards: A letter grade of C- or better for each course to be counted in the minor and a cumulative GPA of 2.3 or better for all courses in the minor.

Master of Engineering (Electrical) Degree Program
The M.Eng. (Electrical) degree program prepares students either for professional work in electrical and computer engineering and closely related areas or for further graduate study in a doctoral program. The M.Eng. degree differs from the Master of Science degree mainly in its emphasis on professional skills, engineering design, and analysis skills rather than basic research.

The program requires 30 credits of advanced technical course work beyond that expected in a typical undergraduate program, including a minimum of four courses in electrical and computer engineering. An electrical and computer engineering design project is also required and may account for three to eight credits of the M.Eng. program. Occasionally, students take part in very extensive projects and may apply for a waiver of the eight-credit maximum and 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, mathematics, or the physical sciences.

Cornell undergraduate students with advanced standing frequently take one or more graduate-level courses prior to graduation and may actually begin accumulating credit toward the Master of Electrical and Computer Engineering program in their last semester in undergraduate work. Application of credits taken while an undergraduate at Cornell must be approved in advance of the last semester of undergraduate work.

Although admission to the M.Eng. (Electrical) program is highly competitive, all well-qualified students are urged to apply. Further information is available from the Master of Electrical and Computer Engineering Program web site at www.ece.cornell.edu/students/progmeng.shtml.

MATERIALS SCIENCE AND ENGINEERING

Bachelor of Science Curriculum
Students majoring in materials science and engineering are required to take ENGRD 261 or ENGRD 262 before affiliating with the field. It is strongly recommended that these courses be taken as engineering distribution during the sophomore year. The field program develops a comprehensive understanding of the physics and chemistry underlying the unique properties of modern engineering materials and processes.

In the field, 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 multiple engineering and science departments. Optional research involvement courses provide undergraduates with the opportunity to work with faculty members and their research groups on current...
The requirements of a Bachelor of Science degree in materials science and engineering are:

1. Completion of the common engineering curriculum including liberal studies electives
2. ENGRD 261, Mechanical Properties of Materials: From Nanodevices to Superstructures OR ENGRD 262, Electronic Materials for the Information Age
3. Completion of 12 required field 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
4. Two materials-related electives covering two groups of different materials
5. Three application-related electives in at least two different types of applications
6. Two applications-related electives must be taken from outside MS&E
7. One additional technical elective outside of MS&E

The department's course curriculum consists of ENGRD 261 or ENGRD 262, the 12 required field courses, and the five technical electives constituting the materials and application-related requirements.

Materials Science and Engineering Honors Program

Eligibility
The bachelor of science degree with honors will be granted to students who, in addition to having completed the requirements for a bachelor's degree, have satisfactorily completed the honors program in materials science and engineering and have been recommended for the degree by the honors committee of the department. An honors program student must enter with, and maintain, a cumulative GPA above 3.5.

Content
The requirements for an honors degree in materials science and engineering are:
1. Students must complete at least nine credits beyond the minimum required for graduation in materials science and engineering. This increases the minimum number of credits for graduation with honors to 140. These additional courses must be technical in nature, i.e., in engineering, mathematics, chemistry, and physics at the 400- and graduate-level, with selected courses at the 300-level. All courses satisfying this requirement must be approved by the upper class adviser.
2. Senior honors thesis (MS&E 405/406) with a grade of at least A.

Note: Undergraduates typically enter the honors program at the beginning of their senior year (seventh semester) and thus must have a cumulative GPA equal to or greater than 3.5 at that point.

Timing
All interested students must complete a written application no later than the end of the third week of the first semester of their senior year, but are encouraged to make arrangements with a faculty member to work on a senior honors thesis during the second semester of their junior year. A student must be in the program for at least two semesters prior to graduation.

Procedures
Each application to the materials science and engineering honors program must have a faculty adviser to supervise the honors program. Written approval of the faculty member who will direct the research is required. After the student's grade-point average is verified, the student will be officially enrolled in the honors program.

Minor in Materials Science and Engineering

Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the materials science and engineering minor: BEE, A&EP, CEE, CHEM, COM S, EAS, ECE, M&AE, OR&IE.

Material properties are the foundation of many engineering disciplines including mechanical, civil, chemical, and electrical engineering. This minor provides engineers in related fields with a fundamental understanding of mechanisms that determine the ultimate performance, properties, and processing characteristics of modern materials.

The requirements for the materials science and engineering minor are outlined below. For further details, consult the Materials Science and Engineering Undergraduate Program Office, 214 Bard Hall.

Requirements
To complete the minor, students must take at least six courses (minimum of 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 A&EP, CHEM, CEE, ECE, M&AE, PHYS, and CHEM, as approved by the MS&E undergraduate coordinator.

Academic Standards: A letter grade of C or better for each course in the minor.

Master of Engineering (Materials) Degree Program

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 program consists of 30 credits, including 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 three-credit technical elective must include advanced mathematics (modeling, computer application, or computer modeling), beyond the MS&E undergraduate requirements.

MECHANICAL AND AEROSPACE ENGINEERING


Members of the faculty of the graduate fields of Aerospace Engineering and Mechanical Engineering are listed in the Announcement of the Graduate School.

Bachelor of Science Curriculum in Mechanical Engineering

The upperclass field program in Mechanical Engineering is designed to provide a broad background in the fundamentals of this 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 the field of mechanical engineering.

**Mechanical systems, design, and materials processing** is concerned with the design, analysis, testing, and manufacture of machinery, vehicles, devices, and systems. Particular areas of concentration are mechanical design and analysis, vehicle engineering, biomechanics, and materials processing and precision engineering. Other topics covered are computer-aided design, vibrations, control systems, and dynamics.

**Engineering of fluids, energy, and heat-transfer systems** is concerned with the efficient conversion of energy in electric power generation and aerospace and surface transport systems. This is done with an impact of engineering activity (including pollutants and noise), aeronautics, and with the experimental and theoretical aspects of fluid flow, heat transfer, thermodynamics, and combustion. Specific areas of concentration include aerospace engineering, heat, energy, and power engineering; and thermo-fluid sciences.

The undergraduate program is a coordinated sequence of courses beginning in the sophomore year. During the fall term sophomore students who plan to enter the Mechanical Engineering program take ENGRD 202 (also T&AM 202) as an engineering distribution course. They also are encouraged to take ENGRD 221 (also M&AE 221), which is a field requirement that may simultaneously satisfy Common Curriculum requirements as an engineering distribution course. Occasionally because of study abroad or requirements for second majors or pre-med, students cannot complete all of the required sophomore courses on schedule. In such cases students must be approved by the student's advisor.

The course requirements for the degree of bachelor of science in Mechanical Engineering are as follows:

1. **Completion of the Common Curriculum.** During the upperclass years this will typically mean earning credit for five humanities or social science courses.

2. **Completion of the field requirements,** which consist of eleven required courses (beyond ENGRD 202 already mentioned), and five field-approved elective courses.

   The eleven required courses are:

   - **M&AE 212, Mechanical Properties and Selection of Engineering Materials**
   - **M&AE 221, Thermodynamics**
   - **M&AE 225, Mechanical Design and Synthesis**
   - **T&AM 203, Dynamics**
   - **ECE 210, Introduction to Circuits for Electrical and Computer Engineers**
   - **M&AE 323, Introductory Fluid Mechanics**
   - **M&AE 324, Heat Transfer**
   - **M&AE 325, Mechanical Design and Analysis**
   - **M&AE 326, System Dynamics**
   - **M&AE 427, Fluids/Heat Transfer Laboratory**
   - **M&AE 428, Engineering Design**

**Electives**

Students should use the flexibility provided by the field-approved electives, approved electives, and humanities/social sciences electives to develop a program to meet their specific goals.

**Field Approved Electives**

The upper-level program includes five field-approved electives. Using these five courses, the student must satisfy the following requirements.

At least three of the courses must be upper-level (300+) M&AE courses. Of these three, two must satisfy a concentration chosen by the student. Typically these are two courses chosen from an appropriate subset of the school’s upper-class offering. However, students may petition for approval of two related courses to form a custom concentration.

The standard concentrations are:

- **Fluids/Aerospace Engineering, M&AE 305, 306, 415, 423, 506, 507**
- **Thermal Systems Engineering, M&AE 423, 449, 453, 501, 506, 543**
- **Materials Processing, M&AE 412, 415, 514**
- **Mechanical Systems, M&AE 412, 471, 470, 478, 479, 525, 565**
- **Biomechanics, M&AE 463, 464, 505**

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 this list includes M&AE 401, 412, 426, 441, 470, 479, 486, 491, and 525.

Note that the design elective must be taken during the senior year. Note that 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 mathematics course taken after MATH 294. The course must include some material on statistics. Currently, the approved courses are T&AM 310, ORIE 270, and CEE 304.

One of the field-approved electives can be viewed as a technical elective and may be any course at an appropriate level, chosen from engineering, mathematics, or science (physics, chemistry, or biological sciences). Appropriate level is interpreted as being at a level beyond the required courses of the college curriculum. Note that courses in economics, business, and organizational behavior are not accepted. Advisors may approve such courses as approved electives.

**Approved Electives**

To maximize flexibility (i.e., the option for study abroad, COOP, internships, pre-med, and flexibility during the upper-class years), the Sibley School faculty recommends that students delay use of approved electives until after term three. The faculty encourages students to consider the following as possible approved electives:

- any 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 informational science (mathematics, computer science)
- courses in methodologies (modeling, problem solving, synthesis, design)
- courses on business enterprise operations (economics, financial, legal, etc.)
- courses in organizational behavior
- courses in cognitive sciences.

The faculty recommendation on humanities/social sciences electives is that students build a program that includes studies in:

- history of technology
- societal impacts of technology
- history
- foreign languages
- ethics
- communications
- political science
- aesthetics
- economics
- architecture

An additional graduation requirement of the field program is proof of elementary competence in computer-aided design and technical drawing for students affiliating in spring 2003 or later. The demonstration of competence is expected to take place in M&AE 225, Mechanical Synthesis. This proof may also be given in other ways, for example:

a. A course with computer-aided design with technical drawing in high school or in a community college,

b. another computer-aided design and technical drawing course at Cornell, or

c. a departmental examination.

The technical writing requirement of the Common Curriculum is satisfied by M&AE 427.

**Minor in Mechanical Engineering**

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in
Typical focus in Mechanical Systems/Design:

The following two courses:

- M&E 325 Mechanical Design and Analysis
- M&E 326 System Dynamics

The remainder from this list, of which at least one course must satisfy requirement 1b:

- M&E 306 Spacecraft Engineering
- M&E 386/486 Automotive Engineering
- M&E 412 Smash and Crash: Mechanics of Large Deformations
- M&E 417 Introduction to Robotics: Dynamics, Control, Design
- M&E 463 Neuromuscular Biomechanics
- M&E 464 Orthopaedic Tissue Mechanics
- M&E 478 Feedback Control Systems
- M&E 479 Modeling and Simulation of Mechanical and Aerospace Systems
- M&E 490 Special Investigations in Mechanical and Aerospace Engineering
- M&E 491 Design Projects in Mechanical and Aerospace Engineering
- M&E 514 Design for Manufacture and Assembly
- M&E 565 Biomechanical Systems—Analysis and Design
- M&E 571 Applied Dynamics

Preparation in Aerospace Engineering

Although there is no separate undergraduate program in aerospace engineering, students may prepare for a career in this area by majoring in mechanical engineering and taking courses from the aerospace engineering concentration such as M&E 305, 306, 506, and 507. 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.

Master of Engineering (Aerospace) Degree Program

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 biomechanical engineering, combustion, propulsion and power systems, fluid mechanics, heat transfer and materials and manufacturing engineering, mechanical systems and design, etc.

A coordinated program of courses for the entire year is agreed upon by the student and the faculty adviser. Any subsequent changes must also be approved by the committee. An individual student’s curriculum includes a four- to eight-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 28 credits (of which at least 20 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 the special approval of the M&E Master of Engineering Committee. The technical electives may be courses of appropriate level in mathematics, physics, chemistry, or engineering; a maximum of six credits may be taken in areas other than these if the courses are part of a well-defined program leading to specific professional objectives. It is expected that all students will use technical electives to develop proficiency in mathematics beyond the minimum required of Cornell engineering undergraduates if they have not already done so before entering the program. Courses in advanced engineering mathematics or statistics are particularly recommended.

Students should check with the M&E graduate field office (107 Upson Hall) for additional degree requirements.

Master of Engineering (Mechanical) Degree Program

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. The program is designed to be flexible so that candidates may concentrate on any of a variety of specialty areas. These include biomechanical engineering, combustion, propulsion and power systems, fluid mechanics, heat transfer and materials and manufacturing engineering, mechanical systems and design, etc.

A coordinated program of courses for the entire year is agreed upon by the student and the faculty adviser. Any subsequent changes must also be approved by the committee. An individual student’s curriculum includes a four- to eight-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 the special approval of the M&E Master of Engineering Committee. The technical electives may be courses of appropriate level in mathematics, physics,
The following courses, or equivalents, are included in the 30-credit program:

**Fall term**
- NS&E 509, Nuclear Physics for Applications
- NS&E 612, Nuclear Reactor Theory
- NS&E 633, Nuclear Reactor Engineering
- Technical elective

**Spring term**
- NS&E 545, Energy Seminar
- Technical elective
- Engineering design project
- Mathematics or physics elective

Engineering electives should be in a subject area relevant to nuclear engineering, such as energy conversion, radiation protection and control, feedback control systems, magnetohydrodynamics, controlled thermonuclear fusion, and environmental engineering. The list below gives typical electives.

- A&EP 606/ECE 581, Introduction to Plasma Physics (fall, 4 credits)
- A&EP 607, Basic Plasma Physics (spring, 4 credits)
- A&EP 661, Microcharacterization (fall, 3 credits)
- ECE 457, Silicon Device Fundamentals (fall, 4 credits with lab)
- M&AE 478/CHM E 372, Feedback Control Systems (fall, 4 credits)
- MS&E 459, Physics of Modern Materials Analysis (spring, 3 credits)
- MS&E 603, Analytical Techniques for Materials Science (spring, 4 credits)
- NS&E 484/A&EP 484/ECE 484/M&AE 459, Introduction to Controlled Fusion, Principles and Technology (spring, 3 credits)
- NS&E 521, Radiation Effects in Materials (fall, 1-3 credits)

**OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING**


The foundation of the B.S. curriculum 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. In the senior year the 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 B.S. program is designed with a minimum of required courses and a large number of required electives. Students should consult with their field advisers to select electives that best meet their future goals.

The faculty have not sought ABET accreditation of the B.S. curriculum as a program in industrial engineering. Industrial engineering curricula, while excellent for preparing industrial engineers, do not have the flexibility that the wide range of our students requires. Nonetheless, by proper selection of field electives, graduates of the B.S. program can and do become highly successful and competent industrial engineers. (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 enter the field program in Operations Research and Engineering should plan to take Basic Engineering Probability and Statistics (ENGRD 270) after completing MATH 192. Early consultation with a faculty member of the school or with the associate director for undergraduate studies can be helpful in making appropriate choices. The required courses for the OR&IE field program and the typical terms in which they are taken are as follows:

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 3, or 4</td>
<td>ENG R 211, Computers &amp; Programming 3</td>
</tr>
<tr>
<td></td>
<td>ENG R 270, Basic Engineering Probability and Statistics 3</td>
</tr>
<tr>
<td>5</td>
<td>OR&amp;IE 320, Optimization I 4</td>
</tr>
<tr>
<td></td>
<td>OR&amp;IE 350, Financial and Managerial Accounting 4</td>
</tr>
<tr>
<td></td>
<td>OR&amp;IE 360, Engineering Probability and Statistics II 4</td>
</tr>
<tr>
<td></td>
<td>Humanities/Social Sciences elective 3</td>
</tr>
<tr>
<td></td>
<td>Field-approved elective 3</td>
</tr>
</tbody>
</table>

**Bachelor of Science Curriculum in Operations Research and Industrial Engineering**

The program is designed to provide 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 program prepares students for a wide range of careers including operations research, industrial engineering, entrepreneurship, information technology, operations management, consulting, financial engineering, financial services, and management.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 310, Industrial Systems Analysis (may be taken in term 4) 4</td>
<td></td>
</tr>
<tr>
<td>OR&amp;IE 321, Optimization II 4</td>
<td></td>
</tr>
<tr>
<td>OR&amp;IE 361, Introductory Engineering Stochastic Processes I 4</td>
<td></td>
</tr>
<tr>
<td>Behavioral science (organizational behavior) 3</td>
<td></td>
</tr>
<tr>
<td>Humanities/Social Sciences elective 3</td>
<td></td>
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</tbody>
</table>

**Undergraduate Study**

Although there is no special undergraduate field program in nuclear science and engineering, students who intend to enter graduate programs in this area are encouraged to begin specialization at the undergraduate level. This may be done by choice of electives within regular field programs such as those in engineering physics, materials science and engineering, computer science, and civil, chemical, electrical, or mechanical engineering) or within the College Program.

**Master of Engineering (Nuclear) Degree Program**

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 special facilities of the Ward Center for Nuclear Sciences are described in the Announcement of the Graduate School.

The interdisciplinary nature of nuclear engineering allows students to enter from a variety of undergraduate specializations. The recommended background is (1) an accredited baccalaureate degree in engineering, physics, or applied science; (2) physics, including atomic and nuclear physics; (3) mathematics, 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.

**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.

**Announcement of the Graduate School.**


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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.

**Announcement of the Graduate School.**

Eligibility
The bachelor of science degree with honors will be granted to students who, in addition to having completed the degree requirements, have satisfactorily completed the honors program in Operations Research and Industrial Engineering and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA of at least 3.5.

Minors

Mathematics Minor
This minor requires the student to develop expertise in mathematics. The goal of the program is to provide the student with a firm understanding of mathematical principles and the ability to apply this knowledge in real-world situations. The requirements for the mathematics minor are outlined below. For further details consult the Mathematics Department.

Operations Research and Engineering Minor Program

Eligibility

The bachelor of science degree with honors will be granted to students who, in addition to having completed the degree requirements, have satisfactorily completed the honors program in Operations Research and Industrial Engineering and have been recommended for the degree by the honors committee of the department. An honors program student must enter with and maintain a cumulative GPA of at least 3.5.

Minor in Industrial Systems and Information Technology

Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the minor: BEE, A&EP, CEE, CHEM, COM S, EAS, ECE, M&A, E, MS&E. 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 information technology systems.

Course Requirements

I. Required Courses:
- ENGRD 270 Basic Engineering Probability & Statistics
- OR&IE 360 or ECE 310 Basic Engineering Probability & Statistics II or Introduction to Probability & Random Signals

II. Four courses (11 credits minimum) taken from the following list:
- OR&IE 361 or ECE 411 Introductory Engineering Stochastic Processes I or Random Signals
- OR&IE 476 Applied Linear Statistical Models
- OR&IE 467 Simulation Modeling and Analysis
- MATH 472 or BTRY 409 Basic Probability Theory or 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. The student should be aware that some of these courses require others as prerequisites. All these courses are cross-listed under the Department of Statistical Science.

Academic Standards: a letter grade of C- or better for each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

Minor in Information Technology

Eligibility
Engineering undergraduates affiliated with the following fields are eligible to participate in the minor: BEE, A&EP, CEE, CHEM, COM S, EAS, ECE, M&A, MS&E.

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 information technology systems.
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.

The requirements for the industrial systems and information technology minor are outlined below. For further details consult the Operations Research and Industrial Engineering Undergraduate Programs Office, 202 Rhodes Hall.

**Requirements**

To complete the minor, the student must take at least six courses (minimum of 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 for Operations Research and Industrial Technology

II. The remaining courses/credit hours from the following:
   - 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 552 Revenue Management
   - OR&IE 577 Quality Control
   - OR&IE 580 Simulation Modeling and Analysis

Academic Standards: A letter grade of C- or better for each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

**Minor in Operations Research and Management Science**

*Eligibility*

Engineering undergraduates affiliated with the following fields are eligible to participate in the operations research and management science minor: BEE, A&EP, CEE, CHEM, COM S, EAS, ECE, M&A, MS&E. The field of operations research and management science (OR/MS) aims to provide rational bases for decision making by seeking to understand and model complex situations to understand and model complex situations with particular emphasis on applications. 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.

The requirements for the operations research and management science minor are outlined below. For further details consult the Operations Research and Industrial Engineering Undergraduate Programs Office, 202 Rhodes Hall.

**Requirements**

To complete the minor, the student must take at least six courses (minimum of 18 credits), chosen as follows:

I. Choose three courses from the following list:
   - ENGRD 270 Basic Engineering Probability and Statistics
   - OR&IE 320 Optimization I
   - OR&IE 321 Optimization II
   - OR&IE 360 Engineering Probability and Statistics II
   - OR&IE 361 Introduction Engineering: Statistical Processes I
   - OR&IE 580 Simulation Modeling and Analysis

II. These courses are to be supplemented with additional OR&IE courses at the 300 level or higher, so that entire program includes at least six courses and at least 18 credits. For example, taking the remaining three options on this list would suffice.

Academic Standards: A letter grade of C- or better for each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

**Master of Engineering (OR&IE) Degree Program**

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 real 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 who wish to expand their practical knowledge in the field; Cornell undergraduates lacking exposure to the field; Cornellians with strong background in math-based fields who want to take advantage of OR&IE courses in the United States.

To ensure compatibility, the program in two semesters, the student should have completed courses in probability and statistics and in computer science, as well as four semesters of multivariate calculus. Program requirements include one course of OR&IE courses plus one project course chosen from a broad array of electives, resulting in 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. Students interested in an option other than the applied operations research option should obtain further information from the following: 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, 607-255-4091; systems engineering option, 207 Hollister Hall, 607-255-7757. For students lacking an undergraduate degree in Operations Research, 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 Field Program in Operations Research and Engineering.

- **Fall term**
  - OR&IE 516, Case Studies
  - OR&IE 893, Applied OR&IE Colloquium
  - M.Eng. Project
  - Technical electives
  - Minimum of 12

- **Spring term**
  - OR&IE 894, Applied OR&IE Colloquium
  - M.Eng. Project
  - Technical electives
  - Minimum of 10

II. For matriculants from other fields 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**
  - OR&IE 560, Engineering Probability and Statistics II
  - OR&IE 520, Optimization I
  - OR&IE 522, Topics in Linear Optimization
  - OR&IE 516, Case Studies
  - OR&IE 580, Simulation Modeling and Analysis
  - OR&IE 893, Applied OR&IE Colloquium
  - M.Eng. Project
  - Technical electives
  - Minimum of 10

- **Spring term**
  - OR&IE 523, Introduction to Stochastic Processes I
  - OR&IE 894, Applied OR&IE Colloquium
  - M.Eng. Project
  - Technical electives
  - Minimum of 8
The M. Eng. portion.

who do not already have it when beginning

usual three years for such a combination.

meeting the business-degree requirements

permits degrees in two years rather than the

for work experience between the M. Eng. and

Management (JGSM).

percent of the students in the JGSM have

systems, and much of the analytical methodo­

program should be discussed with the

the operation of production and service

because modern management is concerned

office of the Johnson Graduate School of

in designing these systems.) This early start on

is the same as that used by systems engineers

undergraduates from other schools, it may be

time out for work experience. For

undergraduates from other schools, it may be

feasible to complete the M. Eng./M.B.A.

completed in six years at Cornell, with

time out for work experience. For

undergraduates from other schools, it may be

be completed in six years at Cornell, with

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).

An advantage for OR&IE majors is that, as part

of their undergraduate and/or M. Eng.

curriculum, they study several subjects that are

required for the M.B.A. degree. (This is

because modern management is concerned

with the operation of production and service

systems, and much of the analytical methodology

required to deal with operating decisions is

the same as that used by systems engineers in

designing these systems.) This early start on

meeting the business-degree requirements

permits degrees in two years rather than the

usual three years for such a combination.

The details of planning courses for this

program should be discussed with the

admissions office of the 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.

Further details and application forms may be

obtained at the office of the School of

Operations Research and Industrial

Engineering, 201 Frank H. T. Rhodes Hall (or

meng@cornell.edu), and at the admissions

office of the Johnson Graduate School of

Management (mbs@johnson.cornell.edu).

The Knight Scholars program, open to Cornell

ingeering graduates, provides financial sup­

port for the M.Eng./M.B.A. combination.

Further details are available in 146 Olin Hall,

(607) 255-7415.

STATISTICAL SCIENCE DEPARTMENT

The universitywide Department of Statistical

Science coordinates undergraduate and gradu­

ate study in Statistics and Probability.

A list of suitable courses can be found in the

Interdisciplinary Centers, Programs, and

Studies section at the front of this catalog.

SYSTEMS ENGINEERING

M. Campbell, R. D'Andrea, R. A. Davidson,

E. Garcia, A. R. George, P. L. Jackson,

J. A. Muckstadt, A. F. Myers, L. K. Nozick,

R. O. Roundy, F. B. Schneider, B. Selman,

C. A. Shoemaker, J. R. Sterlincer, R. J. Thomas,

H. Topaloglu, M. A. Turnquist.

Master of Engineering (Systems) Degree Program

The M.Eng. (Systems) degree program is a 30-

credit (usually nine-course) curriculum
designed to prepare students for professional

practice. Applicants must hold an ABET-

accredited (or equivalent) undergraduate
degree in engineering. Those without such

preparation will require course work beyond

the graduate program's 30-credit minimum to

fulfill the engineering preparation require­

ment. The general degree requirements and

admissions information are described above in

the section "Master of Engineering Degree

Programs." Each student's program of study is
designed individually in consultation with an

academic adviser and approved by the

Director of Graduate Studies for Systems.

For the M.Eng. (Systems) program, the

requirements are:

1) SYSEN 510 Applied Systems Engineering

I, SYSEN 520 Applied Systems Engineering II, Project Management (CEE 590), and a two-semester design project (SYSEN 590).

2) Electives may be taken 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 no more than one may be
taken from the Systems Management
category. A list of pre-approved electives
is on the Systems Engineering web site at


THEORETICAL AND APPLIED

MECHANICS

T. J. Healey, chair; J. A. Burns, K. B. Cady,

Castillo-Chavez, H. D. Conway (Emeritus),

J. M. Guckenheimer, C. Y. Hui, J. T. Jenkins,

and Industrial Engineering 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).

An advantage for OR&IE majors is that, as part

of their undergraduate and/or M. Eng.

curriculum, they study several subjects that are

required for the M.B.A. degree. (This is

because modern management is concerned

with the operation of production and service

systems, and much of the analytical methodology

required to deal with operating decisions is

the same as that used by systems engineers in

designing these systems.) This early start on

meeting the business-degree requirements

permits degrees in two years rather than the

usual three years for such a combination.

The details of planning courses for this

program should be discussed with the

admissions office of the 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.

Further details and application forms may be

obtained at the office of the School of

Operations Research and Industrial

Engineering, 201 Frank H. T. Rhodes Hall (or

meng@cornell.edu), and at the admissions

office of the Johnson Graduate School of

Management (mbs@johnson.cornell.edu).

Theoretical and Applied Mechanics is responsible for courses in engineering mechanics and engineering mathematics, some of which are part of the Common Curriculum.

Independent Major in Engineering Science

A student may enroll in the Independent Major in Engineering Science, which is sponsored by the Department of Theoretical and Applied Mechanics. This Independent Major is described in the section on undergraduate study in the College of Engineering.

Minor in Applied Mathematics

Eligibility

Engineering undergraduates affiliated with the following fields are eligible to participate in the Applied Mathematics minor: BEE, A&EP, CEE, CHEMF, COM S, EAS, ECE, M&AE, MSRE, OR&IE. Contact persons: Richard Rand, 207 Kimball Hall, 255-7145, rhr2@cornell.edu, and Tim Healey, 211 Kimball Hall, 255-3738, tjhl0@cornell.edu.

Requirements

to complete the minor, the student must take

at least six courses beyond MATH 294, to be

chosen as follows:

a) No more than one course may be chosen from any one of the groups 1, 2, 3, or 4.

b) At least three courses must be chosen from groups 5 and 6.

c) No more than one 200-level course may be chosen.

d) No more than one course may be chosen that is offered by the student’s major department.

1. Analysis

TRAM 310 Advanced Engineering Analysis I

MATH 311 Introduction to Analysis

MATH 420 Differential Equations and Dynamical Systems

A&EP 321 Mathematical Physics I

2. Computational Methods

COM S/ENGRD 322 Introduction to Scientific Computation

BEE 449 Computational Tools for Engineers

A&EP 241 Engineering Computation

OR&IE 320 Optimization I

3. Probability and Statistics

OR&IE/ENGRD 270 Basic Engineering Probability and Statistics II
ECE 310 Introduction to Probability and Random Signals
CEE 304 Uncertainty Analysis in Engineering

4. Applications
A&EP 333 Mechanics of Particles and Solid Bodies
CHEM 323 Fluid Mechanics
CEE 331 Fluid Mechanics
CEE 371 Structural Behavior
ECE 425 Digital Signal Processing
MS&E 303 Thermodynamics of Condensed Systems
M&AE 323 Introductory Fluid Mechanics

5. Advanced Courses

Eligibility
Students graduating in 2004 and 2005 in the College of Engineering are eligible to participate in the Biomedical Engineering Minor, unless they are also pursuing the Bioengineering Option. (Students may participate in either the Bioengineering Option or the Biomedical Engineering minor, but not both.)

Requirements
To complete the minor, the student must take at least six courses (minimum of 18 credits) from the five groups listed below, with at least one course from each group. At least four of the six courses must be from outside the student's major. In addition to the six courses for a minimum of 18 credits, all students must take ENGRG 501, Bioengineering Seminar (1 credit).

Required Course: ENGRG 501, Bioengineering Seminar (1 credit)

I. Biomedical and Biomechanics
BEE 365 (3) Properties of Biological Materials
MS&E 265 (3) or TXA 439 (2) Biological Materials and Their Synthetic Replacements
MS&E 463 (3) Neuromuscular Biomechanics
M&AE 464 (3) Orthopaedic Tissue Mechanics
M&AE 565 (3) Biomechanical Systems—Analysis and Design
M&AE 663 (3) Advanced Topics in Neuromuscular Biomechanics
M&AE 664 (3) Mechanics of Bone
BMEP 605.1 (1) Biomaterials
BMEP 606.2 (1) Artificial Organs and Tissue Engineering
BMEP 606.3 (1) Biomechanics of Musculoskeletal Systems

II. Biomedical Systems
BEE 453 (3) Computer-Aided Engineering: Applications to Biomedical and Food Processes
CHEM 481 (3) Biomedical Engineering
BEE 454 (3) Physiological Engineering
BMEP 605.1 (1) Cellular Dynamics and Cancer
BMEP 605.2 (1) Physiological Systems
BMEP 301 (3) Molecular Principles of Biomedical Engineering

III. Instrumentation
BEE 450 (4) Bioinstrumentation
BEE 458 (4) Introduction to Biotechnology
ECE 432 (3) MicroElectro Mechanical Systems (MEMS)
ECE 511 (3) Bioelectric Signal Analysis and Processing
BMEP 606.1 (1) Biomedical Instrumentation and Diagnosis
BEE 659/BEE 459 (4) Biosensors and Biomedical Techniques

IV. Molecular and Cell Biology
BIOGD 281 (5) Genetics
BIOGD 282 (2-3) Human Genetics
BIOI 290 (3) Microbiology
BIOAP 316 (4) Cellular Physiology
BIOBM 330-333 (2-4) Principles of Biochemistry
BIOBM 432 (3) Survey of Cell Biology

V. Physiology
BIOAP 212 (3) Human Physiology
BIOAP 311 (3) Introductory Animal Physiology
BIOAP 313 (4) Histology: The Biology of the Tissues
BIOGD 389 (3) Embryology
BIONB 222 (3–4) Neurobiology and Behavior II: Introduction to Neurobiology
AN SC 427 (3) Fundamentals of Endocrinology
M&AE 463 (3) Neuromuscular Biomechanics

Academic Standards: A letter grade of C- or better for each course in the minor and a cumulative GPA of 2.0 or better for all courses in the minor.

Note: ENGRG 605-606 and M&AE 664 are graduate courses with limited enrollment. First preference will be given to graduate students.

Master of Engineering (Engineering Mechanics) Degree Program
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.

The degree program requires satisfactory completion of 30 credits of course work, including 12 credits that involve analysis, computation, design, or laboratory experience. Of these 12 credits, at least 6 must be earned in Theoretical & 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 departments in the engineering, physical or mathematical sciences. As a consequence, the student has great flexibility in choosing a course of study tailored to his or her 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 computing 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.

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 (ENGR)
Biological and Environmental Engineering (BEE)
Applied and Engineering Physics (A&EP)
Chemical and Biomolecular Engineering (CHEM)
Civil and Environmental Engineering (CEE)
Computer Science (COM S)
Earth and Atmospheric Sciences (formerly Geological Sciences) (EAS)
Electrical and Computer Engineering (ECE)
Materials Science and Engineering (M&SE)
Mechanical and Aerospace Engineering (M&A)
Nuclear Science and Engineering (NS&IE)
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.

ENGRC 334 Independent Study in Engineering Communications
Variable credits (1–3). 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 documentation, creating user manuals, analyzing and producing technical graphics, reading and writing about problems in engineering practice, and writing about technical topics for the public.

ENGRC 335 Communications for Engineering Managers
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 organizational contexts common to engineering graduates. Topics may include internal and external communications; balancing visual and verbal elements in documents and oral presentations; teamwork and leadership; running and attending meetings; management strategies; and communicating with colleagues, superiors, subordinates, and clients. Students develop writing and management strategies that they apply in individual and team assignments. They learn how to organize technical and managerial information, articulate and support ideas, and communicate with technical and nontechnical audiences. (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.

ENGRC 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 being hired as well as being promoted; the higher an engineer rises, the more writing and presentation he/she will do. ENGRC 350 prepares students for these important activities. They write various types of documents (e.g., letters, memos, executive summaries, problem analyses, proposals, reports), give presentations, and incorporate graphics in both their oral and written work. Students learn how to communicate specialized information to different audiences (e.g., technical and nontechnical people, colleagues and clients, peers and supervisors, in-house departments, and government agencies), work in teams, and address organizational and ethical issues. The course material is drawn from professional contexts, principally engineering, and it generates lively discussion. Class size ensures close attention to each student's work. (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.

Engineering Distribution Courses
Courses in this category are sophomore-level courses cross-listed with a department. These courses are intended to introduce students to more advanced concepts of engineering and may require pre- or corequisites.

ENGRD 201 Introduction to the Physics and Chemistry of the Earth (also EAS 201)
Fall. 3 credits. Prerequisites: PHYS 112 or PHYS 207. L. M. Cathles. 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; rock and minerals; earth dynamics; mantle plumes; the hydrologic cycle; runoff; floods and sedimentation; groundwater flow; contaminant transport; and the weathering cycle: chemical cycles, CO₂ (weathering), rock cycle, controls on global temperature (CO₂ or ocean currents), oil and mineral resources.

ENGRD 202 Mechanics of Solids (also T&AM 202)
Fall, spring. 4 credits. Prerequisite: PHYS 112, coregistration in MATH 192 or permission of instructor. Covers: principles of statics, force systems, and equilibrium; frameworks; mechanics of deformable solids, stress, strain, statically indeterminate problems; mechanical properties of engineering materials; axial force; shearing force; bending moment, plane stress; bending and torsion of bars.

ENGRD 203 Dynamics (also T&AM 203)
Fall, spring. 3 credits. Prerequisite: T&AM 202, coregistration in MATH 293, or permission of instructor. Newtonian dynamics of a particle, systems of particles, a rigid body. Kinematics, motion relative to a moving frame. Impulse, momentum, angular momentum, energy. Rigid-body kinematics, angular velocity, moment of momentum, the inertia tensor. Euler equations, the gyroscope.

ENGRD 210 Introduction to Circuits for Electrical and Computer Engineers (also ECE 210)
Fall. 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 the lab. Fall. J. C. Belina, C. E. Seyler; spring, M. C. Kelley. This is a first course in electrical circuits and electronics that establishes the fundamental properties of circuits with application to modern electronics. Topics include circuit analysis methods, operational amplifiers, basic filter circuits, and elementary transistor principles. The laboratory experiments are closely coupled with the lectures and there is a final design project.

ENGRD 211 Computers and Programming (also COM S 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.

ENGRD 219 Mass and Energy Balances (also CHEM 219)
Fall. 3 credits. Corequisite: CHEM 101 or an equivalent course in physics. Intermediate programming in 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.

ENGRD 221 Thermodynamics (also M&AE 221)
Fall, spring, may be offered summer. 3 credits. Prerequisites: MATH 192 and PHYS 112. The definitions, concepts, and laws of thermodynamics. Applications to ideal and real gases, vapor and gas power systems, refrigeration, and heat pump systems. Combustion and chemical equilibrium. Examples and problems.
are related to contemporary aspects of power generation and broader environmental issues.

**ENGRD 230 Introduction to Digital Logic Design**
Fall, spring. 4 credits. Prerequisite: COM S 100. Fall, W. E. Swartz, spring, W. E. Speight. Introduction to the design and implementation of practical digital circuits. Topics include transistor network design, Boolean algebra, combinational circuits, sequential circuits, finite state machine design, and analog and digital conversion. Design methodology using both discrete components and hardware description languages is covered in the weekly laboratory portion of the course.

**ENGRD 241 Engineering Computation (also CEE 241)**
Fall, spring. 3 credits. Prerequisites: COM S 100 and MATH 293. Corequisite: MATH 294. (Completion of MATH 294 is suggested.) W. D. Philpot, C. A. Shoemaker. Introduction to numerical methods, numerical mathematics, and probability and statistics. Development of programming and graphics proficiency with MATLAB and spreadsheets. Numerical analysis topics considered are accuracy, precision, Taylor-series approximations, truncation and round-off errors, condition numbers, operation counts, convergence, and stability. Included are numerical methods for solving engineering problems that entail roots of functions, simultaneous linear equations, regression, curve fitting, interpolation, numerical differentiation and integration, and ordinary and partial differential equations. Introduction to finite-difference and finite-element methods. Applications are drawn from different areas of engineering.

**ENGRD 251 Engineering for a Sustainable Society (also BEE 251)**
Spring. 3 credits. Corequisite: MATH 293. Case studies of contemporary environmental issues including pollutant distribution in natural systems, air and water pollution, hazardous waste management, and sustainable development. Emphasis is on the application of mathematics, physics, and engineering sciences to solve energy and mass balances in environmental sciences. Studied are the basic chemistry, ecology, biology, ethics, and environmental legislation relevant to the particular environmental problem.

**ENGRD 252 The Physics of Life (also A&EP 252)**
Fall. Prerequisites: MATH 192, CHEM 207 or 211, and co-registration in or completion of PHYS 213. U. Pollack. This course introduces the physics of biological macromolecules (e.g., proteins, DNA, RNA) to students of the physical sciences or engineering who have little or no background in biology. The macromolecules are studied from three perspectives. First, the biological role or function of each class of macromolecules is considered. Second, a quantitative description of the physical interactions and 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)**
Spring. 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. Topic areas range from molecular principles of reaction kinetics 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. 5 credits. S. P. Baker. The mechanical properties of materials (strength, stiffness, toughness, 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. Efforts 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 electron conduction in metals, semiconductors and insulators, the tuning of electrical properties in semiconductors, the transport of charge across metal-semiconductor and semiconductor/semi-conductor functions, 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 lab, 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, analog nonlinear square fitting of experimental data, viscosity of fluids, a robot arm, and thermal diffusion. Both C++ programming and graphical programming with MATLAB 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. D. Dalthorp. 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, expectation, 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 100, 111, 191, or 192 and a course in linear algebra such as MATH 221 or 294 or BTRY 417. MATH 200 or equivalent and some familiarity with iteration, arrays, and procedures. An introduction to numerical computing using MATLAB organized around five applications: the analysis of protein shapes, dynamics, protein folding, score functions, 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 analysis, the solution of ordinary and partial differential equations, linear programming, and nonlinear minimization are also taught. 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, or 421.

**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. Students will cover parallel computation. COM S majors and minors may use only one of the following toward their degree: COM S 321, 322, or 421.

**Courses of General Interest**
Courses in this category are of general interest and aperative technical interest. It also covers social issues relevant to the engineering profession. These courses may also include seminar or tutorial type courses.

**ENGRG 150 Engineering Seminar**
Fall. 1 credit. First-year students only. S-U grades only. Engineering freshmen meet weekly with their faculty advisers to discuss a range of engineering topics. Discussions may include the engineering curriculum and student programs, what different types of engineers do, the character of engineering careers, active research areas in the college and in engineering in general, and study and examination skills useful for engineering students. Groups may visit campus academic, engineering, and research facilities.

**ENGRG 250 Technology in Society (also ECE 250, HIST 250, SATS 250)**
Fall. 3 credits. A humanities elective for engineering students. R. R. Kline. 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 works of key figures such as Morse, Edison, Ford; the government's regulation of the technology; the origins of mass production; and the spread of the automobile and microelectronics cultures in the United States.
ENGRG 298 Inventing an Information Society (also ECE 298, S&T 292, and HIST 292)
Spring. 3 credits. Approved for humanities distribution; evaluation can be taken for credit after ENGRG 196/ECE 198. R. R. Kline.
Explores the history of information technology from the 1830s to the present by considering the technological and social history of telecommunication, electronic, power, industry, radio, 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.
Introduces 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 360 Ethical and Social Issues in Engineering (also S&T 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 are not only safe and of high quality but are also socially beneficial; 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&A&E 461, OR&E 452)
Fall. 3 credits. Enrollment open to upper-class engineers; others with permission of instructor.
For description, see M&A&E 461.

ENGRG 676 Teaching Seminar
Fall, spring. 1 credit. S-U grades only. Independent Study promoting reflection on teaching styles and experiences for teaching assistants in the College of Engineering. Participants must be concurrently fulfilling a TA assignment. Requirements include: participation in the College of Engineering's TA Development Program, consisting of an initial one and one-half day training session, followed by one evening microteaching session early in the semester; participation in the TA midterm evaluation process, followed by a formal feedback session with program staff; and completion of a reflective journal on teaching experiences. All components are designed to provide TAs with the opportunity to process their understanding of teaching and learning through the formulation of questions, concepts, and theories related to their experiences.

Introduction to Engineering Courses
Courses in this category are freshman-level courses intended to introduce students to various aspects of engineering. They have no prerequisites and are always cross-listed with a department.

ENGR 101 Introduction to Biomedical Engineering Analysis (also BMEP 101)
Spring. 1 credit. Requires concurrent registration in BIO G 110. Lec and lab.
D. Grubb and S. Archer
This class is integrated with BIO G 110 to provide examples of engineering analysis of biological topics described in BIO G 110. Emphasis on molecular, cellular, and physiological systems.

ENGR 110 The Laser and Its Applications in Science, Technology, and Medicine (also A&E&P 110)
Fall. 3 credits. A. Greta
The principles of laser action, types of laser systems, elements of laser design, and applications of lasers in science, technology, and medicine are discussed. In the laboratory, students build and operate a nitrogen laser. Demonstration experiments with several types of lasers illustrate phenomena such as holography, laser processing of materials, optical tweezers, and fiber optics.

ENGR 111 Nanotechnology (also M&A&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 manipulation, storing, and transmitting information. In this hands-on course students learn how to design and manipulate materials to build devices and structures in applications ranging from computers to telecommunications to biotechnology.

ENGR 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 blockbusting, and (re)definition of the design goal, in the context of contemporary chemical and biomolecular engineering. Includes methods for analyzing designs, such as mathematical modeling, empirical analysis by graphics, and dynamic scaling through dimensional analysis, to assess product quality, economics, safety, and environmental issues.

ENGR 113 Solving Environmental Problems for Urban Regions (also CEE 113)
Fall. 3 credits. Not open (without instructor's permission) to upper-division engineering students. M. L. Weber-Shirk.
Learn how to design: reservoirs to provide water during droughts, aqueducts to transport water, water treatment plants to prevent waterborne diseases, and landfills to minimize contamination of the environment. Take field trips, build a miniature water treatment plant, and explore new technologies for making safe drinking water.

ENGR 115 Engineering Applications of Operations Research
Fall, spring. 3 credits. Enrollment open to OR&IE upper-class majors.
An introduction to the design 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 a computational laboratory, students encounter problem simulations and use some standard commercial software packages.

ENGR 116 Modern Structural Systems and Materials (also CEE 116)
Fall. 3 credits. R. A. Davidson.
Introduction to civil infrastructure engineering in the 21st century—the latest challenges civil engineers face, and the innovative techniques they are using to address them. Using case studies of famous structures and structural failures, students learn strategies for identifying different structural forms, explain qualitatively how each carries loads, apply basic engineering principles and mathematics to describe their behavior quantitatively, explain how they fail in earthquakes and other extreme events, learn strategies for improving their performance, and recognize their historical, economic, social, and political context. Nontraditional structures, such as aircraft and underground structures, are discussed as well. Includes a project to design, analyze, build, and test an engineering structure.

ENGR 117 Introduction to Mechanical Engineering (also M&A&E 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 materials characteristics, the behavior of materials, and material selection for performing engineering function. They also learn fundamentals of fluid mechanics, heat transfer, automotive engineering, engineering design and 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&A&E 118 and T&AM 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 elementary 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&A&E 119)
Fall. 3 credits. D. N. Pashley.
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, toxicity, wear, and bio-compatibility. Case studies of design lead to consideration of regulatory approval requirements and legal liability issues.

**[ENGRI 121] Introduction to Biomedical Engineering (also CHEME 121)**
Introduction to the fundamental science and engineering that spawned the biotechnology revolution—technologies of cell cultures, DNA, and the relationship between biomedical science, bioengineering, and the growing biomedical product industry. Case studies of the development of biotechnical processes, from discovery to clinical use, include processes for vaccines, antibiotics, cancer chemotherapy, protein pharmaceuticals, and organ transplantation.

**ENGRI 121 Fission, Fusion, and Radiation (also A&EP 121 and NS&E 121)**
Spring. 3 credits.
Lecture/laboratory course on the physical nature and biological effects of nuclear radiation; benefits and hazards of nuclear energy; light-water reactors, breeder reactors, and fusion reactors; and uses of nuclear radiation in research. Laboratory demonstrations involve Cornell's research reactor; detection of nuclear radiation; activation analysis using gamma-ray spectroscopy; neutron radiography; and pulsed power generators for fusion research.

**ENGRI 122 Earthquake! (also EAS 122)**
Spring. 3 credits.
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 such resources. Includes seismic experiments on campus to probe for groundwater, the new critical environmental resource.

**ENGRI 124 Designing Materials for the Computer (also MS&E 124)**
Spring. 3 credits. 3 lectures.
Introduces the materials, processes, and properties of thin-film, conductors, 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.

**ENGRI 126 Introduction to Telecommunications**
Spring. 3 credits. 3 lectures.
This course introduces the technologies that underlie wired and wireless telecommunication systems. The course begins with an introduction to telephony and the public switched telephone network. Moderns and cellular telephony are then introduced, along with ISDN and BISDN. The course concludes with an introduction to ATM and TCP/IP. The course includes both lectures and laboratory demonstrations. Students have the opportunity to design communication systems and to determine their performance through simulations.

**ENGRI 127 Introduction to Entrepreneurship and Enterprise Engineering (also M&AE 127)**
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-tech ventures. Basic engineering management issues, including the entrepreneurial perspective, opportunity recognition and evaluation, and gathering and managing resources are covered. Technical topics such as the engineering design process, product realization, and technology forecasting are discussed. This course is considered an “Introduction to Engineering” course by the College of Engineering, and satisfies the curricular requirements for such a course. The course is intended for freshmen and is taught from this perspective and at that level.

**ENGRI 130 Introduction to Nanoscience and Nanoengineering (also A&EP 130)**
Fall, spring. 3 credits.
Lecture/laboratory course designed to introduce freshmen to some of the ideas and concepts of nanoscience and nanotechnology. Topics covered include nanoscience and nanotechnology—that what they are and why they are of interest; atoms and molecules; the solid state; surfaces; behavior of light and material particles when confined to nanoscale dimensions; scanning tunneling microscopy (STM), atomic force microscopy (AFM), microelectromechanical systems (MEMS) design; basic micromachining and chemical synthesis methods, i.e., “top-down” and “bottom-up” approaches to nanofabrication; how to manipulate structures on the nanoscale; physical laws and limits they place on the nanoworld; some far-out ideas. In the laboratory, students will use an AFM to record atomic resolution images, use a MEMS computer-aided design software package to model the entire manufacturing sequence of a simple MEMS device, examine the simulated behavior of nanoscale devices, and compare it with real behavior, construct a simple STM and learn through hands-on experience the basic workings of the device.

**ENGRI 172 Computation, Information, and Intelligence (also COM S 172)**
Fall. 3 credits.
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 are assigned. Not open to students who have completed the equivalent of COM S 100. Analysis and Design (also EAS 200, and MS&E 288)
Spring. 3 credits.
R. Kay.
An intermediate course in 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 110 The Laser and Its Applications in Science, Technology, and Medicine (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 121 Fission, Fusion, and Radiation (also ENGR 121 and NS&E 121)**
Spring. 3 credits.
S-U grades optional for students outside the College of Engineering. K. B. Cady.
This is a course in the Introduction to Engineering series. For description, see ENGR 121.

**A&EP 130 Introduction to Nanoscience and Nanoengineering (also ENGR 130)**
Fall, spring. 3 credits.
This is a course in the Introduction to Engineering series. For description, see ENGR 130.

**A&EP 217 Electricity and Magnetism (also PHYS 217)**
Fall, spring. 4 credits.
Prerequisites: approval of student's adviser 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 293 or equivalent. Staff.
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 111; B. W. Nickerson.
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
Spring. 4 credits. Prerequisite: A&EP 321. Second of the 2-course sequence in mathematical physics intended for upper-level undergraduates in the physical sciences.

B. Kusse.

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, boundary 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. Lovelace.

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, summer. 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 classical wave properties such as interference, diffraction, and polarization. Each experimental setup is equipped with standard, off-the-shelf optics and opto-mechanical components to provide the students with hands-on experience in practical laboratory techniques currently employed in physics, chemistry, biology, and engineering. Students are also introduced to digital imaging and image processing techniques.

A&EP 333 Mechanics of Particles and Solid Bodies
Fall. 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 physical-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 geometrics, electric and magnetic multipole, electric and magnetic materials, energy in fields, classical, quantum, 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, 2 labs. 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). Topics include circuits, resistors, capacitors, operational amplifiers (linear amplifiers with feedback, oscillators, comparators), filters, diodes and transistors. Digital circuits: combinational (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, microcanonical, canonical and grand canonical ensembles, and partition functions. Classical and quantum ideal gases, partition functions, quantum statistics, 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 Ross.

A&EP 434 Continuum Physics
Spring. 4 credits. Prerequisites: A&EP 333 and 350 or equivalent.


A&EP 438 Computational Engineering Physics
Spring. 3 credits. Prerequisites: COM S 100, A&EP 321, 333, 355, 361, or equivalent, or permission of instructor; coregistration in PHYS 361 permitted.

Numerical computation (derivatives, integrals, differential equations, mapping; Fourier Series; Fourier and Laplace transforms, Green’s functions, 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 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 phase conjugation, optical resonance, and two-level atoms, atom cooling and trapping, multiphoton effects, spontaneous and stimulated scattering, and ultra-intense laser-matter interactions.

A&EP 450 Introductory Solid State Physics (also PHYS 454)
Fall. 4 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 BIOPH 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 biophysical systems at the cellular and molecular level. Topics covered include methods that examine both structure and function of systems, with emphasis on the applications of these methods to biological membranes. The course format includes assigned literature reviews by the students on specific biophysics topics and individual student presentations on these topics. The course is intended for students of the engineering, physics, chemistry, and biological disciplines who seek an introduction to modern biophysical experimental methods.

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 or theoretical work in any branch of engineering physics under the direction of a member of the faculty. The study can take a number of forms; for example, design of laboratory apparatus, performance of laboratory measurements, computer simulation or software development, 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, solid state electronic devices, solid state detectors and generators of electromagnetic radiation, superconducting devices and materials, 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 582)
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. R. B. Cady. For description, see NS&E 633.

A&EP 661 Microcharacterization
Fall. 3 credits. Prerequisites: introductory 3-semester physics sequence or an introductory course in modern physics. At the senior/first-year graduate level. The basic physical principles underlying the many modern microanalytical techniques available for characterizing materials from volumes less than a cubic micron. Discussion centers on the physics of the interaction process by which the characterization is performed, the methodology used in performing the characterization, the advantages and limitations of each technique, and the instrumentation involved in each characterization method.

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 other applications. Vacuum and plasma thin-film deposition processes. Photon, electron, X-ray, and ion-beam lithography. Techniques for pattern replication by plasma and ion processes. Emphasis is on understanding the physics and materials science that define and limit the various processes. At the level of Brodie and Muray.

A&EP 663 Nanobiotechnology (also BIO G 663 and MS&E 563)
Spring. 3 credits. Prerequisites: A&EP 356, or equivalent. Upper level undergraduate and graduate-level course that covers the basics of biology and the principles and practice of microfabrication techniques. The course focuses on applications in biomedical and biological research. A team design project that stresses interdisciplinary communication and problem solving is one of the course requirements. The course is held twice weekly with 75-minute lectures. All lectures are teleconferenced to our NFTC associate institutes.

A&EP 711 Principles of Diffraction (also MS&E 671)
Fall. 3 credits. Letter grades only. Not offered 2003–2004. J. D. Brock. 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-rays 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 such as 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 participate in an independent research project through work on a special problem related to their field of interest. A formal and complete research report is required.

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.

BIOLOGICAL 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's website, www.bee.cornell.edu.

BEE 151 Introduction to Computing
Fall. 4 credits. Prerequisite: MATH 191 or equivalent (coregistration permissible). Each lab and recitation session limited to 22 students.

BEE 152 Computer Applications for Engineers
Spring. 3 credits. Prerequisites: BEE 151 or equivalent, MATH 191. Course comprises three one-credit modules: (1) MATLAB; (2) spreadsheets; and (3) presentation graphics.

BEE 200 The BEE Experience
Spring. 1 credit.

BEE 222 Bioengineering Thermodynamics and Kinetics
Spring. 3 credits. Prerequisites: BEE 152 or equivalent, MATH 192. Course in chemical engineering. Required for candidates for the M.Eng. (Engineering Physics) degree. 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.
BEE 365 Properties of Biological Materials
Spring. 3 credits. Prerequisites: ENGRD 202 (coregistration permissible).

BEE 371 Hydrology and the Environment
Spring. 3 credits. Prerequisite: 1 course in calculus.

BEE 411 Biomass Processing: Modeling and Analysis
Spring. 3 credits. Prerequisites: BEE 250, BEE 350 (or any course in heat and mass transport), BIOBM 331, 352, or BIOMI 290.

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&AE 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 Bioprocessing Processes
Fall. 3 credits. Prerequisites: biochemistry, physics, MATH 112 or 192, BEE 260, or permission of instructor.

BEE 471 Geohydrology (also CEE 431 and GEO/LAS 445)
Fall. 3 credits. Prerequisites: MATH 294 and ENGRD 202.

BEE 473 Watershed Engineering
Fall. 3 credits. Prerequisite: fluid mechanics or hydrology.

BEE 474 Drainage and Irrigation Design
Spring. 3 credits. Prerequisites: fluid mechanics or hydrology.

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 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 511/552 Agricultural and Biological Engineering Design Project
Fall, spring, 552. 2–6 credits. Prerequisite: admission to the M.Eng. (Agricultural and Biological) degree program.

BEE 625 Science and Technology of Environmental Management
Fall. 3 credits. Prerequisite: graduate standing.

BEE 647 Water Transport in Plants
Fall. 2 credits. Offered alternate years.

BEE 649 Wastewater Treatment 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 358 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 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 MBA 573)
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: T&AM 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. 1–4 credits. 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
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 773 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 767 Industrial Ecology of Agriculturally Based Bioindustries  
Spring. 3 credits. Prerequisites: 1 year calculus, MATLAB. BEE 687, graduate standing.

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 PROGRAM

BMEP 101 Introduction to Biomedical Engineering Analysis (also ENGR 101)  
Spring. 1 credit. Requires concurrent registration in BIO G 110. Lecture and laboratory. D. Gribb and S. Archer. For description, see ENGR 101.

BMEP 265 Biological Materials and Their Synthetic Replacements (also MS&E 265)  
Spring. 3 credits. For description, see MS&E 265.

BMEP 301 Molecular Principles of Biomedical Engineering (also CHEM 401)  
Fall. 3 credits. Prior course work in BIO G 110, BIO BM 330, BIO MI 290 or equivalent. Lect. and lab. K. H. Lee, S. Archer. 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 nanomachines and nanobiotechnology. Existing and emerging technologies and instrumentation critical to molecular-level analysis in biomedical engineering.

BMEP 302 Cellular Principles of Biomedical Engineering (also CHEM 402)  
Spring. 3 credits. Prerequisite: BMEP 301 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.

BMEP 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.

BMEP 360 Molecular and Cellular Biomechaning (also BEE 360)  
Spring. 3 credits. Prerequisite: biochemistry or A&EP 252. For description, see BEE 360.

BMEP 401 Biomedical Engineering Analysis of Metabolic and Structural Systems (also M&E 466)  
Fall. 3 credits. Prerequisite: prior course work in basic biology. Lect. and lab. L. Bonassar, S. Archer. Quantitative biology of the renal, respiratory, cardiovascular, and musculoskeletal systems. Biophysics and biomedical engineering of bone. Tissue engineering and biomechanics of soft tissue.

BMEP 402 Information Exchange in Biomedical Engineering Systems  
Spring. 3 credits. Prerequisite: BMEP 401 or permission of instructor. Lec. and lab. Staff. Quantitative biology of the endocrine, nervous, and immune systems. Computation and mathematics of neural nets, communication among macroscale biocommunication systems.

BMEP 404 CDE in Biomedical System Design (also ECE 402)  
Spring. 1–4 credits. Co- or prerequisites: at least one of ECE 425, ECE 476, ECE 453. J. C. Belina. For description, see ECE 402.

BMEP 463 Neuromuscular Biomechanics (also M&E 463)  
Spring. 3 credits. Prerequisite: ENGRD 202 and 203, or permission of instructor. Offered alternate years. For description, see M&E 463.

BMEP 464 Orthopaedic Tissue Mechanics (also M&E 464)  
Spring. 3 credits. Prerequisites: ENGRD 202 and M&E 325 or permission of instructor. Offered alternate years. For description, see M&E 464.

BMEP 481 Biomedical Engineering (also CHEM 481)  
Spring. 3 credits. Prerequisite: CHEM 324 or equivalent permission of instructor. W. L. Olbricht. For description, see CHEM 481.

BMEP 501 Bioengineering Seminar (also BEE 501)  
Fall, spring. 1 credit. For juniors, seniors, and graduate students only. Staff. Broad survey of all aspects of bioengineering, including biomedical, bioprocess, biological, and bioenvironmental engineering and aspects of biotechnology. Sessions may be technical presentations or discussions. Sessions may occasionally be held outside of scheduled times.

BMEP 533 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; some lectures as TXA 439.

BMEP 565 Biomechanical Systems Analysis and Design (also M&E 565)  
Fall, 3 or 4 credits. Prerequisites: undergraduate courses in dynamics and strength of materials (e.g., T&M ENGRD 202 and 203) and senior standing, graduate standing, or permission of instructor. For description, see M&E 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. Prerequisites: permission of instructor. A. P. Reeves. For description, see ECE 578.

BMEP 605 Fundamentals of Biomedical Engineering I (also CHEM 605)  
Fall. 1–4 credits (1 credit per section). Prerequisites: graduate standing in Engineering or Science; PHYS 213 and MATH 294 or equivalent. S-U grades optional for graduate students not majoring or minoring in biomedical engineering. Coordinator: M. L. Shuler. A series of four-week modules on specialized topics.

605.1 Cellular Dynamics and Cancer  

605.2 Physiological Systems  
1 credit. Meets second third of term. Staff. Emphasis is on development of physiologically-based pharmacokinetic models for drug delivery and on models of cardiovascular system, particularly blood flow.

605.3 Biomaterials  
1 credit. Meets final third of term. C. C. Chu and staff. The main objective of the biomaterials module is to provide students with an effective background in a wide range of biomaterials that include polymers, metals/alloys, and ceramics that are currently used in human body repair. After completion of this module, students have the basic and some in-depth knowledge of what biomaterials are made of, how biomaterials contribute to the saving of human lives, the criteria of materials for biomedical use, biocompatibility, failure modes of biomaterials, the current R&D activities in biomaterials, challenges that biomaterials are facing, and future direction of R&D in biomaterials.

[605.4 Biomedical Engineering Project  

Students work in teams on a design problem of their choice related to development of a biomedical device or procedure. Each team prepares a written report.

BMEP 606 Fundamentals of Biomedical Engineering II (also CHEM 606)  
Spring. 1–4 credits. Prerequisites: graduate standing in Engineering or Science; PHYS 213 and MATH 294 or equivalent. S-U grades optional for graduate students not majoring or minoring in biomedical engineering. Coordinator: M. L. Shuler. A series of one and two-credit modules on specialized topics.

606.1 Biomedical Instrumentation and Diagnosis  
1 credit. Lect. Meets second third of term. Staff. This course gives a perspective on the use of advanced instrumentation for the diagnosis and treatment of disease and the investigation of fundamental biological processes. The basic theory and application of different microscopic and spectroscopic methods, imaging tomographies, and micro-electromechanical devices to biological systems are explored.
606.2 Artificial Organs and Tissue Engineering
1 credit. Lec. Prerequisite: ENGRG 605, Section 08 (Biomaterials). Meets first third of term. L. Bonassar and staff.
An introduction to the use of cells, biological molecules, and synthetic materials as the basis for building artificial organs and encouraging tissue regeneration. The section discusses the physiological and engineering issues underlying the use of synthetic, extracorporeal systems (e.g., membrane-based dialysis devices), composite implantable materials and nerve regeneration guides, and hybrid cell/polymer implantable systems (e.g., engineered tissues).

606.3 Biomechanics of Musculoskeletal Systems
Integrated lecture/laboratory experience. The anatomy and function of the canine hindlimb are explored in dissection laboratories and through demonstration of a non-invasive technique, computed tomography. Methods of approximating functional joint loads are discussed, and physical testing is demonstrated. A computer model of the stifle (knee) joint is created by combining knowledge of the anatomy and the mechanical environment.

BMEP 631 Engineering Principles for Drug Delivery (also CHEM 631)
Fal. 3 credits. Prerequisite: graduate standing or permission of instructor.
Application of engineering principles (particularly fluid, transport, and kinetics) to problems in drug formulation and delivery. Specific topics include traditional drug formulation, mechanisms and kinetics of pharmaceutical stability, transdermal systems, controlled release devices, prodrugs, and foreign body response, cell engineering, 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 760 Nucleic Acid Engineering (also BEE 760)
Fall. 3 credits. Prerequisite: BEE 360 or permission of instructor.
For description, see BEE 760.

CHEMICAL ENGINEERING

CHEME 112 Introduction to Chemical Engineering (also ENGRI 112)
Fall. 3 credits. Limited to freshmen.
T. M. Duncan.
This is a course in the Introduction to Engineering series. For description, see ENGRI 112.

CHEME 120 Introduction to Biomedical Engineering (also ENGRI 120)
This is a course in the Introduction to Engineering series. For description, see ENGRI 120.

CHEME 219 Mass and Energy Balances (also ENGRI 219)
Fall. 3 credits. Corequisite: physical or organic chemistry or permission of instructor.
W. L. Olbricht.
For description, see ENGRI 219.

CHEME 301 Nonresident Lectures
Spring. 1 credit. M. Ackley.
Lecturers from industry and from selected departments of the university provide information to assist students in their postgraduate plans.

CHEME 313 Chemical Engineering Thermodynamics
Fall. 4 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 equilibrium; heat effects in batch and flow processes; and power cycles and refrigeration.

CHEME 323 Fluid Mechanics
Spring. 3 credits. Prerequisites: CHEME 219 and engineering mathematics sequence.
D. L. Koch.

CHEME 324 Heat and Mass Transfer
Fall. 3 credits. Prerequisite: CHEME 323.
C. Cohen.

CHEME 332 Analysis of Separation Processes
Spring. 3 credits. Prerequisites: CHEME 313 and 323. Y. L. Joo.
Analysis of separation processes involving phase equilibria and mass transfer. Covers: phase equilibria; binary and multicomponent distillation; liquid-liquid extraction; gas absorption, adsorption, membrane separations.

CHEME 372 Introduction to Process Dynamics and Control
Spring. 1 credit. Prerequisites: CHEME 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.

CHEME 390 Reaction Kinetics and Reactor Design
Spring. 3 credits. Prerequisites: CHEME 313 and 323. J. R. Engstrom.
A study of chemical reaction kinetics and principles of reactor design for chemical processes.

CHEME 391 Physical Chemistry II (also CHEM 391)
Spring. 4 credits. Limited to engineering students. T. M. Duncan.
For description, see CHEM 391.

CHEME 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.

CHEME 402 Cellular Principles of Biomedical Engineering (also BMEP 302)
Spring. 3 credits. D. Putnam.
For description, see BMEP 302.

CHEME 432 Chemical Engineering Laboratory
Fall. 4 credits. Prerequisites: CHEME 323, 324, 332, and 390. K. E. Ackley and staff.
Laboratory experiments in fluid dynamics, heat and mass transfer, kinetics, other operations. Correlation and interpretation of data. Technical report writing.

CHEME 462 Chemical Process Design
Spring. 4 credits. Prerequisite: CHEME 432. K. E. Ackley and staff.
A consideration of process and economic alternatives in selected chemical processes; design and assessment.

CHEME 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.

CHEME 472 Feedback Control Systems (also ECE 471 and M&AE 478)
Fall. 4 credits. Prerequisites: CHEME 372, ECE 301, M&AE 326, or permission of instructor. A. B. Anton and R. D’Andrea.
For description, see M&AE 478.

CHEME 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.
CHME 481 Biomedical Engineering (also BMEP 481)
Spring. 3 credits. Prerequisite: CHME 324 or equivalent or permission of instructor. W. L. Obriech.
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 (ECG and pace makers), and analysis of physiological processes such as adhesion, mobility, secretion, and growth.

CHME 484 Microchemical and Microfluidic Systems
Fall. 5 credits. Prerequisite: CHME 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.

CHME 490 Undergraduate Projects in Chemical Engineering
Fall, spring. Variable credit. Research or studies on special problems in chemical engineering.

CHME 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.

CHME 520 Chemical Polymer, Biomedical, and Electronic Materials Processing
Fall, spring. 1–6 credits (1 credit per section).

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.

520.2 Introduction to Biomedical Engineering
Spring. 1 credit. Meets first third of term. W. L. Obriech.
Meets concurrently with CHME 481.

520.3 Introduction to Electronic Materials Processing
Spring. 1 credit. Meets first third of term. A. B. Anton.
Meets concurrently with CHME 480.

520.4 Introduction to Polymer Processing
Spring. 1 credit. Meets final second 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.

520.5 Chemical Engineering Processing Units and Equipment
Spring. 1 credit. Meets first third of term. K. E. Ackley and A. M. Center.

The hardware of the chemical process and refining industries and their everyday evaluation and trouble shooting.

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.

520.7 Process Control Strategies
Spring. 1 credit. Meets first third of term. A. M. Center.
Meet concurrently with CHME 470.

CHME 543 Bioprocess Engineering
Spring. 3 credits. Prerequisite: CHME 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. Application to food, fermentation, and pharmaceutical industries and to biological waste treatment.

CHME 562 Managing Chemical Process Design
Spring. 1 or 2 credits. Prerequisite: CHME 462. K. E. Ackley.
Guidance and evaluation of chemical process designs developed by teams of chemical engineers.

CHME 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.

CHME 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.

CHME 590 Special Projects in Chemical Engineering
Fall. Variable credit. Limited to graduate students.
Nonthesis research or studies on special problems in chemical engineering.

CHME 596 Systems on a Chip
Fall. 3 credits. Not offered 2003. P. Clancy.
Fundamentals of electronic chip fabrication processes for systems on a chip, the complexities of building devices on dissimilar substrates (e.g., Si on plastics), the creation of organic optoelectronic devices, and functional design integration issues. Applications to lab on a chip systems. Group design project required.

CHME 605 Fundamentals in Biomedical Engineering (also BMEP 605)
Fall. 1–4 credits (1 credit per section). Prerequisites: graduate standing in Engineering or Science; PHYS 213 and MATH 294 or equivalent.
Undergraduates must have permission of instructor and have completed BEE 454, CHME 481, or MSAE 465. S-U grades optional for students not majoring or minoring in biomedical engineering.

For description, see BMEP 605.

CHME 606 Fundamentals of Biomedical Engineering II (also BMEP 606)
Spring. 1–4 credits. Prerequisites: graduate standing in engineering or science; PHYS 213 and MATH 294 or equivalent.
Undergraduates must have permission of instructor. S-U grades optional for students not majoring or minoring in biomedical engineering. Coordinator: M. L. Shuler.
A series of one- and two-credit modules on specialized topics. For description see BMEP 606.

CHME 631 Engineering Principles for Drug Delivery (also BMEP 631)
Fall. 3 credits. Prerequisite: graduate standing or permission of instructor.
For description, see BMEP 631.

CHME 640 Polymeric Materials
Fall. 3 credits. C. Gohen.
Chemistry and physics of the formation and characterization of polymers. Principles of fabrication.

CHME 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.

CHME 661 Air Pollution Control
Spring. 3 credits. P. H. Steen.

CHME 675 Synthetic Polymer Chemistry (also MS&E 622 and CHEM 671)
Fall. 4 credits. Prerequisites: CHEM 359–360 or equivalent or permission of instructor.
For description, see CHEM 671.

CHME 711 Advanced Chemical Engineering Thermodynamics
Fall. 3 credits. Prerequisite: CHME 313 or equivalent. P. Clancy.

CHME 713 Chemical Kinetics and Dynamics
Spring. 3 credits. Prerequisite: CHME 390 or equivalent. F. M. White.
Topics include microscopic and macroscopic viewpoints; connections between phenomenological chemical kinetics and molecular reaction dynamics; reaction cross sections, potential energy surfaces, and dynamics of bimolecular collisions; molecular beam scattering; transition state theory. Unimolecular reaction dynamics; complex
chemically reacting systems: reactor stability, multiple steady states, oscillations, and bifurcation; reactions in heterogeneous media, and free-radical mechanisms in combustion and pyrolysis.

CHME 731 Advanced Fluid Mechanics and Heat Transfer
Fall. 3 credits. Prerequisites: CHME 323 and 324 or equivalent. A. Stroock.
Topics include derivation of the equations of motion for Newtonian fluids, low Reynolds number fluid dynamics, lubrication theory, inviscid fluid dynamics; boundary layer theory; and convective and conductive heat transfer.

CHME 732 Diffusion and Mass Transfer
Spring. 2 credits. Prerequisite: CHME 731 or equivalent. L. A. Archer.
Conservation equations in multicomponent systems, irreversible thermodynamics, dispersion, and Brownian diffusion. Mass transfer for convective diffusion in liquids. Application to a variety of problems such as coagulation of aerosols, diffusion through films and membranes, liquid-liquid extraction, chemical vapor deposition, polymer rheology and diffusion, and reaction-diffusion systems.

CHME 741 Selected Topics in Biochemical Engineering
Fall, spring. 1 credit (may be repeated for credit). Prerequisite: permission of instructor. K. H. Lee and M. L. Shuler.
Discussion of current topics and research in biochemical engineering for graduate students.

CHME 745 Physical Polymer Science I
Fall. 3 credits. Corequisite: CHME 711 or equivalent. Offered alternate years; offered 2003-2004. C. Cohen.

CHME 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.

CHME 753 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation
Fall. 3 credits. Prerequisite: CHME 751 or equivalent. Offered alternate years; offered 2003-2004. P. H. Steen.
Topics include elements of stability and bifurcation theory, branch-following techniques, stability of discrete and continuous systems, and application to elasticity, reaction-diffusion, and hydrodynamic systems using software for continuation problems.

CHME 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.

CHME 792 Principles and Practices of Graduate Research
Fall, spring. 1 credit. T. M. Duncan and staff.
A colloquium/discussion group series for first-year graduate students. Topics include the culture and responsibilities of graduate research and the professional community; the mechanics of conducting research (experimental design, data analysis, serendipity in research, avoiding self-deception), documenting research (lab notebooks, computer files), and reporting research (writing a technical paper and oral presentations).

CHME 890 Thesis Research
Fall, spring. Variable credit.
Thesis research for the M.S. degree in chemical engineering.

CHME 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 Systems Engineering and Information Technology. 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) (F,3cr.)
CEE 116 Modern Structural Systems and Materials (also ENGR 116) (F,3cr.)
CEE 241 Engineering Computation (also ENGRD 241) (F,3cr.)
CEE 304 Uncertainty Analysis in Engineering (F,3cr.)
CEE 308 Introduction to CADD (F,3cr.)
CEE 309 Special Topics in Civil and Environmental Engineering (F,1cr.)
CEE 323 Engineering Economics and Management (also ENGRG 323) (S,3cr.)
CEE 400 Senior Honors Thesis (F,3cr.)
CEE 401 Undergraduate Engineering Teaching in CEE (F,3cr.)

Civil Infrastructure
See also: CEE 116, CEE 241, CEE 304, CEE 308, CEE 503, and CEE 595

Geotechnical Engineering
CEE 341 Introduction to Geotechnical Engineering and Analysis (F,3cr.)
CEE 501/502 Design Project in Geotech/Structures (S,F,3cr.)
CEE 602 Civil Infrastructure Seminar (F,1cr.)
CEE 640 Foundation Engineering (F,3cr.)
CEE 641 Retaining Structures and Slopes (S,3cr.)
CEE 644 Environmental Applications of Geotechnical Engineering (S,3cr.)
CEE 649 Special Topics in Geotechnical Engineering (F,3cr.)
CEE 740 Engineering Behavior of Soils (F,3cr.)
CEE 741 Rock Engineering (S,3cr.)
CEE 744 Advanced Foundation Engineering (F,2cr.)
CEE 745 Soil Dynamics (S,3cr.)
CEE 746 Embankment Dam Engineering (S,2cr.)
CEE 749 Research in Geotechnical Engineering (F,3cr.)
CEE 840 Thesis—Geotechnical Engineering (F,3cr.)

Structural Engineering
CEE 116 Modern Structural Systems and Materials (F,3cr.)
CEE 371 Modeling of Structural Systems (F,3cr.)
CEE 376 Physical and Computational Material Simulation (S,1cr.)
CEE 472 Fundamentals of Structural Mechanics (F,3cr.)
CEE 473 Civil Infrastructure Design I (F,3cr.)
CEE 474 Civil Infrastructure Design II (S,3cr.)
CEE 475 Introduction to Composites Materials (F,3cr.)
CEE 479 Collaborative Distance Design of Structural Systems
CEE 501/502 Design Project in Geotech/Structures (F,S,3cr.)
CEE 602 Civil Infrastructure Seminar (F,S,1cr.)
CEE 671 Random Vibration (F,3cr.)
CEE 673 Engineering Analysis (F,S,3cr.)
CEE 674 Finite Element Modeling of Civil Infrastructure (S,3cr.)
CEE 675 Concrete Materials and Construction (S,3cr.)
CEE 676 Finite Element Analysis for Mechanical, Structural, and Aerospace Applications (S,3cr.)
CEE 677 Stochastic Processes in Science and Engineering (F,3cr.)
CEE 678 Structural Dynamics and Earthquake Engineering (S,3cr.)
CEE 770 Engineering Fracture Mechanics (F,3cr.)
CEE 774 Advanced Structural Concrete (S,3cr.)
CEE 775 Structural Concrete Systems (S,3cr.)
CEE 776 Design of Metal Structures (S,3cr.)
CEE 778 Fundamentals of Structural Mechanics (S,3cr.)
CEE 783 Civil and Environmental Engineering Materials Project (F,3cr.)
CEE 785 Research in Structural Engineering (F,3cr.)
CEE 786 Special Topics in Structural Engineering (F,S,3cr.)
CEE 880 Thesis—Structural Engineering (F,S,3cr.)

**Environment**
See also CEE 113, CEE 241, and CEE 304

**Environmental Engineering**
CEE 113 Solving Environmental Problems for Urban Regions (F,3cr.)
CEE 351 Environmental Quality Engineering (S,3cr.)
CEE 352 Water Supply Engineering (F,3cr.)
CEE 451 Microbiology for Environmental Engineering (F,3cr.)
CEE 453 Laboratory Research in Environmental Engineering (S,3cr.)
CEE 501/502 Design Project in Environmental Engineering (F,S,3cr.)
CEE 601 Water Resources and Environmental Engineering Seminar (F,1cr.)
CEE 632 Hydrology (F,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,3cr.)
CEE 638 Hydraulics Seminar (S,1cr.)
CEE 639 Special Topics in Hydraulics (F,S,3cr.)
CEE 655 Transport, Mixing, and Transformation in the Environment (F,3cr.)
CEE 735 Research in Hydraulics (F,S,3cr.)
CEE 880 Thesis—Fluid Mechanics and Hydrology (F,S,3cr.)

**Systems Engineering and Information Technology**
See also CEE 113, CEE 241, and CEE 304

**Engineering Management**
CEE 490 Management Practice in Project Engineering (F,S,3cr.)
CEE 590 Project Management (F,S,3cr.)
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 597 Risk Analysis and Management (S,3cr.)
CEE 598 Introduction to Decision Analysis (S,4cr.)
CEE 692 Special Topics in Engineering Management (F,S,3cr.)
CEE 694 Research in Engineering Management (F,S,3cr.)
CEE 764 Special Topics in Transportation (F,S,3cr.)
CEE 860 Thesis—Transportation Engineering (F,S,3cr.)

**Remote Sensing**
CEE 411 Remote Sensing: Environmental Applications (also CSS 411) (S,3cr.)
CEE 610 Remote Sensing Fundamentals (F,3cr.)
CEE 615 Digital Image Processing (S,3cr.)
CEE 671 Project—Remote Sensing (F,S,3cr.)
CEE 768 Special Topics—Remote Sensing (F,S,3cr.)
CEE 810 Thesis—Remote Sensing (F,S,3cr.)

**Systems Engineering**
CEE 504 Applied Systems Engineering (also M&A 591, ECE 512, OR&IE 512, SYSEN 510, COM S 504) (F,3cr.)
CEE 505 Applied Systems Engineering II (also M&A 592, ECE 513, OR&IE 513, SYSEN 520, COM S 505) (F,3cr.)
CEE 506 Civil Infrastructure Systems (S,3cr.)
CEE 509 Heuristic Methods of Optimization (also COM S 574) (S,3cr.)
CEE 603 Systems Engineering and Information Technology Seminar (F,1cr.)

**Transportation**
CEE 361 Introduction to Transportation Engineering (S,3cr.)
CEE 463 Transportation and Information Technology (F,3cr.)
CEE 464 Transportation Systems Design (S,3cr.)
CEE 561 Urban Transportation Planning and Modeling (F,3cr.)
CEE 762 Transportation Research (F,S,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 ENGRI 113)**
Fall. 3 credits. Not open (without instructor’s permission) to upper-division engineering students. Students must register under ENGRI 113. M. L. Weber-Shirk.
This is a course in the Introduction to Engineering series. For description, see ENGRI 113.

**CEE 116 Modern Structural Systems and Materials (also ENGRI 116)**
Fall. 3 credits. Students must register under ENGRI 116. R. A. Davidson.
This is a course in the Introduction to Engineering series. For description, see ENGRI 116.

**CEE 241 Engineering Computation (also ENGRD 241)**
Fall, 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. W. Philpot, C. A. Shoemaker. For description, see ENGRD 241.
CIVIL AND ENVIRONMENTAL ENGINEERING

CCE 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, and related disciplines. Course covers data presentation, commonly used probability distributions describing natural phenomena and material properties, parameter estimation, confidence intervals, hypothesis testing, correlation, linear regression, and nonparametric statistics. Examples include structural reliability, windspeed/flood distributions, pollutant concentrations, and models of vehicle arrivals.

CCE 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, J. J. Bisogni.
Learn to employ Computer Aided Design and Drafting (CADD) to construct 2D drawings and 3D models using a variety of AutoCAD 2000 techniques. Alternative software tools for solid modeling are introduced. Course meets in ACCEL once per week for eleven weeks, and grades are based on attendance, weekly exercises completed in class, and a semester project.

CCE 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.

CCE 323 Engineering Economics and Management (also ENGRG 323)
Spring; usually offered in summer for Engineering Co-op Program. 3 credits. Primarily for juniors and seniors. D. P. Loucks.
For description, see ENGRG 323.

CCE 331 Fluid Mechanics
Fall; usually offered in summer for Engineering Co-op Program. 4 credits. Prerequisite: ENGRD 202 (may be taken concurrently). E. A. C. Loucks.
Covers: hydrostatics, the basic equations of incompressible fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulence, dimensional analysis, laminar and turbulence boundary layer, flows around obstacles, and open-channel flow.

CCE 332 Hydraulic Engineering
Application of fluid-mechanical principles to problems of engineering practice and design: hydraulic machinery, water-distribution systems, open-channel design, river engineering, and pollutant dispersal. Lectures supplemented by laboratory work and a design project. See www.cee.cornell.edu/cce332/for details.

CCE 341 Introduction to Geotechnical Engineering and Analysis
Spring. 4 credits. Prerequisite: ENGRD 202, CCE 351 (or equivalent), or permission of instructor. H. E. Stewart.
Fundamentals of geotechnical engineering. Topics covered include: origins and descriptions of soil and rock as engineering materials, subsurface exploration methods, principles of effective stresses, stress distribution and ground settlements from surface loads, magnitude and time-dependent subsurface fluid flow, soil strength and failure criteria, geoenvironmental applications, and introduction to hazardous waste containment systems.

CCE 351 Environmental Quality Engineering
Spring. 3 credits. L. W. Lion.
Introduction to engineering aspects of environmental quality control. Quality parameters, criteria, and standards for water and wastewater. Elementary analysis pertaining to the modeling of pollutant reactions in natural systems, and introduction to design of unit processes for wastewater treatment.

CCE 352 Water Supply Engineering
Fall. 3 credits. Prerequisites: CCE 351 and previous/concurrent enrollment in CEE 451 or BIOMI 290. J. J. Bisogni.
Analysis of contemporary threats to human health from water supplies. Criteria and standards for design and management of Water-quality control theory. Design of water supply facilities.

CCE 361 Introduction to Transportation Engineering
Spring, usually offered in summer for Engineering Co-op Program. 3 credits. J. Mbwana and A. H. Meyburg.
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.

CCE 371 Modeling of Structural Systems
Spring. 4 credits. Prerequisite: ENGRD 202. J. F. Abel.
Analytical and computational modeling of structural systems. The course is based on case studies involving different scales and different materials such as modern steel bridges, soil-foundation-structure systems, micro-electromechanical structures (MEMS), and aerospace vehicle structures. Topics include: analytical methods for solving statically determinate systems; virtual work principles for determination of kinematic and static unknowns; matrix formulation of the flexibility and stiffness methods of structural analysis for statically indeterminate systems; linear members (2D truss, frame); and an introduction to finite element modeling of continua.

CCE 376 Physical and Computational Material Simulation
Spring. 4 credits. Prerequisites: ENGRD 202, CCE 371. Staff.
Material failure phenomena such as fracture, plastic yielding and buckling in metals, plastics, polymeric and cement-based composites including concrete, and smart materials. Material response presented through fundamental theories of physical behavior, theories for predicting response and methods for computational simulation. Practical considerations for material use in civil infrastructure. Weekly lab meetings including fabrication, experimentation and simulation of materials.

CCE 400 Senior Honors Thesis
Fall, spring. 1-6 credits. Staff.
Available to students admitted to the CEE Honors Program. Supervised research, study, and/or project work resulting in a written report or honors thesis.

CCE 401 Undergraduate Engineering Teaching in CEE
Fall, spring. 1-3 credits. Prerequisite: permission of instructor. Staff.
Methods of instruction developed through discussions with faculty and by assisting with the instruction of undergraduates under the supervision of faculty.

CCE 402 Engineers without Frontiers
Fall, spring. 2 credits. R. A. Davidson and J. Mbwana. Students may enroll for credit for a maximum of 4 semesters.
Students undertake engineering-based group service projects in cooperation with partner community organizations. The projects, which may be local or international, offer real-life engineering research and design experience from problem formulation through implementation. Students work on interdisciplinary teams with a faculty mentor (often a professor or practicing engineer) and a representative from the partner community organization. Projects are selected based on academic content, potential significance to the partner community, commitment of the partner community organization, and student safety. The instructors coordinate with the Cornell chapter of Engineers without Frontiers.

CCE 411 Remote Sensing: Resource Inventory Methods (also CSS 411)
Spring. 3 credits. Prerequisite: permission of instructor. S. C. DeGloria.
For description, see CSS 411.

CCE 431 Geohydrology (also GEO/LAS 445 and BEE 471)
Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes: description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.

CCE 432 Hydrology
Spring. 3 credits. Prerequisite: CCE 331. Intended for undergraduates. Lectures concurrent with CEE 632. W. H. Brutsaert.
Introduction to hydrology as a description of the water cycle and the role of water in the natural environment, and other issues for environmental engineers. See description for CEE 632.

CCE 436 Case Studies in Environmental Fluid Mechanics
Spring. 4 credits. Prerequisite: CCE 351 or equivalent. E. A. Cowen.
An introduction to fundamental fluid mechanics and transport processes of the environment through laboratory- and field-based studies (Cayuga Lake, and Fall, Six-Mile, and Cascadilla Creeks) and case studies. Topics include: surface and interfacial waves, dynamics, sediment and nutrient/contaminant transport, and interfacial transfer. Lectures are based on laboratory/field projects. Course includes a design project.

CCE 437 Experimental Methods in Fluid Dynamics
An introduction to fundamental aspects of microbiology, organic chemistry, and biochemistry pertinent to environmental engineering. Topics include: principal characteristics and reactions of organic molecules; characteristics of Bacteria, archaebacteria, eukaryotes, fungi, algae, and protozoa; and viruses relevant to water, wastewater and groundwater; pathogens, disease, and immunity; environmental influences on microorganisms; bioenergetics; enzymes and metabolism; microbial genetics; molecular microbiology, and microbial ecology. This is an introductory course; consequently, it is inappropriate for those who have taken BIOMI 290 or equivalent.

CxEE 451 Microbiology for Environmental Engineering
Fall. 3 credits. Prerequisite: two semesters of college chemistry. R. E. Richardson.
An introduction to fundamental aspects of microbiology, organic chemistry, and biochemistry pertinent to environmental engineering. Topics include: principal characteristics and reactions of organic molecules; characteristics of Bacteria, archaebacteria, eukaryotes, fungi, algae, and protozoa; and viruses relevant to water, wastewater and groundwater; pathogens, disease, and immunity; environmental influences on microorganisms; bioenergetics; enzymes and metabolism; microbial genetics; molecular microbiology, and microbial ecology. This is an introductory course; consequently, it is inappropriate for those who have taken BIOMI 290 or equivalent.

CxEE 453 Laboratory Research in Environmental Engineering
Spring. 3 credits. Prerequisites: CxEE 351 or permission of instructor. M. L. Weber-Shirk.
Laboratory investigations of reactor flow characteristics; acid rain/lake chemistry; contaminated soil-site assessment; risk assessment, and remediation; pollutant dispersion/transport in rivers; drinking water filtration for pathogen removal; oxygen sag in rivers; and biodegradation in landfills. Design of laboratory experiments, development of laboratory methods, and use of experimental data are emphasized. See www.cee.cornell.edu/cee453 for more information.

CxEE 463 Transportation and Information Technology
Fall. 3 credits. M. A. Turnquist.
Improving the use of existing facilities has become an important objective in transportation planning. This course examines the role of computer and telecommunications technologies in these improvements. Specific attention is focused on the development of analyses to evaluate the benefits of inclusion of these technologies in transportation systems.

CxEE 464 Transportation Systems Design
Spring. 3 credits. Prerequisite: CxEE 361.
Staff
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.

CxEE 472 Fundamentals of Structural Mechanics
Fall, summer. 3 credits. Prerequisites: ENGRD 202, MATH 294. Primarily for seniors or by permission of the instructor. M. D. Grigoriu.
The course covers geometric definitions of deformation, rotation, and strain; small-strain theory; and the concept of stress. Students will learn about equilibrium and the conservation of energy and virtual work. Other course topics include elasticity, basic plasticity, failure criteria for design, plane stress and plane strain, stress function solutions, torsion, beam and plate theory, and buckling. There will be two lectures and a recitation per week.

CxEE 473 Civil Infrastructure Design I
Fall. 4 credits. Prerequisites: CxEE 341 and 376 or permission of instructor. K. C. Hoover.
Behavior and design of reinforced concrete and structures. Discussion of how forces are transferred through elements of building system. Includes a semester project requiring the design of a reinforced concrete structure.

CxEE 474 Civil Infrastructure Design II
Spring. 4 credits. Prerequisite: CxEE 341 and 376 or permission of instructor. K. C. Hoover.
Behavior and design of steel members, connections, and structures. Discussion of structural systems for buildings and bridges.

CxEE 475 Introduction to Composite Materials (also M&AE 455, MS&E 555, and TAM 455)
Spring. 4 credits. L. Phoenix.
For description, see TAM 455.

CxEE 479 Collaborative, Distance Design of Structural Systems (also M&AE 491)
Fall, spring. 8 credit hours. Students who enroll in CxEE 479 are expected to take it in both the fall and spring semesters.
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.

CxEE 481 LRFB-Based Engineering of Wood (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.

CxEE 490 Management Practice in Project Engineering
Fall. 3 credits. Prerequisite: permission of instructor K. C. Hoover.
An introduction to the principles of project management. Planning, organizing, communicating, scheduling, and controlling of engineering work done in project teams.

CxEE 501/502 Design Project
Fall, spring. 3 credits each term. Required for students in the M.Eng. (Civil) program. Staff.
CxEE design projects present students with an exemplary design experience that reflects those carried out in the course of professional practice. Projects are typically performed by student design groups, and the topics reflect the diverse specialty areas of the Civil and Environmental engineering field as described below.

CxEE 501/502 Design Project in Geotech Structures
Design of major civil engineering project. Planning and preliminary design during the fall term; final design completed in January intersession.

CxEE 505 Applied Systems Engineering I (also COM S 504, ECE 512, M&AE 591, OR&IE 512, SYSEN 510)
Fall. 3 credits. Prerequisite: senior or graduate standing in engineering, or permission of instructor. R. Roundy/M. E. Campbell.
For description, see SYSEN 510.

CxEE 505 Applied Systems Engineering II (also COM S 505, ECE 512, M&AE 592, OR&IE 513, SYSEN 520)
Spring. 3 credits. Prerequisite: Applied Systems Engineering I (CxEE 504, COM S 504, ECE 512, M&AE 591, OR&IE 512 or SYSEN 520). L. Nozick, P. Jackson, and R. Thomas.
For description, see SYSEN 520.

CxEE 506 Civil Infrastructure Systems
Spring. 3 credits. Letter S-U.
Prerequisites: Probability and statistics (CxEE 304 or equivalent) and Engineering economics (CxEE 323 or equivalent). L. K. Nozick.
Introduction to the framing and solution of civil infrastructure problems using a systems engineering approach. Systems tools, such as optimization, life-cycle cost analysis, decision analysis, simulation, Markov modeling, and risk analysis, will be examined through case studies related to civil infrastructure.

CxEE 509 Heuristic Methods for Optimization (also COM S 572)
Spring. 3 or 4 credits. Prerequisites: CxEE/ENG 241 or COM S/ENG 211 or 222 or graduate standing or permission of instructor. Not offered every year. G. A. Shoemaker and B. Selman.
This course describes a variety of heuristic search methods including simulated annealing, tabu search, genetic algorithms, randomized evolution strategy, random walk, and direct search algorithms. Algorithms are used to find values of discrete and/or continuous variables arising in optimization and model fitting. Applications are discussed in a range of areas including some of the following: artificial intelligence, scheduling, protein folding, economic planning, water quality protection, telecommunications, and robotics. The advantages and disadvantages of heuristic search methods for both serial and parallel computa-
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. P. Carr
A course on the fundamentals of construction planning: organization of the work site; construction planning, scheduling, and cost estimating; bidding, temporary structures; applications of computer methods; and the relationships among owners, designers, contractors, suppliers, and developers.

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, BTRY 261, or ECON 324. Some knowledge of calculus is helpful. Course examines statistical, time series, and mathematical methods in risk analysis, including applications to environmental, technical, and other fields.

CEE 598 Introduction to Decision Analysis
Spring. 3 credits. Prerequisite: an introduction to probability and statistics course such as CEE 304, ENGRD 270, ILRST 210, BTRY 261 or AE 210. Some knowledge of calculus is helpful. Course introduces students to the basic concepts and techniques of decision analysis and modeling. Topics include decision trees, sensitivity analysis, value of information, utility theory, and applications to areas of engineering and life. Includes a group project to analyze a real-world decision.

CEE 601 Water Resources and Environmental Engineering Seminar
Fall. 1 credit. J. R. Stedinger.
Presentation of topics of current interest.

CEE 602 Civil Infrastructure Seminar
Fall, spring. 1 credit. Required for first-year graduate students. Staff.
Presentation of topics of current interest.

CEE 603 Systems Engineering and Information Technology Seminar
Fall, spring. 1 credit. Staff.
Presentation of topics of current interest.

CEE 605 Issues in Risk Analysis Seminar
Fall. 1 credit. S-U 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 two required discussion meetings for class members designed to integrate the issues raised during the semester.

CEE 610 Remote Sensing Fundamentals
(also CCS 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. Prerequisites: facility with algebra and trigonometry (e.g., MATH 109) and statistics (e.g., CEE 304 or ARME 310) 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 Project—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 618 Special Topics—Remote Sensing
On demand. 1-6 credits. W. D. Philpot.
Supervised study in small groups on one or more special topics not covered in the regular courses. Special topics may be of a theoretical or applied nature.

CEE 620 Water-Resources Systems Engineering
Spring. 3 credits. Prerequisites: CEE 323 and CEE 593. D. P. Loucks.
Development and application of deterministic and stochastic optimization and simulation models for water-resources 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 prediction and control.

CEE 621 Stochastic Hydrology
Spring. 3 credits. Prerequisites: CEE 304 or permission of instructor. Not offered 2003-2004. J. R. Stedinger.
Course examines statistical, time series, and stochastic optimization and simulation methods in assessment of water resources planning and management problems involving uncertainty objectivity 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.)
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 include linear programming, integer, dynamic, nonlinear programming, and sensitivity analysis.

CEE 628 Environmental and Water Resources Systems Analysis Seminar
Spring. 1 credit. Prerequisite: permission of instructor. C. A. Shoemaker.
Graduate students and faculty members give informal lectures on various topics related to ongoing research in environmental or water resources systems planning and analysis.

CEE 631 Flow and Contaminant Transport Modeling in Groundwater
Spring. 3 credits. Prerequisites: MATH 294 or equivalent, ENGRD 241 or experience in numerical methods and programming, and elementary fluid mechanics.

Potential flows and their calculation. Numerical methods include finite difference, finite elements, and boundary elements. 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 includes the use of computer programs.

CEE 632 Hydrology
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 laws, statistical prediction methods for design related to hydraulic processes, hydrometeorology and evaporation, infiltration and base flow; surface runoff and channel routing; linear and nonlinear hydrologic systems; and storage routing and routing hydrograph methods.

CEE 633 Flow in Porous Media and Groundwater
Fall. 3 credits. Prerequisite: CEE 331.
W. H. Brutsaert.
Fluid mechanics and equations of single-phase and multiphase flow, methods of solution. Applications involve aquifer hydraulics, pumping wells, drought flows, infiltration, groundwater recharge; land subsidence; seawater intrusion, miscible displacement, and transient seepage in unsaturated materials.

CEE 634 Boundary Layer Meteorology
Fall. 3 credits. Prerequisite: CEE 331 or permission of instructor. 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
P. L.-F. Liu.
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
Spring. 3 credits. E. A. Cowen.
Course covers: analytic and modeling perspectives of environmental flows; mechanics of layered and continuously stratified flow; steady, unsteady, and unsteady 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
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 Hydraulics Seminar
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.
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 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. Application of course material under field conditions of engineering practice.

CEE 644 Environmental Applications of Geotechnical Engineering
Spring. 3 credits. Prerequisite: CEE 341 or equivalent. 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.
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
Spring. 3 credits. Prerequisite: CEE 653 or CHEM 297-298. Not offered 2003-2004.
J. J. Bisogni.
Concepts of chemical equilibria applied to natural aquatic systems. Topics include acid-base reactions, buffer systems, mineral precipitation, coordination and redox reactions, E-h-pH diagrams adsorption phenomena, humic acid chemistry, and chemical-equilibria 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 659 Environmental Quality Engineering Seminar
Spring. 1 credit. Prerequisite: enrollment as graduate student in environmental engineering. Staff. Presentation and discussion of current research in environmental engineering.

CEE 671 Random Vibration
Fall. 3 credits. Prerequisites: MRAE 326 and OR&IE 260, or equivalent, and permission of instructor. M. D. Grigoriu.
Review of random-process theory, simulation, and first-passage time. Linear random vibration: second-moment response, spectral 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 Kolmogorov equations, change of calculus, and applications from chaotic vibration, fatigue, seismic analysis, and parametrically excited systems.
CIVIL AND ENVIRONMENTAL ENGINEERING

[C EE 673 Engineering Analysis

Vector spaces, linear transformations, and eigenvalue problems with applications to matrix structural analysis, linear dynamics, stability, and principal stresses, strains, and moments of inertia. Fourier analysis for periodic and non-periodic functions, with applications to the solution of ordinary differential equations, beams, plates, and other structural mechanics problems. Partial differential equations with applications to the analysis of static and dynamic response of continuous systems and transport problems.]

[C EE 674 Finite Element Modeling of Civil Infrastructure
Spring. 3 credits. Prerequisites: CEE 371 and either CEE 472 or CEE 778. Staff.

Matrix methods of structural analysis; truss and frame analysis; computer programming of displacement (stiffness) method. Covers the finite element method as an extension of the displacement method of structural analysis; basic two- and three-dimensional continuum elements. Introduction to nonlinear analysis. Emphasis is on applications in Civil Infrastructure design. The course develops the knowledge base for intelligent usage of finite element programs for structural and geotechnical engineers. Brief exposition of the theory and informed use of commercial codes on more advanced topics: shell elements, material and geometric nonlinearity. Also includes: applications to concrete, steel, and soil structures; solution methods; transient problems.]

[C EE 675 Concrete Materials and Construction

Materials science, structural engineering, and construction technology involved in the materials aspects of the use of concrete. Cement and concrete chemistry; physics, mix design, admixtures, engineering properties, testing of fresh and hardened concrete, and the effects of construction techniques on material behavior.]

[C EE 676 Finite Element Analysis (also M&AE 680 and T&AM 666)
Spring. 3 credits. Prerequisite: T&AM 663 or equivalent. Staff.

For description, see M&AE 680.

[C EE 677 Stochastic Problems in Science and Engineering
Fall. 3 credits. Prerequisites: permission of instructor. Not offered 2003–2004. M. D. Grigorou.

Review of probability theory, stochastic processes, and its formulation with illustrations by Monte Carlo Simulation. Analytical and numerical methods for solving stochastic problems defined by algebraic, differential, and integral equations with random/deterministic coefficients and random/deterministic input. Applications include: solution of Laplace, transport, Schrodinger, and other deterministic partial differential equations; dynamic systems subjected to Gaussian and non-Gaussian noise; random eigenvalue problems; and homogenization, structure evolution, and pattern formation for random heterogeneous materials.]

[C EE 678 Structural Dynamics and Earthquake Engineering
Spring. 3 credits. M. D. Grigorou.

Modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

[C EE 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.

[C EE 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.

[C EE 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.

[C EE 722 Environmental and Water Resources Systems Analysis Research
On demand. 1–6 credits. Staff.

Investigations of particular environmental or water resources systems problems.

[C EE 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.

[C EE 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 in the form of a research report.

[C EE 740 Engineering Behavior of Soils
Fall. 3 credits. Prerequisite: CEE 341. H. E. Stewart.


[C EE 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 excavations; and openings in, rock masses; and analysis of the stability of rock slopes.

[C EE 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.

[C EE 745 Soil Dynamics
Spring. 3 credits. Prerequisite: permission of instructor. H. E. Stewart.

Study of soil behavior under dynamic loading conditions. Foundation design for vibration 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.

[C EE 746 Embankment Dam Engineering
Spring. 2 credits. Prerequisites CEE 641 and 741, or permission of instructor. Not offered 2003–2004. F. H. Kulhawy.

Principles of analysis and design for earth and rockfill dams. Materials, construction methods, internal and external stability, seepage and drainage, performance monitoring, abutment and foundation evaluation. Introduction to tailings dams.]

[C EE 749 Research in Geotechnical Engineering
On demand. 1–6 credits. Staff.

For students who want to pursue a particular geotechnical topic in considerable depth.

[C EE 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.

[C EE 752 Environmental and Water Resources Systems Analysis
On demand. 1–6 credits. W. D. Philpot.

Specialized topics not covered in regular courses.

[C EE 756 Biological Processes
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.

[C EE 755 Physical/Chemical Processes
Spring. 3 credits. Prerequisite: CEE 755, or permission of instructor. J. M. Gossett.

Introduction to physical and chemical 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.

[C EE 757 Environmental Engineering Process Laboratory
Fall. 2 credits. Prerequisite: concurrent enrollment in CEE 653 and CEE 755. J. J. Bisogni and M. F. Shirazi.

Laboratory studies of aquatic chemistry and physical/chemical processes of environmental engineering. Topics include: gravimetric analyses; acids/bases; alkalinity; gas chromatography; UV-visible and atomic absorption spectrophotometry; adsorption; filtration; ion exchange; gas transfer; sedimentation; characterization of reactor mixing regimes, and coagulation.
CE 758 Biological Processes Laboratory
Spring. 2 credits. Prerequisite: concurrent enrollment in CE 756. R. Richardson. Laboratory studies of microbiological processes. Topics include microscopy; biochemical and chemical oxygen demand; biological treatability studies; and enumeration of bacteria.

CE 759 Special Topics in Environmental Engineering
On demand. 1-6 credits. Staff. Supervised study in special topics not covered in formal courses.

CE 762 Transportation Research
On demand. 1-6 credits. A. H. Meyburg. In-depth investigation of a particular transportation planning or engineering problem mutually agreed upon between the student and one or more faculty members.

CE 764 Special Topics in Transportation
On demand. 1-6 credits. Staff. Advanced subject matter not covered in depth in other regular courses.

CE 770 Engineering Fracture Mechanics
Fall. 3 credits. Prerequisite: CE 674 or CE 772 (M&E 680/T&AM 666) and T&AM 753, or permission of instructor. Offered alternate years. Not offered 2003-2004. 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 elasto-plastic and cohesive approaches to inelastic crack growth. Element formulation, meshing and remeshing, interactive steering. Case studies across scales from geomechanics to micromechanics, and including metals, ceramics, and polymers. Laboratory techniques for fracture toughness, crack growth rate, and trajectory testing.

CE 773 Structural Reliability

CE 774 Advanced Structural Concrete
Fall. 3 credits. Prerequisite: undergraduate concrete design course. Staff. Advanced behavior, analysis, and design of structural concrete with an introduction to prestressing, course project integrating computer simulation and physical experimentation of a design.

CE 775 Structural Concrete Systems
Spring. 3 credits. Prerequisite: CE 774. Not offered 2003-2004. Staff. Behavior and design of structural concrete building and bridge systems; integration of material, component, and system modeling with structural design; independent study project.

CE 776 Advanced Design of Metal Structures
Spring. 3 credits. Prerequisite: CE 374 or equivalent. T. Pekoz. Preliminary design of structural systems. Behavior and design of members and connections. Behavior and computer-aided design of building frames.

CE 778 Fundamentals of Structural Mechanics

CE 783 Civil and Environmental Engineering Materials Project
On demand. 1-3 credits. Staff. Individual projects or reading and study assignments involving engineering materials.

CE 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.

CE 786 Special Topics in Structural Engineering
On demand. 1-6 credits. Staff. Individual supervised study or independent design or research in specialized topics not covered in regular courses. Occasional offering of such special courses as Shell Theory and Design, and Advanced Topics in Finite Element Analysis.

CE 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.

CE 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.

CE 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.

CE 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.

CE 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.

CE 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.

COM S 099 Fundamental Programming Concepts
Fall, summer. 2 credits. No prerequisites. S-U grades only. Credit cannot be applied toward the Engineering degree. Freshmen only. This course is designed for students who intend to take COM S 100 but are not adequately prepared for that course. Basic programming concepts and problem analysis are studied. An appropriate high-level programming language is used. Students with previous programming experience and students who do not intend to take COM S 100 should not take this course.

COM S 100 Introduction to Computer Programming
Fall, spring, summer. 4 credits. An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis and the development of algorithms and programs. There are two versions of the course. Both provide adequate preparation for COM S/ENGRD 211. Both versions are not offered every semester.
COM S 100M Introduction to Computer Programming
Corequisite: MATH 111, 191, or equivalent. This version starts with a seven-week introduction to programming in MATLAB. Iteration, functions, and arrays are introduced. During the second seven weeks of the course, students examine how these ideas are handled in the object-oriented framework provided by the Java programming language. Throughout the course, examples and assignments are chosen to give the student an appreciation for computational science and engineering. The pace of the course assumes that the student has no prior programming experience.

COM S 100J Introduction to Computer Programming
This course is an introduction to programming using the Java programming language. A two-week unit on MATLAB is included. Topics include algorithms, language concepts, selection, repetition, functions, objects and classes, arrays, strings, and inheritance. Principles of software development and style are emphasized. The course assumes basic high school mathematics (no calculus) but no programming experience.

COM S 101 Introduction to Cognitive Science (also COGST 101, LING 170, and PSYCH 102)
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. A brief introduction to the C programming language and standard libraries. Unix accounts are made available for students wishing to use Unix 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 Web Programming (also CIS 130)
Fall, summer. 3 credits. No prerequisites. Interactive online media such as the World Wide Web are revolutionizing the way we communicate. This course introduces students having little or no computer background to tools and techniques for creating interactive documents. Questions of both design and technical issues are emphasized. Students must think seriously about digital graphic impact and must learn how to do some relatively simple programming with a scripting language (such as JavaScript). Topics covered include HTML, JavaScript, interaction techniques (elementary DHTML); ways of coping with slow connections, the incorporation of sound, video, and images in web documents; animation techniques (Flash); ethics, and e-commerce.

COM S 172 Computation, Information, and Intelligence (also ENGR 172)
Fall. 3 credits. Prerequisites: some knowledge of calculus. 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. Not open to students who have completed the equivalent of COM S 100.

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/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 ENGR 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, subtyping), 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. Prerequisite: COM S 211 or permission of instructor.

COM S 213 C++ Programming
Spring. 2 credits. Prerequisite: COM S 100 or equivalent programming experience. Students who plan to take COM S 213 and 212 must take 211 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 grade only. 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, bash), makefiles, programs for delivering 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. Prerequisite: COM S/ENGRD 211 or equivalent experience. This course covers the basics of the C# programming language and introduces students to building applications in the .NET environment using the C# language.

COM S 230 Intermediate Web Design (also CIS 230)
Spring. 3 credits. Prerequisite: COM S 130 or equivalent. Web programming requires the cooperation of two machines: the one in front of the viewer (the client) and the one delivering the content (the 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, and then, through a succession of projects, learn how to apply this understanding to the creation of an interactive data-driven site via the use of an integrated web 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. 4 credits. Pre- or corequisite: COM S/ENGRD 211 or permission of instructor.

COM S 292 Information Science (also COGST 292)
Fall, spring. 1 credit. Prerequisites: 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 310 Advanced UNIX Tools
Fall. 1 credit. Usually weeks 5–8. Prerequisite: COM S 114 or equivalent. Projects that make use of Unix as a programming tool and the one delivering the content (the 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, and then, through a succession of projects, learn how to apply this understanding to the creation of an interactive data-driven site via the use of an integrated web 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 311 Data Structures and Functional Programming
Fall, spring. 4 credits. Prerequisite: COM S 211/212 or equivalent programming experience. 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 Discrete Mathematics
Fall, spring. 4 credits. Prerequisite: COM S 211/212 or equivalent programming experience. 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, bash), makefiles, programs for delivering 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 314 Computer Organization (also ECE 314)  
Fall, spring. 4 credits. Prerequisite: COM S 210; COM S 211/ENG RD 230 are recommended 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 321 Numerical Methods in Computational Molecular Biology (also 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.  
An introduction to numerical computing using MATLAB organized around five applications: the analysis of protein shapes, dynamics, protein folding, score functions, 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 analysis, the solution of ordinary and partial differential equations, linear programming, and nonlinear minimization will also be 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, or 421.

COM S 322 Introduction to Scientific Computation (also ENGRD 322)  
Spring, summer. 3 credits. Prerequisites: COM S 100 and (MATH 222 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, 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, or 421.

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 CIS 330)  
Spring. 3 credits. Prerequisite: COM S 211/ENG RD 211; COM S majors may use only one of the following toward their degree: CIS/COM S 330 or COM S 433.  
An introduction to modern database systems and three-tier application development using database systems. Concepts covered include the relational model, query languages, data modeling, database tuning, three-tier architectures, Internet data formats and query languages, server- and client-side technologies, decision support systems, and an introduction to data mining. The course is targeted at users of database systems and at application development using database systems and includes several programming projects comprising the design and implementation of a database-backed web site.

COM S 381 Introduction to Theory of Computing  
Fall, summer. 4 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.  
An introduction to the modern theory of computing: automata theory, formal languages, and effective computability.

COM S 411 Programming Languages  
Fall. 4 credits. Prerequisite: COM S 312 or permission of instructor.  
An introduction to the theory, design, and implementation of programming languages. Topics include operational semantics, type systems, higher-order function, scope, lambda calculus, laziness, exceptions, side effects, continuations, effects, and evaluation strategies. 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. 3 credits. Prerequisite: 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 415 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 multiuser, multiwindow, virtual memory, and various input-output devices. All the programming for the project is in a high-level language.

COM S 421 Numerical Analysis  
Fall. 4 credits. Prerequisites: MATH 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming.  
Modern algorithms for systems of 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, or 421.

COM S 426 Introduction to Computational Biology  
Fall. 3 credits. Prerequisites: COM S/ENG RD 211, COM S 280.  
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 for 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, better understand cellular "computations", 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 biological 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 or corequisite: 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 software suite for sequence comparison or analysis of gene expression data, etc.

COM S 430 Information Discovery (also CIS 430)  
Fall. 3 credits. Prerequisite: COM S 211 or equivalent.  
This course studies the methods used to search for and discover information in large-scale systems. The emphasis is on information retrieval applied to textual materials, but there is some discussion of other formats. The course includes techniques for searching, browsing, and filtering 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 CIS 431; formerly CIS/COM S 502)
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 mixes exploration of current tools for building web information systems such XML, XSLT, and RDF with broader concepts such as techniques for knowledge representation and description, object models for content representation, and legal and economic impacts of web information. A theme that runs throughout the course is the relationship between traditional information environments, exemplified by libraries and the distributed information environment of the web.

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++.
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 may use only one of the following toward their degree: CIS/COM S 330 or COM S 433.
An introduction to building web-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 465 Computer Graphics I (also ARCH 374)
Fall. 3 credits. Prerequisite: COM S/ENGRD 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 human visual perception, digital images, rasterization and anti-aliasing, 2D and 3D affine geometry, perspective and 3D viewing, spline curves, elementary 3D surface modeling, and ray tracing. Homework assignments require some programming.

COM S 467 Computer Graphics II
Spring. 3 credits. Prerequisite: COM S 465.
This course covers the principles of computer graphics in detail. A wide variety of topics are covered, including 3D transformations, the hardware graphics pipeline, advanced texturing and shading, visual perception and color science, rendering algorithms including global illumination, animation, user interfaces, visualization, 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. 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/ENGRD 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 COGST 474, LING 474)
Fall, 4 credits. Prerequisites: 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.
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 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 581)
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.
Independent reading and research for undergraduates.

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 I (also CEE 504, ECE 512, M &A 591, OR & IE 512, SYS EN 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 M &A 591.

COM S 505 Applied Systems Engineering II (also CEE 505, ECE 513, M &A 592, OR & IE 513, SYS EN 520)
Spring. 3 credits. Prerequisite: Applied System Engineering I (CEE 504, COM S 504, ECE 512, M&A 591, OR&IE 512).
For description, see M&AE 592.

COM S 513 System Security
Spring. 4 credits. Prerequisites: COM S 414 or 519 and familiarity with JAVA programming language.
This course discusses security and survivability for computers and communications networks. 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 comprise "trustworthiness" in a computing system. Mechanisms for authorization and authentication as well as cryptographic protocols are covered. 

**COM S 514 Intermediate Computer Systems**

Fall. 4 credits. Prerequisites: 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 design, basic agent 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, project. Many students obtain additional project credit by coregistering in COM S 490, project. Many students obtain additional project credit by coregistering in COM S 490, project. Many students obtain additional project credit by coregistering in COM S 490, project.

**COM S 519 Computer Networks**

Spring. 4 credits. Prerequisites: COM S 314 or permission of instructor. Not offered every year. Introduction to computer networks with an emphasis on evolving Internet standards. Detailed introduction to networking protocols for reliable data transfer, flow control, congestion control, naming and addressing, routing, error control, and multiple access. Fundamentals of layered protocols and techniques for protocol design and implementation. The course is project-oriented and requires substantial programming experience.

**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 their implementation using the MATLAB Financial Toolbox, along with additional MATLAB tools, are used extensively. The underlying numerical techniques discussed include: nonlinear least-squares procedures (basic linear algebra, linear and nonlinear optimization, finite-difference methods for PDEs, quadratic programming (and linear complementarity problems), and specialized tree (and lattice) evaluation methods.

**COM S 572 Heuristic Methods for Optimization (also CEE 509)**

Spring. 4 credits. Prerequisites: COM S/ENG 211 or 322 or CEE/ENG 241, or graduate standing, or permission of instructor. Not offered every year. This course describes a variety of heuristic search methods including simulated annealing, tabu search, genetic algorithms, derandomized evolution strategy, random walk, and direct search algorithms. Algorithms are used to find values of discrete and/or continuous variables arising in optimization and model fitting. Applications are discussed in a range of areas including some of the following: artificial intelligence, scheduling, protein folding, economic planning, water quality protection, telecommunications, and robotics. The advantages and disadvantages of heuristic search methods for both serial and parallel computation are discussed in comparison to other optimization algorithms.

**COM S 574 Language Technologies**

Fall. 3 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent. Not offered every year. This course studies computational techniques for large-scale text-processing applications including: information retrieval, text classification, information extraction, document clustering, document ranking, summarization, topic detection and tracking, and question answering. The course focuses on statistical and machine learning approaches to these natural language processing tasks as well as methods for their empirical evaluation.

**COM S 578 Empirical Methods in Machine Learning and Data Mining**

Fall. 4 credits. Prerequisites: COM S 280 and 312 or equivalent. This implementation-oriented course presents a broad introduction to current algorithms and approaches in machine learning, knowledge discovery, and data mining and their application to real-world learning and decision-making tasks. The course also covers experimental methods for comparing learning algorithms, for understanding and explaining their differences, and for exploring the conditions under which each is most appropriate.

**COM S 601 System Concepts**

Fall. 3 credits. Prerequisites: open to students enrolled in the COM S Ph.D. program. Not offered every year.

**COM S 611 Advanced Programming Languages**

Fall. 4 credits. Graduate standing or permission of instructor. A study of programming paradigms: functional, imperative, concurrent, and logic programming. Models of programming languages, including lambda calculus. Type systems, polymorphism, modules, and other object-oriented constructs. Program transformations, programming logic, and applications to programming methodology.

**COM S 612 Compiler Design for High-Performance Architectures**

Spring. 4 credits. Prerequisites: COM S 314 and 412 or permission of instructor. Compiler design for pipelined and parallel architectures. Program analysis: data and control dependencies, dataflow analysis, efficient solution of dataflow equations, dependence tests, solution of Diophantine equations. Architecture and code generation for instruction-level parallel (ILP) processors: pipelined, VLIW and superscalar architectures, code reorganization and software pipelining. Architecture and code generation for multiprocessors: shared- and distributed-memory architectures, latency tolerance and avoidance, loop transformations to enhance parallelism and locality of reference.

**COM S 613 Concurrent Programming**

Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor. Not offered every year.

**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 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 Adaptive Systems**

Fall. 4 credits. Prerequisites: COM S 614 recommended. This course broadly examines self-organization in distributed systems, with particular emphasis on peer-to-peer and mobile ad hoc networks. Students read recent research papers on proactive, reactive and hybrid routing protocols for ad hoc networks, system support for mobility, peer-to-peer systems and their applications.

**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., MATH 421 or 621) and differential equations, and knowledge of MATLAB. Offered in even-numbered years.

Finite difference methods for the solution of ordinary and partial differential equations. A fast-moving course that begins with a three-week survey of numerical methods for ODEs, then moves on to Fourier analysis and methods for PDEs, especially parabolic and hyperbolic equations. Other topics covered include numerical stability, finite element methods, Hamiltonian problems, and computational issues such as mesh generation and sparse matrix computation for PDEs.

**COM S 626 Computational Molecular Biology**

Spring. 4 credits. Prerequisites: familiarity with linear programming, numerical solutions of ordinary differential equations, and nonlinear optimization. Problems and algorithms in computational molecular biology. Topics include sequence alignment, scoring functions, complexity of searches and alignment, secondary structure prediction, families, and function), the protein folding problem (lattice models, lattice searches, the HP model, chemical potentials, statistical potentials, funnels, complexity and model verification, global optimization, homology, threading, dynamics of complex biosystems (the Molecular Dynamics
method, long-range forces, statistics of flexible systems, reduced models).

COM S 627 Computational Biology: The Machine Learning Approach
Spring. 4 credits. Prerequisites: COM S 426 or 620 and COM S 478 or 578 or permission of instructor.
This is a graduate-level course in computational biology that focuses on machine learning models and their application to computational problems in biology. Some topics covered are supervised (Support Vector Machines, Hidden Markov Models, deterministic and probabilistic suffix trees) and unsupervised (embedding, PCA, ICA, clustering) learning in computational biology, advanced statistical analysis of sequences, analysis of microarrays, and modeling of complex systems (Bayesian Belief Networks, DEA).

COM S 630 Representing and Accessing Digital Information (also CIS 630)
Fall. 4 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent.
This course covers the representation, organization, and access of digital information with an emphasis on textual information. Topics include structured and semi-structured data, information retrieval, natural language processing, and machine learning, with links to work in databases, data mining, and computational linguistics.

COM S 632 Advanced Database Systems
Spring. 4 credits. Prerequisite: COM S 432/433 or permission of instructor.
A variety of advanced issues ranging from transaction management to query processing to data mining. Involves extensive paper reading and development of a term project with research content is required.

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 an applications-based perspective. 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 small 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. Offered fall 2003.
This course covers advanced topics in realistic rendering with a focus on fast/interactive techniques. Topics include light transport and global illumination, Monte-Carlo ray tracing and radiosity, hardware rendering, and image-based rendering.

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. 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 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, models for 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. Not offered 2003–2004.
Examines formalizing reasoning about and representing uncertainty, using formal logical approaches as a basis. Topics: logics 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 reducibilities. Also covers topics such as parallel algorithms and efficient data structures.

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.
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. Prerequisite: COM S 681 or permission of instructor. Not offered every year.

COM S 684 Approximation and Network Algorithms
Fall. 4 credits. Prerequisites: COM S 681 or permission of instructor. Not offered every year.

COM S 685 The Structure of Information Networks (also CIS 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 connects 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, 582, 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, visiting, 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 712 Seminar in Systems and Methodology
Fall, spring, 4 credits. Prerequisites: 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 procedure, 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 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. Not offered every year; semester TBA. 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 series 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 physical 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, MAE 650)]
Fall, 4 credits. Prerequisite: programming experience or permission of instructor. Not offered every year.

[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 experience. S-U grades only. Not offered every year.

[COM S 754 Systems Research Seminar]
Fall, 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 482 or 681, COM S 682, elementary logic (MATH 481 or 681), and Kleene 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 schematology, 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, spring, 4 credits. Prerequisite: permission of a computer science adviser. Letter grade only.

COM S 990 Special Investigations in Computer Science
Fall, spring, 4 credits. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

EARTH AND ATMOSPHERIC SCIENCES

Courses
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, spring. 3 credits. Staff.

EAS 102 Evolution of the Earth and Life (also offered as BIO G 170)
Spring. 3 credits. J. L. Cisne.

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 and Build a Habitable Planet
Fall. 3 credits. J. M. Bird.

EAS 122 Earthquake! (also ENGRD 122)
Spring. 3 credits. L. D. Brown.
This is a course in the Introduction to Engineering series. For description, see ENGRD 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 Introduction to Fortran Programming
Fall. 3 credits. M. W. Wysocki.

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 185, or MS&E 285)
Spring. 3 credits. R. W. Kay.
This is a course in the Introduction to Engineering series. For description, see ENGRD 185.

EAS 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)
Fall. 3 credits. Prerequisites: PHYS 112 or 207. L. M. Cathles.
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 250 Meteorological Observations and Instruments  
Spring. 3 credits. Prerequisite: EAS 131. M. W. Wysocki.

EAS 260 Soil Science (also CSS 260)  
Fall. 4 credits. S. J. Rha.

EAS 268 Climate and Global Warming  
Spring. 3 credits. 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: MATH 112, EAS 101, or 201, or permission of instructor. One weekend field trip. R. W. Allmendinger.

EAS 326 Structural Geology  
Spring. 4 credits. Prerequisite: MATH 112, EAS 101, or 201, or permission of instructor. W. W. White.

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 Micrometeorology  
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. M. W. Wysocki.

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  
Fall. 3 credits. Prerequisites: 1 year of calculus and a semester of oceanography (i.e., EAS 154), or instructor’s permission. C. H. Greene.

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. Prerequisite: EAS 101 or 201 and CHEM 207 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. Cisne.

EAS 388 Geophysics and Geotechnics  
Spring. 4 credits. Prerequisites: MATH 192 (or 112) and PHYS 208 or 213. B. L. Isacks.

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. Prerequisites: an introductory course in statistics (e.g., AEM 210) and calculus. D. S. Wilks.

EAS 436 Geophysical Field Methods  
Fall. 3 credits. Prerequisites: PHYS 213 or 208 or permission of instructor. L. D. Brown.

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. Colucci.

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 2003–2004. S. Mahlburg Kay.

EAS 455 Geochemistry  
Fall. 4 credits. Prerequisites: CHEM 207 and MATH 192 or equivalent. Recommended: EAS 256. Offered alternate years. W. M. White.

EAS 456 Meteorology and Climatology  
Spring. 3 credits. Prerequisites: EAS 341 and 342 or permission of instructor. Offered alternate years. S. J. Colucci.

EAS 457 Atmospheric Air Pollution  
Fall. 3 credits. Prerequisites: EAS 341 or 1 course in thermodynamics, and one semester of chemistry, or permission of instructor. Offered alternate years. Not offered 2003–2004. M. W. Wysocki.

EAS 458 Volcanology  

EAS 462 Marine Ecology (also offered as BIOEE 462)  

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.

EAS 476 Sedimentary Basins: Tectonics and Mechanics  
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. Not offered 2003–2004. T. E. Jordan.

EAS 478 Advanced Stratigraphy  
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. T. E. Jordan.

EAS 479 Paleobiology (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. W. Almon.

EAS 481 Senior Survey of Earth Systems  
Spring. 3 credits. Limited to seniors majoring in geological science. J. M. Bird.

EAS 483 Environmental Biophysics  
Spring. 3 credits. Prerequisites: EAS/CSS 260 or equivalent, or permission of instructor. Offered alternate years. Not offered 2003–2004. S. J. Rha.

EAS 487 Intro to Radar and Remote Sensing (also ECE 487)  
Fall. 3 credits. Prerequisites: PHYS 208 or 213 or equivalent or permission of instructor. D. L. ‘Hyssel.

EAS 491-492 Undergraduate Research  
Fall, spring. 1-6 credits. S-U grades optional. Undergraduate level.

EAS 494 Internship Experience  
Fall, spring. 1-2 credits. S-U grades only.

EAS 497 Individual Study in Atmospheric Science  
Fall, spring. 8 credits maximum. S-U grades optional. Undergraduate level.

EAS 498 Advanced Structural Geology I  
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. L. 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. Mathematics 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 colloquia 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 COMP 314)**

Fall, spring, 4 credits. Prerequisites: COM S/ENGRD 211 or ENGRD 230 required. Fall: COM S staff; spring, S. A. McKee. 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 210 and ECE 215. Fall, A. Lal; Apel; spring, B. A. Minge. B. A. Minge. 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 338 Nanofabrication**

Spring, 3 credits. Prerequisites: PHYS 213 or 217, PHYS 214 or 218, CHEM 211 or 207, or equivalent. E. C. Kan. Fundamentals of nanofabrication for integrated circuits. Optoelectronics, microelectro mechanical systems (MEMS), sensors, (nano)biotechnology, biology, chemistry, and micro-systems. Hands-on and virtual laboratory as facilitated by available resources. Designed for electrical/computer engineering, materials science/engineering, mechanical/aerospace engineering, chemical engineering, applied/engineering physics, agricultural/biological engineering, biology, and chemistry students.

**ECE 391-392 Junior Electrical and Computer Engineering Project**

Fall, spring, 391, 392, 1-8 credits. Limited to juniors 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 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 BMEP 404)**

Spring, 1-4 credits. Co- or prerequisite: at least one of: ECE 425, ECE 476, ECE 453. J. C. Belina. 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/prototyping 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 301 and 310 or equivalent. A. Scaglione. Introduction to models for random signals in discrete and continuous time: Markov chains, Poisson process, queueing 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 (also M&AE 458)**

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 can also serve as a basic course for those who do not intend to continue in the field. Introduction to the fundamentals of nuclear reactivity 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 M&AE 415)**

Fall, 4 credits. Prerequisite: a 300-level engineering course with advanced math content such as ECE 301 or ECE 303, or M&AE 326. P. M. Kintner. An introduction to the GPS operating principles and engineering practice with a culminating design exercise. Analytical methods, receiver analysis, error computation, 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 301, ECE 302, 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, implementation, and system 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. L. Tang. An introduction to the operation and application of lasers. Material covered includes different types of lasers, Gaussian beams, optical resonators, interaction of radiation with matter, physics of laser operation, and laser design. Applications of coherent radiation to nonlinear optics, communication, and research are discussed.

**ECE 432 MicroElectro Mechanical Systems (MEMS)**

Spring, 4 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/nanometer scale, material issues, and the integration of micromechanical structures and actuators with simple electronics. This is an introductory course drawing content from mechanics, materials, structures, electronic systems, and the disciplines of physics and chemistry. ECE 432 is a culminating design experience (CDE) course.

**ECE 433 Introduction to Microwave Devices and Circuits**

Fall, 4 credits. Prerequisites: ECE 303 and ECE 306. Staff. An introduction to the properties of microwave devices and circuits and the
considers that must be appreciated when the operating frequency approaches or exceeds 1 GHz. Topics include microwave devices, microwave measurement techniques, S-parameters, signal flow diagrams, matching networks, bias 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 403 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 437 is a culminating design experience (CDE) course.

**ECE 445 Computer Networks and Telecommunications**  
Fall. 4 credits. Prerequisite: ECE 341 or COM S 441 and a course in probability.  
S. Servetto.  
Design of performance analysis of communication systems operating over packet-switched networks. This is a basic course in networking that aims to bridge the gap between a classical networking class and components. ECE 445 is a culminating design experience (CDE) course.

**ECE 451 Electric Power Systems I**  
Fall. 3 credits. Prerequisite: ECE 301 or equivalent. J. S. Thorp.  
The objective is to acquaint the student with modern electric power system analysis and control. Topics 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, 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. Topics include: distributed generation, power plant control systems, and high-voltage transmission system protection and control systems.

**ECE 453 Analog Integrated Circuit Design**  
Fall. 4 credits. Prerequisites: ECE 301 and ECE 315 or equivalent. ECE 453 is a culminating design experience (CDE) course.  
B. A. Mishra.  
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 MSE 262 or AEP 450.  
F. C. Krein.  
Semiconductor carrier statistics, band diagrams, transport and their applications in diodes, MOSFET, and BJT. Emphasis is put 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 culminates in 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 Telecommunication Systems I**  
Fall. 4 credits. Prerequisites: ECE 301 and ECE 302. C. R. Johnson.  
An introduction to broadband digital receiver design. Topics include: PAM and QAM modulation, down-conversion, pulse-shaping, matched filtering, carrier frequency and phase recovery, baud-time synchronization, packet marker synchronization, adaptive linear equalization, and coding. Course projects include composition and testing of a Matlab-based software receiver. ECE 467 is a culminating design experience (CDE) course.

**ECE 468 Telecommunication Systems II**  
Spring. 4 credits. Prerequisite: ECE 467 or permission of instructor. Suggested prerequisite: ECE 411. C. R. Johnson.  
Fundamentals 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 coding and equalization; digital transmission through band-limited AWGN channels, inter-symbol interference (ISI), equalization techniques; phase-locked loops (PLL); trellis-coded modulation (TCM); and spread-spectrum communication systems.

**ECE 472 Feedback Control Systems**  
Spring. 4 credits. Prerequisite: CHEM 372, ECE 301, M&AE 326, or permission of instructor. Staff.  
For description, see M&AE 478.

**ECE 474 Digital VLSI Design**  
Fall and spring. 5 credits (fall 4, spring 1). Prerequisites: ENGRD 230, ECE/CS 314.  
R. Manohar.  
Introduction to digital VLSI design. Topics include basic transistor physics, switching networks and transistors, combinational and sequential logic, latches, clocking strategies, clocking, and synchronization, PLAs, memories, physical design, floor planning, and simulation. ECE 474 is a culminating design experience (CDE) course.

**ECE 475 Computer Architecture**  
Fall. 4 credits. Prerequisites: ENGRD 230 and ECE 403 or equivalent. 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 hierarchies. Students learn the issues and tradeoffs involved in the design of modern microprocessors. Labs involve the design of a processor and cache subsystem at the RTL level. ECE 475 is a culminating design experience (CDE) course.

**ECE 476 Digital Systems Design Using Microcontrollers**  
Spring. 4 credits. Prerequisite: ECE 457 (CDE).  
B. R. Land.  
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 494 Introduction to Controlled Fusion: Principles and Technology**  
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. Hammer.  
For description, see NS&E 484.

**ECE 486 Electromagnetic Waves and Communication**  
Spring. 3 credits. Prerequisite: ECE 303.  
D. L. Hysell.  
This course is recommended for students who wish to obtain a greater understanding of the fundamentals of guided waves, high data rate electronics and 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 301 and ECE 403.  
D. L. Hysell.  
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 sensing 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 circuit 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 applications, and 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 on the project is required. Students must make informal presentations with faculty advisor prior to registration for this course and submit a request for an independent project form to the Electrical Engineering undergraduate office.

ECE 495 Optimizing Compilers
Fall. 4 credits. Prerequisite: ECE/COM S 314. M. Burtscher.
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, Complex Adaptive 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. S. Ben-David.
Large-scale complex adaptive (LSCA) networks in ECE include the Internet, World Wide Web, bulk electric power distribution systems, wireless and wired telecommunications networks. We study several principles common to LSCA bulk electric power distribution systems; wire-based network, abstracted to expose its networks. Each principle will be introduced in a course, then explored in depth. A. W. Bojanczyk, 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 513 Applied Systems Engineering II
Fall. 4 credits. Prerequisite: Applied Systems Engineering I (CEE 504, COM S 504, ECE 512, M&AE 591, or OR&E 512). R. Thomas, L. Nozick, P. Jackson. For description, see M&AE 592.

ECE 521 Theory of Linear Systems
Fall. 4 credits. Prerequisite: ECE 302 or permission of instructor. Recommended: a good background in linear algebra and linear differential equations. A. W. Bojanczyk. 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 523 Adaptive Filtering in Communication Systems
Spring. 4 credits. Required prerequisite: ECE 411 and ECE 467. Not offered 2003–2004. C. R. Jackson. Fundamentals of the basic adaptive filters intended for digital communication systems applications. Wired and wireless communication systems tasks (such as channel equalization, echo cancellation, antenna beam forming, and interference rejection) are used to motivate adaptive filter design issues. Assignments consist of reports on adaptive digital filter algorithms and their simulated evaluation.

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 modeling. 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 behavior of optical fields in photonic and optoelectronic devices and systems. Topics include quantization of the electromagnetic field, quantum mechanical properties of photon states, vacuum fluctuations, noise and quantum Langevin equations, matter-photon interactions, phase-sensitive and phase-insensitive optical amplifiers, direct and coherent photon detection, lasers, parametric oscillators, and photonic devices for quantum information processing.

ECE 535 Semiconductor Physics
Fall. 4 credits. Prerequisites: ECE 407 and 457, or permission of instructor. 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 548 Digital Image Processing
Fall. 4 credits. Prerequisites: ECE 411, ECE 425, familiarity with linear algebra. S. S. Hemami.
Introduction to image processing through seven major topics: perception, statistical modeling, transforms, enhancement, analysis, compression, and restoration techniques. Attention is allocated to compression. Equal emphasis is placed on gaining a mathematical and an intuitive understanding of algorithms through actual image manipulation and viewing.

ECE 550 Digital Image Processing
Fall, 4 credits. Prerequisites: ECE 411, ECE 425, familiarity with linear algebra. S. S. Hemami.
Introduction to image processing through seven major topics: perception, statistical modeling, transforms, enhancement, analysis, compression, and restoration techniques. Attention is allocated to compression. Equal emphasis is placed on gaining a mathematical and an intuitive understanding of algorithms through actual image manipulation and viewing.

ECE 551 Electric Systems Engineering and Economics (Electricity Markets)
Fall, 4 credits. Prerequisites: basic calculus, microeconomics. R. J. Thomas, T. D. Mount.
This course is designed to explore new arrangements in power system planning and operation brought about by the current restructuring of the electric industry. The course is organized around lectures on 1) how basic economic principles interact with basic engineering principles used to determine the physical and operational makeup of the system; and 2) the principles and techniques of optimization and their applications to emerging institutional arrangements in the power industry. The course involves extensive laboratory work designed to test the principles under discussion. A laboratory project is assigned, requiring building an intelligent software agent capable of performing in a competitive market with rules similar to those being set up in the electric power business today. The agents are exercised in a class competition.

ECE 554 Advanced Analog VLSI Circuit Design
Spring. 4 credits. Prerequisite: ECE 453. A. B. Apseul.
Advanced analog integrated circuit and system design. Topics include integrated continuous-time filter design, translinear circuits and systems, dynamic analog techniques, integrated discrete-time filter design, and Nyquist-rate data converter design.

ECE 555 Compound Semiconductor Electronics
Spring, 3 or 4 credits; 4 with a project. Prerequisite: ECE 457 or equivalent. Not offered 2003–2004. T. W. Parks. Electronic properties of advanced semiconductor structures using compound semiconductor materials and heterojunctions. Fundamentals of carrier transport and scattering. Properties of direct bandgap semiconductors and quantum wells. Advanced semiconductor devices, including metal-semiconductor transistors (FETs), modulation-doped FETs, and heterojunction bipolar transistors (HBTs). High-frequency
operation of compound semiconductor devices. Includes six two-week labs, which include low-temperature carrier transport, optical absorption and emission, and electrical characteristics of compound semiconductor devices.)

**ECE 561 Error Control Codes**
Fall. 4 credits. Prerequisite: ECE 301 or ECE 521 or equivalent. A strong familiarity with linear algebra is assumed. S. B. Wicker.

An introduction to the theory and practice of error control codes. Topics include algebraic codes, convolutional codes, concatenated codes, and codes on graphs. The construction and decoding of Reed-Solomon (RS) codes will be considered in some detail, as will the iterative (turbo) decoding of concatenated codes and codes on graphs. The use of error control in wireless systems will be discussed throughout the course.

**ECE 562 Fundamental Information Theory**
Spring. 4 credits. Prerequisite: ECE 310 or equivalent. Staff.

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. Z. Haas.

Classical line-switched communication networks: point-process models for offered traffic; blocking and queuing analyses. Stability, throughput, and delay of distributed algorithms for packet-switched transmission of data over local-area and wide-area nets. Flow control and capacity assignment algorithms, ATM networks.

**ECE 564 Detection and Estimation**
Spring. 4 credits. Prerequisites: ECE 411 or permission of instructor. Z. Haas.


**ECE 566 Wireless Networks**

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, personal communications system (PCS), cordless telephones), 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 modulation and optimal receiver principles. Baseband and passband transmissions and processing. Interference channels and equalization techniques. Performance analysis including bit error rate calculation and 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.

A 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**
Spring. 4 credits. Prerequisite/corequisite: ECE 475, J. P. Martinez.

Principles and tradeoffs in the design of parallel architectures. Emphasis is on latency, bandwidth, and synchronization in parallel machines. Case studies illustrate the history and techniques of shared-memory, message-passing, dataflow, and data-parallel machines. Additional topics include memory consistency models, cache coherence protocols, and interconnection network topologies. Architectural studies presented through lecture and some research papers.

**ECE 574 Advanced Digital VLSI Design**
Spring. 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, circuit compilation, and electrical optimizations. Students complete a group project of the design of a pipelined microprocessor. The processor can be clocked, asynchronous, or a combination of the two. Note: the only difference between taking and not taking ECE 574 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 design, out-of-order execution, register renaming, caching, value prediction, confidence estimation, branch prediction, predication, control speculation, multithreading, compiler optimizations, and cache designs 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. Offered spring 2004 and fall 2004. R. Manohar.

For description, see ECE 574.

**ECE 577 Feedback Neural Networks**
Fall. 4 credits. Prerequisite: ECE 310. Not offered 2003–2004. T. ECE 474, ECE 475. Feedback neural networks (multi-layer perceptrons) are computing systems formed out of many highly interconnected nonlinear memoryless elements that are arranged in a parallel architecture that is loosely modeled on that of the brain. Focus is on their roles as pattern classifiers, signal processors, estimators, and forecasters and on their role in communication systems. Includes exploration of neural networks through mathematical analysis and extensive simulation studies using MATLAB.

**ECE 579 Radio Frequency (RF) Integrated Circuit Design**
Fall and spring. 6 credits. Prerequisites: ECE 433, ECE 453, and ECE 488.
K. T. Kornegay.

This two semester, 6-credit, course conveys a practical knowledge of advanced concepts related to the design radio-frequency (RF) integrated circuits in state-of-the-art silicon germanium (SiGe) technology. 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 amplifier, voltage-controlled oscillator (VCO), phase-lock loop, and high-performance mixer design are emphasized. The basic transmitter/receiver building blocks are covered, and students learn how to design and assemble them to form single-chip wireless systems.

**ECE 581 Introduction to Plasma Physics**
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; coulomb scattering, collisions; ambipolar diffusion; elementary transport theory; twofluid 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. Prerequisites: Physics through 214 or equivalent, introductory chemistry, ECE 486 or equivalent.
M. C. Kelle.

ECE 506 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 (also NS&E 545 and M&A 545)
Fall, spring. 1 credit. May be taken for credit in any semester. E. Fisher.
Energy resources, their conversion to electricity or mechanical work, and the environmental consequences of the energy cycle are discussed by faculty members from several departments in the university and by outside experts. Examples of topics to be surveyed include: energy resources and economics; coal-based electricity generation; nuclear reactors; solar power; energy conservation by users; and air pollution control.

ECE 596 VLSI for Optical Interconnects
Spring. 4 credits. Prerequisites: ECE 515; ECE 453, or permission of instructor. A. B. Apsel.
This course is a graduate-level introduction to the concepts of optoelectronic interconnects. We will cover high-speed circuit design of transmitters and receivers for chip-to-chip and Ethernet communication channels. Topics include transimpedance amplifiers, data formats, introduction to optical devices, drivers, comparisons to conventional interconnect, and novel receiver architectures.

ECE 598 Contemporary Topics in Micromachining Microsystems
Spring. 3 credits. A. L. Fisher.
Contemporary topics in MEMS will be covered with a focus on using science and engineering to analyze the why and how of MEMS/NEMS solutions. The aim of this course is to learn how to think about the microsystems. The focus areas will be communication systems incorporating MEMS and autonomous systems incorporating MEMS.

ECE 630 Photonics
Fall. 3 credits. M. Lipson.
This course covers the primary advances in the photonic field with emphasis on emerging technologies. Typical topics include novel optical materials, optical MEMS, Photonic Band Gaps and the role of optics in next-generation computers.

ECE 672 Distributed Systems
Fall. 3 credits. Prerequisite: ECE 475. W. E. Speight.
Design of distributed systems, with particular emphasis on the field of cluster-based architectures. Students read papers, discuss topics in class, make presentations to the class, and complete a major software design project. Topics include runtime system design, coherence protocols for software distributed shared memory systems, fault-tolerant systems, file access, emerging interconnection networks, process and thread migration, adaptive systems, and cluster-based solutions for web servers and multimedia applications.

ECE 682 Advanced Plasma Physics
Spring. 3 credits. Prerequisite: ECE 581.
Not offered 2003-2004. C. E. Seyler, Boltzmann and Vlasov Equations; dielectric tensor; waves in hot magnetized plasmas; Landau and cyclotron damping; microinstabilities; low-frequency stability; nonlinear phenomena; solitons and nonlinear wave equations; ponderomotive effects and parametric processes; plasma models.

ECE 691-692 Electrical and Computer Engineering Colloquium
Fall. 691; spring, 692. 1 credit each term. For students enrolled in the graduate field of Electrical and Computer Engineering.
Staff.
Lectures by staff, graduate students, and visiting authorities. A weekly meeting for the presentation and discussion of important current topics in the field. Reports required.

ECE 693-694 Master of Engineering Design
Fall, 693; spring, 694. 1-8 credits. For students enrolled in the M.Eng. (Electrical) degree program.
Uses real engineering situations to present fundamentals of engineering design. Each professor is assigned a section number. To register, see roster for appropriate six-digit course ID numbers.

[ECE 696 Topics in Communications
Spring. 3 credits. Prerequisite: ECE 562.
Introduction to multi-user problems in information theory (such as multiple access and broadcast channels, distributed correlated sources, coding with side information, multiple descriptions), and to classical networking problems (such as routing, flow control, delay, performance of protocols). Emphasis is on developing tools needed to do research work in this area.]

ECE 697 Topics in Computer Systems
Fall, spring. 1 credit. S-U only.
Prerequisites: ECE 475 and interest in computer systems. S. A. McKee, staff.
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 791-792 Thesis Research
Fall, 791; spring, 792. 1–15 credits. For students enrolled in the master’s or doctoral program.

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 TAM 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 System (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
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.
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 nanotechnology, organic optoelectronics, self-assembling materials, or nano-ceramic.

MS&E 206 Atomic and Molecular Structure of Matter
Spring. 4 credits.

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.
Corequisites: PHYS 213 or permission of instructor. G. Malliaris.
For description, see ENGRD 262.

MS&E 265 Biological Materials and Their Synthetic Replacements
Spring. 3 credits.
From contact lenses and false teeth to arterial implants and hip joints, a tremendous range of synthetic materials are used in contact with the body to replace or supplement natural biological materials. The course considers a number of biological systems and describes the properties and structure of the natural materials. Requirements for candidate replacement materials are discussed, with historical and current solutions. These involve material properties such as strength and corrosion resistance as well as toxicity and bio-compatibility. Design constraints, including methods of production, economics, regulatory approval, and legal liabilities, are also considered.

MS&E 281 The Substance of Civilization—Materials through the Ages
Fall. 3 credits. 2 lectures. 1 lab. S. L. Sass.
Materials have enabled revolutionary advances in how we live, work, fight, travel, and play—hence the naming of eras after them—Stone, Bronze, and Iron Ages. This course explores the role of materials in the development of the modern industrial Western civilization by putting technology into an historical and human context and examining the advances made possible by innovations with materials, starting with the Stone Age. Interconnections between crucial innovations and historical events are identified and explored. Lectures, demonstrations, and hands-on laboratory experiments elucidate the origin of the unique properties of materials such as polymers, ceramics, metals, and glass. This course is designed to fulfill the science requirement in the College of Arts and Sciences.

MS&E 291-292 Research Involvement IIa and IIb
291, fall; 292, spring. 3 credits each term.
Prerequisite: approval of department. Staff. Supervised independent research project in association with a faculty member and faculty research group 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 MS&E 582)
Spring. 4 credits. Prerequisite: MS&E 206. Corequisite: MS&E 304 or permission of instructor. Staff. Stress and infinitesimal strain as second-rank Cartesian tensors. Linear elasticity and fourth-rank Cartesian tensors. Symmetry effects (Nye, Physical Properties of Crystals). Design criteria for beams, shafts, and pressure vessels (Dowling, Mechanical Behavior of Materials). Generalized plastic flow relations. Design based on yielding, fracture toughness, fatigue, creep, and rupture with specific applications. Basis for improved materials.

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 equilibria and phase diagrams, heterogeneous reactions, solutions, surfaces, and defects. Introduction to electrochemistry and fuel/power cells.

MS&E 304 Kinetics, Diffusion, and Phase Transformation (also MS&E 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, glasses, and ceramics; polymers; diffusion in the presence of driving forces; fast diffusion paths; thermo- and electrotransport; interfaces and microstructure; nucleation and growth; growth of product layers (spray deposition); solidification of alloys; diffusion and diffusionless transformations in solids; glass transition.

MS&E 305 Electronic, Magnetic, and Dielectric Properties of Materials (also MS&E 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 bands structure of crystals. Intrinsically and doped semiconductors, junctions electronic and optical devices. Physical origin of magnetic behavior, ferromagnetic domains, magneto-resistance. Materials for data storage and manipulation. Polarization in dielectric materials, frequency dependence of dielectric constants and refractive indices. Ferroelectric domains. Dielectric components in devices. The close connection between fundamental concepts and current technology will be emphasized.

MS&E 307 Materials Design Concept I
Fall. 2 credits. S. Sass. For description, see MS&E 407.

MS&E 311 Junior Laboratory I
Fall. 1 credit. C. K. Ober. 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. C. K. Ober. Practical laboratory covering the analysis and characterization of materials and processing. The spring semester labs will be based on the course material in kinetics, diffusion, and phase transformation and mechanical properties of materials, processing, and design.

MS&E 391-392 Research Involvement IIa and IIb
391, fall; 392, spring. 3 credits each term. Prerequisite: approval of department. Staff. For description, see MS&E 291. May be a continuation or a 1-term affiliation with a research group.

MS&E 403-404 Senior 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 testing 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. A. Ruoff. 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. Approval depends on involvement in ongoing experimental research in direct collaboration with one or more ongoing research programs. 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. S. Sass. 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 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 a continuation or a 1-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 ENGR 111, 119, or 124, ENGR 261, or MS&E 281. 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
Spring. 3 credits. Offered alternate years. Mechanical properties that are unique to materials in the form of thin films (typical thickness 1 micrometer and less) and micrometer-scale structures. Mechanics of two-dimensional structures. Stress and mechanical property measurement methods in small dimensions. Microstructural development in thin films. Elastic, plastic, and fracture response of films and constrained volumes.

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 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 541 Microprocessing of Materials
Fall. 3 credits. Prerequisite: MS&E 521 or permission of instructor. Offered alternate years. C. K. Ober.
Preparation of synthetic polymers by step- and chain-growth polymerization; condensation; free radical, anionic, and cationic mechanisms; ring opening and coordination routes. Statistical and kinetic aspects of homopolymer and copolymer formation. Stereochemistry of polymers and spectroscopic methods for polymer analysis. Molecular aspects of polymer design for properties such as conductivity, elasticity, thermal stability, and engineering properties. Special topics include liquid crystals, polyelectrolytes, photoreactive, and supramolecular chemistry. At the level of Principles of Polymerization by Odian.

MS&E 525 Organic Optoelectronics
Fall. 3 credits. Offered alternate years. G. G. Malliaris.
Overview of relevant materials from small aromatic molecules to conjugated polymers. Focuses on optoelectronic properties, including photophysics (absorption, emission, photogeneration, recombination), charge transport (doping, hopping, disorder, charge injection), and elements of nonlinear optics. Optoelectronics applications (such as electrophotography, light-emitting diodes, lasers, photovoltaic cells, thin film transistors) are also discussed.

MS&E 531 Introduction to Ceramics
Fall. 3 credits. R. Dieckmann.
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 (atomic 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 532 Glass, Ceramic, and Glass-Ceramic Materials: Critical Components in Technologies
Spring. 3 credits. Offered alternate years. Staff.
The course discusses preparation of glasses and ceramics in both bulk and thin film form by conventional and unconventional techniques. Topics include hydrolysis and condensation of molecular precursors, colloids, gelation, aging, drying, and sintering. Emphasis is placed on phenomenology and modeling. Spectroscopic and scattering techniques are discussed. Synthesis and properties of nanoparticles and nanocomposites are also presented and discussed.

MS&E 544 Plasma Processing of Electronic Materials (also ECE 482)
Spring. 3 credits. Prerequisites: PHYS 213 and 214 or equivalent. Offered on demand. Staff.
For description, see ECE 482.

MS&E 545 Magnetic Materials
Fall. 3 credits. Prerequisites: PHYS 213 and 214 or equivalent. Offered alternate years. Not offered 2003-2004. D. G. Ast.
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. Nec. 2 credits. Lab. 1 credit. Laboratory enrollment is limited to 10 students. No prerequisites. Not offered fall 2005. D. G. Ast.
Solar cells provide power to satellites but are increasingly used for other applications, including the generation of electricity to power homes and even cars and airplanes. This course introduces the physics, design, manufacturing, testing, applications, and long-term reliability of solar cells. Topics include the energy distribution of the solar spectrum in space and at the surface of the earth, the physics of converting light into electricity, the ideal conversion efficiency of solar cells, solar cell design, the economical fabrication of solar cells, testing and government regulations, and the long-term reliability of solar cells. The course covers mostly classical solid state solar cells but provides an introduction to emerging competing technologies using polymers and organic dyes. In the laboratory, students fabricate and test a solar cell. The instructor provides special recitations, as needed, for students lacking a send background. Students interested in the subject of solar cells. The recommended textbook is Solar Cells, Operating Principles, Technology and Systems Applications by Martin Green.

MS&E 555 Introduction to Composite Materials (also CEE 475, M&E 455, and T&M 455)
Spring. 4 credits. For description, see T&M 455.

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 M&E 603)
Spring. 3 credits. Survey of modern analytical techniques used to determine composition and structure of near-surface and bulk materials. Interaction of ions, electrons, and photons with solids, characteristics of the emergent radiation. Techniques covered include ion scattering, Auger electron spectroscopy, nuclear activation, secondary ion mass spectroscopy, UV and X-ray photoelectron spectroscopies, and X-ray techniques. Selection and design of experiments.

MS&E 572 Computational Materials Science
Spring. 3 credits. Prerequisite: MS&E 303 or equivalent; programming M. O. Thompson.
Computational methods for predicting the behavior of condensed matter systems, including Monte Carlo, molecular dynamics, and phase field approaches. Extraction of physical parameters from simulation results and limitations of computational methods. Survey of interatomic potential development and quantum-mechanical ab-initio techniques. Examples drawn from surface and condensed phase systems.

Graduate Professional Courses

MS&E 501-502 Special Project
501, fall; 502, spring. 6 credits each term. Master of Engineering research project.

MS&E 502 Mechanical Properties of Materials, Processing, and Design (also MS&E 302)
Spring. 4 credits. Corequisite: MS&E 584 or permission of instructor. For description, see MS&E 302.

MS&E 583 Thermodynamics of Condensed Systems (also M&E 303)
Fall. 4 credits. M. O. Thompson, for description, see MS&E 303.
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. R. Dieckmann.

Topics include point defects (thermal disorder,component-activity-dependent disorder, influence of dopants, different kinds of associates, Coulomb interaction between point defects), dislocations, grain boundaries, transport in solids (definition and different types of diffusion coefficients, reference frames, mechanisms of electrical conduction, elementary diffusion mechanisms, atomic theory of transport, correlation effects, phenomenological theory of transport including some aspects of thermodynamics of irreversible processes, Fick’s laws); point-defect relaxation (migration controlled, phase-boundary-reacted controlled); inter-diffusion, solid-state reactions involving compound formation (oxidation of metals, reactions between solids), and de-mixing of materials in potential gradients, and selected solid-state processes (internal reactions, etc.).

MS&E 632 Solid State Electrochemistry
Fall. 3 credits. Prerequisite: MS&E 631 or permission of instructor. Not offered 2003–2004. R. Dieckmann.

Topics include disorder in solids; thermodynamic quantities or quasi-free electron and electron defects in semiconductors; mobility, diffusion, and partial conductivity of ions and electrons; solid ionic conductors, solid electrolytes, and solid solution electrodes; galvanic cells with solid electrolytes for thermodynamic investigations; and technical applications of solid electrolytes. At the level of Electrochemistry of Solids by H. Rickert.

MS&E 655 Composite Materials (also M&E 655 and T&AM 655)
Spring. 4 credits. Staff.

For description, see T&AM 655.

MS&E 665 Principles of Tissue Engineering (also M&E 665, BMEP 665)
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. L. Bonassar.

This course covers introductory concepts in tissue engineering, including: polymers, 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
Spring. 3 credits. Prerequisite: MS&E 206 or equivalent. Offered alternate years. 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 patterns, and convergent beam patterns), 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 681 Surfaces and Interfaces in Materials
Spring. 3 credits. Offered alternate years. This course deals with special topics in the field of surface and interface science. Some 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 graduate students and staff.

Related Course in Another Department

Introductory Solid-State Physics (PHYS 454)
MECHANICAL AND AEROSPACE ENGINEERING

General and Required Courses

M&AE 101 Naval Ship Systems (also NAV S 202)
Spring. 3 credits.
For description, see NAV S 202.

M&AE 117 Introduction to Mechanical Engineering (also ENGR 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.

M&AE 127 Introduction to Entrepreneurship and Enterprise Engineering (also ENGR 127)
Spring. 3 credits. Open to all Cornell students regardless of major. No prerequisites.
For description, see ENGR 127.

M&AE 212 Mechanical Properties and Processing of Engineering Materials
Spring. 4 credits. Prerequisite: ENGRD 202 (strictly enforced). Software fee.
Introduction to the broad range of mechanical behavior of engineering materials and their processing. Origins of mechanical properties: atomic bonding and crystalline structures, point and line defects, plastic deformation of crystals and polycrystals, strain-hardening behavior and basic elements of plasticity. Fundamentals of thermal processing are introduced including the development of equilibrium microstructures in metals and time-dependent phase transformations. Bulk deformation processes are introduced including the ideal work and slab analysis methods. General failure of materials and materials selection topics are explored. The laboratory component of the course introduces students to the fundamentals of mechanical testing and thermal processing as well as instrumentation using common engineering transducers such as strain gages and thermocouples.

M&AE 221 Thermodynamics (also ENGRD 221)
Fall, spring, may be offered summer. 3 credits.
Prerequisites: MATH 192 and PHYS 112.
For description, see ENGRD 221.

M&AE 225 Mechanical Synthesis
Spring. 4 credits. Prerequisite: ENGRD 202. Pre- or corequisites: ENGRD 203 and ENGRD 221. Lab fee.
A hands-on introduction to the mechanical design process. Basic prototyping skills developed using machine tools. Mechanical dissection used to demonstrate successful product design and function. Design projects provide experience from conceptualization through prototype construction and testing. Basic instruction on CAD and technical sketching.

M&AE 323 Introductory Fluid Mechanics
Fall. Usually offered in Engineering Cooperative Program also. 4 credits.
Prerequisites: ENGRD 202 and 203 and coregistration in 221, or permission of instructor.
Topics covered include physical properties of fluids, hydrostatics, conservation laws using control volume analysis and using differential analysis, Bernoulli's equation, potential flows, simple viscous flows (solved with Navier-Stokes equations), dimensional analysis, pipe flows, boundary layers, introduction to compressible flow.

M&AE 324 Heat Transfer
Spring. May also be offered in Engineering Cooperative Program. 3 credits.
Prerequisite: M&AE 325 or permission of instructor.
Topics include steady and unsteady heat conduction, forced and free convection, external and internal flows; radiation heat exchange; mass transfer boiling and condensation. Heat exchangers and fins. Thermophysical transport properties. First law and rate equations are derived for heat transport processes in energy systems, including applications in propulsion and power, thermal environmental control, and manufacturing.

M&AE 325 Mechanical Design and Analysis
Fall. Usually offered in Engineering Cooperative Program also. 4 credits.
Prerequisites: ENGRD 202, ENGRD 203, M&AE 212, and M&AE 225. Lab fee.
Application of the principles of mechanics and materials to problems of analysis and design of mechanical components and systems.

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 427 Fluids/Heat Transfer Laboratory
Fall. 3 credits. Prerequisites: M&AE 323, 324. Fullfills the technical writing requirement.
Laboratory exercises in methods, techniques, and instrumentation used in fluid mechanics and the thermal sciences. Measurements of flame temperature, pressure, heat transfer, viscosity, lift and drag, fluid-flow rate, effects of turbulence, flow visualization, and spark ignition engine performance. Biweekly written assignments.

M&AE 428 Seminar on Engineering Design
Fall. 2 credits. Prerequisite: completion of 6 semesters in mechanical engineering or equivalent. S/U grades only.
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 presented in weekly invited lectures from a wide range of disciplines, including thermofluid processes, manufacturing, energy, mechanical 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 I (also CEE 504, COM S 504, ECE 512, ORIE 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.

M&AE 592 Applied Systems Engineering II (also CEE 505, COM S 505, ECE 512, ORIE 512, SYSEN 510)
Spring. 3 credits. Prerequisite: Applied Systems Engineering I (CEE 504, COM S 504, ECE 512, M&AE 591, or ORIE 512, SYSEN 510).
For description see SYSEN 520.

Mechanical Systems, Design, Materials Processing, and Precision Engineering

[M&AE 103] Introduction to Computer Aided Manufacture (CAM)
Fall. Spring. 1 credit, approximately 8 weeks (total 15 hrs. of instruction and 15 hrs. of lab). Prerequisite: M&AE 225, equivalent experience, or permission of instructor. Limited enrollment. Not offered 2003–2004.
M&AE 103 introduces students to the fundamentals of computer-aided manufacture (CAM) through the use of computer numerical control (CNC) programming using G codes and solid modeling software. Students learn setup, tool selection, and operation of CNC mills and lathes. They also receive an introduction to the CNC machine tool as an electro-mechanical system. This course is required for students wishing to use the CNC equipment in the Emerson Lab's Product Realization Facility for team or research projects.

M&AE 378 Mechatronics
Fall. 4 credits. Prerequisite: MATH 294, or permission of instructor. Limited enrollment.
Analog circuits, passive and active components, filter design, transistors, diodes, and power amplifiers are covered. Other topics include: electronics, piezoelectric and shape memory material transduction, gear trains, pulse width modulation, optical encoders, A/D and D/A conversion, discretization, aliasing, microprocessors, and programming.
Laboratory experiments culminate in a controlled robotic vehicle project.

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-meets 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.
For description, see CIS 409.

[M&AE 412] Smash and Crash: Mechanics of Large Deformations
Severe loading is a defining feature of both materials processing and crash worthiness. Materials are stressed beyond their elastic limits intentionally, resulting in large permanent deformations. In materials processing, the desire is to change a work piece 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 bound 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&E 415 GPS: Theory and Design (also ECE 415)
Fall, 4 credits. Prerequisites: A 300-level engineering course with advanced math content such as ECE 301, ECE 303, or M&E 326. For description, see ECE 415.

M&E 417 Introduction to Robotics: Dynamics, Control, Design
Spring, 3 credits. Introductory course in the analysis and control of mechanical manipulators and related robotic machines. Topical 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&E 425 FSAE Automotive Design Project
Fall, spring, 3 or 4 credits. Intended for M&E or ECE juniors and seniors or by arrangement with instructor. Usually 3 credits. Permission of instructor only. Project course to research, design, build, develop, and compete with a Formula SAE car for intercollegiate competition. Students work in interdisciplinary teams using concurrent engineering and systems engineering principles applied to complex mechanical, electromechanical, and electronic systems.

M&E 426 FSAE Auto Design Project (Design Option)
Fall, spring, 3 or 4 credits. Limited to M&E seniors; permission of instructor only.

Senior design version of M&E 425. For description, see M&E 425.

M&E 440 Hybrid Electric Vehicle
Fall, spring, 3 credits for team members; 4 credits for team leaders. Enrollment limited to a maximum of 4 students. Permission of instructor only. Team work on the design and fabrication of a hybrid vehicle for national competition.

M&E 441 Hybrid Electric Vehicle (Design Option)
Fall, spring, 3 or 4 credits. Limited to M&E seniors; permission of instructor only.

Senior design version of M&E 440. For description, see M&E 440.

M&E 455 Introduction to Composite Materials (also CEE 475, MSE 555, and T&M 455)
Spring, 4 credits. For description, see T&M 455.

M&E 461 Entrepreneurship for Engineers (also ENGRG 461 and OR&AIE 452)
Fall, 3 credits. Enrollment open to upper class engineers; others with permission of instructor limited enrollment. This course develops skills necessary to identify, evaluate, and begin new business ventures. Topics include intellectual property, competition, strategy, business plans, technology transfer, 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&E 463 Neuromuscular Biomechanics (also BMEP 463)
Spring, 3 credits. Prerequisites: ENGRD 202 and 203 or permission of instructor. Offered alternate years. Not offered 2003-2004. 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&E 464 Orthopaedic Tissue Mechanics
Spring, 3 credits. Prerequisites: ENGRD 202 and M&E 325 or permission of instructor. Offered alternate years. Applications of mechanics and materials principles to 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&E 466 Biomedical Engineering Analysis of Metabolic and Structural Systems (also BMEP 401)
Fall, 3 credits. Prerequisite: prior course work in basic biology. For description, see BMEP 401.

M&E 470 Finite Element Analysis for Mechanical and Aerospace Design
Spring, 3 credits. (4 credits as M&E design elective for M&E seniors) Prerequisite: senior standing or permission of instructor. Limited enrollment. Evening examinations. Term project. Fulfills senior design requirement for M&E students. Introduction to linear finite element static and dynamic analysis for discrete and distributed mechanical and aerospace structures. Prediction of load, deflection, stress, strain, and temperature distributions. Major emphasis on underlying mechanics and numerical methods. Introduction to computational aspects via educational and commercial software (such as MATLAB and ANSYS). Selected mechanical and aerospace applications. Co-meets with M&E 570.

M&E 477 Engineering Vibrations
Spring, 3 credits. Prerequisite: M&E 326 (or co-registration), or permission of instructor. Lumped element, distributed parameter, and mixed structural vibratory systems are examined. Equations of motion are derived from Newton's law and Lagrange's equations. Eigenanalysis, free and forced responses, and frequency-time domain solutions are considered. Vibration absorbers, isolators, and vibration suppression control systems using feedback approaches are also investigated. Co-meets with M&E 577.

M&E 478 Feedback Control Systems (also CHEM 472, ECE 472)
Spring, 4 credits. Prerequisites: one of the following: CHEM 372, ECE 301, M&E 326, 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.

M&E 479 Modeling and Simulation of Mechanical and Aerospace Systems
Fall, 3 credits. Prerequisite: senior engineering standing or permission of instructor. Evening examinations. Term project. Fulfills M&E senior design elective. Limited enrollment. F. Valero-Cuevas. Analysis and simulation of linear and nonlinear systems. Representation of discrete and distributed dynamical systems by state-variable models. Time- and frequency-domain simulation via general-purpose languages (such as MATLAB and Mathematica) and special-purpose simulation software (such as Simulink). Selected applications from diverse fields. Co-meets with M&E 579.

M&E 486 Automotive Engineering Design
Spring, 4 credits. Prerequisite: senior standing. Fulfills field senior design requirement for M&E students. For description, see M&E 386.

M&E 514 Design for Manufacturing and Assembly
Fall or spring, 4 credits. Prerequisites: M&E 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 DFMA in the product development process in part and product design. The second stream, covered mainly through lectures, addresses dimensional variability and its control through parametric and geometric tolerancing, dimensional metrology, and statistical quality and process control.
M&AE 525 Mechatronics Systems Engineering Project
Fall, spring. 4 credits each term (must be taken for BMEP 526 alternate years. Not offered 2003-2004.)*
Engineering students only. Corequisite: M&AE 650 or equivalent, graduate standing, or permission of instructor.
Prerequisite: M&AE 326 or equivalent, graduate standing, or permission of instructor. Graduate version of M&AE 470.
For description, see M&AE 470.

M&AE 565 Biomechanical Systems—Analysis and Design (also BMEP 565)
Fall. 3 or 4 credits. Prequisites: undergraduate courses in dynamics and strength of materials, (e.g., T&AM/ENGRD 202 and 203) and junior 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 biomechanical systems frequently encountered in orthopaedic engineering, including bone-implant systems. Crosslisted with BMEP 565.

M&AE 570 Simulation of Mechanical and Aerospace Systems (also MAE 470)
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.
Evening examinations. Term project.
Graduate version: M&AE 470. For description, see M&AE 470.

M&AE 571 Applied Dynamics
Fall. 3 credits. Prerequisites: graduate standing, seniors with T&AM/ENGRD 203, and M&AE 326 or permission of instructor. 2 lectures.
Introduction to multidisciplinary dynamics; dynamics of rigid bodies; Newton-Euler methods, Lagrangian dynamics, principle of virtual power (Kane-Jourdain methods); and applications to robotics, space dynamics of satellites, electro-mechanical systems. Introduction to multidisciplinary simulation using working model.

M&AE 577 Engineering Vibrations
Spring 3 credits. Prerequisite: M&AE 326 or equivalent, graduate standing, or permission of instructor. Graduate version of M&AE 477.
For description, see M&AE 477.

M&AE 579 Modeling and Simulation of Mechanical and Aerospace Systems
Fall. 3 credits. Prerequisite: graduate standing or permission of instructor. Limited enrollment. Even lectures. Term project. Graduate version of M&AE 479.
For description, see M&AE 479.

M&AE 613 Simulation Methods in Mechanics of Materials
Spring. 4 credits. Prerequisite: M&AE 612 or TAM 665, programming experience, knowledge of MATLAB, FORTRAN, or C; introductory finite element course recommended. Offered alternate years. Not offered 2003-2004.
Presentation of mechanics framework for simulations of large plastic deformations. Discussion of constitutive theories for the constitutive description of mechanical behavior of solids. Presentation of finite element formulations for solving problems that include nonlinearity from large deformations and inelastic behavior of several numerical issues, including consistent computational formulations, error estimation, adaptive meshing, and contact algorithms. Applications in polymer processing, metal forming, micromechanics, and inelastic design.

M&AE 615 Mechanics of Materials: Experiments and Simulations
Fall. 4 credits. Prerequisite: M&AE 680 (finite elements) or permission of instructor. Not offered 2003-2004.
This course focuses on experiments and simulations related to the mechanical properties of metals and materials processing. A general introduction to sensors and instrumentation for engineering measurements is also included. Testing for mechanical properties/model parameter characterization and simple boundary value problems: linear elasticity, inelastic deformation, fatigue, and fracture, including rate and temperature effects. Process simulation experiments including forging, extrusion, rolling, and ironing may also be conducted. In addition, an emphasis is placed on the experimental formulation interface. Students perform analyses including finite element modeling to correlate and predict materials behaviors observed in the experiments. These analyses include linear elasticity behavior, state variable plasticity modeling, and fracture mechanics.

M&AE 655 Composite Materials (also MS&E 655 and TAM 655)
Spring. 4 credits. For description, see TAM 655.

M&AE 663 Advanced Topics in Neuromuscular Biomechanics (also BMEP 663)
Spring. 3 credits. Permission of instructor only. Offered alternate years.
F. Valero-Cuevas.
Advanced topics in modeling and simulation of biomechanical systems using mechanics, dynamics, and control principles. Mathematical representation of the functional interactions among neurons, muscles, and skeletal structures. Numerical prediction of force and movement in biological systems, and projects exploring muscle coordination using optimization design 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 2003-2004.
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 BMEP 665 and MS&E 665)
Spring. 3 credits. Prerequisite: graduate standing or permission of instructor. L. Bonassar.
See BMEP 665 for description.

M&AE 675 System Identification and Control
Fall. 4 credits. Prerequisite: M&AE 478/ECE 471/CHME 472, M&AE 521/ECE 521, or equivalent.
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. Prerequisite: linear algebra, differential equations, and MATLAB programming. Open to M.S./Ph.D.; others by permission of the instructor.
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 techniques for nonlinear models. Both theory and application are presented.

M&AE 677 Robust and Optimal Control
Spring. 4 credits. Prerequisite: M&AE 478/ECE 471/CHME 472 (or equivalent), ECE 521 (or equivalent), graduate standing, or permission of instructor. Not offered 2003-2004.
An introduction to model based control of multi-input, multi-output systems. Emphasis on design techniques that result in closed loop systems that are insensitive to modeling errors and that achieve a pre-specified level of performance. Topics include lq spaces and performance measures, model reduction and approximation, H2 and H-infinity optimal control, explicit models of system uncertainty, and the analysis of uncertain control systems. Most of the design and analysis tools developed in the course are in the form of linear matrix inequalities or semidefinite programs. Each student is expected to: (1) give a presentation on a research paper, which is chosen from a list provided by the instructor, or (2) to complete a design project applying the techniques developed in the course.

M&AE 680 Finite Element Analysis (also MS&E 680 and TAM 680)
Spring. 4 credits. Prerequisites: T&AM 663 and TAM 610 or equivalent, graduate standing or permission of instructor.
Theoretical, practical, and actual programming techniques for finite element analysis and design, with emphasis on structural, mechanical, and thermal problems. Focusing on the FEM as a method for numerical solution of 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.


The focus of this course is the evaluation of mechanical properties from knowledge of the material microstructure, with attention to anisotropic elastic and plastic behaviors. Topics include mathematical and mechanics preliminaries, mathematical foundations of orientations, including parameterizations, symmetries, and fibers; construction and sampling of orientation distributions; hypotheses used to link macro and micro length scales; methodology for evaluation of effective elastic and plastic moduli; evolution of orientations and orientation distributions with deformation. Applications to polycrystalline solids (metal alloys and minerals), composite materials, biomaterials (soft tissues), and polymers.

Energy, Fluids, and Aerospace Engineering

[M&E 305] Introduction to Aeronautics
Fall. 3 credits. Prerequisite: T&AM/ENG RD 205; limited to upperclass engineers, others with permission of instructor. Introduction to aerodynamic design of aircraft. Principles of incompressible and compressible aerodynamics, boundary layers, and wing theory. Calculation of lift and drag for aircraft. Analysis of aerodynamic performance, stability, and control. Description and performance of reciprocating and jet propulsion engines; propeller theory.

[M&E 306] Spacecraft Engineering
Spring. 3 credits. Junior and senior engineering students. 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&E 400] Components and Systems: Engineering in a Social Context (also M&AE 400)
Fall. 3 credits. Prerequisites: upperclass standing, 2 years of college physics. Serves as an approved elective but not as a Field Elective in Mechanical Engineering. Not offered 2003–2004.

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 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&E 401] Components and Systems: Engineering in a Social Context
Fall. 4 credits. Prerequisites: senior standing; 2 years of college physics. M&E senior field design requirement. Not offered 2003–2004.

For description, see M&E 400.

[M&E 423] Intermediate Fluid Dynamics
Spring. 3 credits. Prerequisite: M&E 323. Fall. 3 credits. M&E 623.

This course builds on the foundation of M&E 323. Emphasis is placed on the fundamental principles and numerical calculation of real flows (both engineering and environmental) using a computational fluid dynamics package. Topics covered include some exact solutions to the Navier-Stokes equations, boundary layers, wakes and jets, separation, convection, stratified and rotating flows, fluid instabilities, and turbulence.

[M&E 449] Combustion Engines
Spring. 3 credits. Prerequisites: ENGRD 221 and M&E 323.

Introduction to combustion engines, with emphasis on the application of thermo-dynamic and fluid-dynamic principles affecting their performance. Chemical equilibrium and kinetics, ideal-cycle analyses, deviations from ideal processes, engine breathing, combustion, knock. Description and control of undesirable exhaust emissions.

[M&E 453] Computer-Aided Engineering: Applications to Biomedical Processes (also BEE 453)
Spring. 3 credits. Prerequisite: heat and mass transfer (BEE 350 or equivalent). Fall. 3 credits. M&E 650. M&E 305. M&E 680 (or equivalents). Second year standing in MS/Ph.D. program.

Fulfills computer applications elective for M&E students. See BEE 453 for description.

[M&E 454] Introduction to Nuclear Science and Engineering (also ECE 443)
Fall. 3 credits. Prerequisites: PHYS 214 and MATH 294.

For description, see ECE 443.

[M&E 459] Introduction to Controlled Fusion: Principles and Technology (also A&EE 484 and 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. Offered spring 2004.

For description, see NS&E 484.

Spring. 3 credits. Prerequisites: ENGRD 221, M&E 323, M&E 326, or equivalents. Open to graduate and upperclass students or approval from instructor. Critically examines 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 lowered-carbon sources (co-generative gas turbine plants, fuel cells) are also studied. Both the devices as well as the overall systems are analyzed.

[M&E 506] Aerospace Propulsion Systems
Fall. 3 credits. Prerequisite: M&E 323 or permission of instructor. Offered alternate years.


[M&E 507] Dynamics of Flight Vehicles


[M&E 523] Intermediate Fluid Dynamics with CFD
Spring. 4 credits. Prerequisites: graduate standing or permission of instructor. This course is intended for M&E students who wish to take a single fluid dynamics course. Students desiring more intensive treatment should consider M&E 601 and one or more of M&E 636, M&E 736, and M&E 737. This class co-meets with M&E 423. In addition to the normal requirements for M&E 423, this course includes an extensive CFD design project.

[M&E 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 thermochemistry, kinetics, vessel explosions, laminar premixed and diffusion flames, droplet combustion, and combustion of solids.

[M&E 601] Foundations of Fluid Dynamics and Aerodynamics
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Foundations of fluid mechanics from an advanced viewpoint, including formulation of continuum fluid dynamics, surface phenomena and boundary conditions at interfaces; fundamental kinematic descriptions of fluid flow, tensor analysis, derivation of the Navier-Stokes equations and energy equation for compressible fluids, boundary layers, viscous flows, boundary layers, and potential flows.

[M&E 602] Fluid Dynamics at High Reynolds Numbers
Spring. 4 credits. Prerequisite: M&E 601. Offered alternate years.

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 603 Compressible Fluid Dynamics]
Fall. 4 credits. Graduate standing or permission of instructor. Not offered 2003–2004. Fundamentals of compressible gas dynamics are described using thermodynamics and fluid properties, together with isentropic and viscous andaducous flow theories; normal and oblique shock-waves, Prandtl-Meyer expansion fans; sound waves and acoustics; and duct flows including effects of area, friction, and heat interaction. Applications include high-speed aerodynamics, including hypersonic combustor design.

[M&AE 608 Physics of Fluids]
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Offered alternate years. 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 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. 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 mean equations.

[M&AE 636 Elements of Computational Aerodynamics]
Fall or spring. 4 credits. Prerequisites: graduate standing and a graduate-level course in fluid mechanics. Not offered 2003–2004. 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. 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 equilibrium chemistry, 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, 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. 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 techniques and 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. Not offered 2003–2004. For description, see COM S 750.

[M&AE 651 Conduction and Radiation Heat Transfer]

[M&AE 652 Convection Heat Transfer]
Fall, weeks 8–14. 2 credits. Prerequisite: graduate standing; undergraduates by permission of instructor. An intermediate treatment of convection heat transfer. Governing equations developed in integral and differential forms. Boundary layers. Laminar and turbulent flows. Internal and external, forced and free convection. Entropy and system arguments for optimal design. Parameter identification. At the level of, but extends, Heat Transfer by Bejan.

[M&AE 714 Computational Sensors: Information Technologies for Complex Continuum Systems]
Fall. 4 credits. Prerequisites: exposure to computational mathematics, background in continuum systems and processes such as fluid flow, thermal transport and/or deformation of materials/structures. Not offered 2003–2004. N. Zabaras. 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; advanced adaptive sensing and actuation of continuum fields.

[M&AE 733 Stability of Fluid Flow]

[M&AE 734 Analysis of Turbulent Flows]

[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 (FORTRAN, MATLAB, etc.) programming experience. Not offered 2003–2004. 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
Special Offerings

M&A 490 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit TBA. Prerequisite or corequisite M&A 428. Fulfills field design requirement.
Intended for individual students or small groups of students who want to pursue a particular project or experimental investigation outside of regular courses or for informal instruction supplementing that given in regular courses.

M&A 491 Design Projects in Mechanical and Aerospace Engineering
Fall, spring. Credit TBA. Prerequisite or corequisite M&A 428. Fulfills field 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&A undergraduate office.

M&A 545 Energy Seminar (also ECE 587, M&A 545)
Fall, spring. 1 credit. May be taken for credit both semesters.
Energy resources, their conversion to electricity or mechanical work, and the environmental consequences of the energy cycle are discussed by faculty members from several departments in the university and by outside experts. Examples of topics to be surveyed include energy resources and economics, coal-based electricity generation, nuclear reactors, solar power, energy conservation by users, and air pollution control.

M&A 594 Enterprise Engineering Colloquium (also ORIE 693-894)
Fall, spring. Credit TBA. Limited to graduate students.
For description, see ORIE 893-894.

M&A 595 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit TBA. Limited to graduate students.

M&A 695 Special Topics in Mechanical and Aerospace Engineering
Fall, spring. Credit TBA. Graduate standing and permission of instructor.

M&A 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 lectures by faculty members on topics of current research.

M&A 791 Mechanical and Aerospace Research Conference
Fall, spring. 1 credit each term. S-U grades only. For graduate students selected to participate in research projects.
Presentations on research in progress by faculty and students.

M&A 799 Mechanical and Aerospace Engineering Colloquium
Fall, spring. 1 credit each term. Credit limited to graduate students. All students and staff invited to attend.
Lectures by visiting scientists and Cornell faculty and staff members on research topics of current interest in mechanical and aerospace science, especially in connection with new research.

M&A 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&A 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.

Nuclear Science and Engineering

NS&E 121 Fission, Fusion, and Radiation (also A&E 121 and ENGR 121)
Spring. 3 credits. S-U grades optional for students outside the College of Engineering. K. B. Cady.
This is a course in the Introduction to Engineering series. For description, see ENGR 121.

NS&E 484 Introduction to Controlled Fusion: Principles and Technology (also A&E 484, ECE 484, and M&A 459)
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. Not offered 2003-2004. D. A. Hammer.
Introduction to the physical principles and various engineering aspects underlying power generation by controlled fusion. Topics include fuels and controls 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 internal confinement fusion-reactor designs.

NS&E 509 Nuclear Physics for Applications
Fall. 3 credits. Prerequisites: sophomore physics and math or permission of instructor; some upper-division physics is desirable. Primarily for graduate students,

especially those with a major or minor in Nuclear Science and Engineering; also open to qualified undergraduates. V. O. Kostroun.
A first course in nuclear physics. Systematic presentation of nuclear phenomena and processes that underlie applications ranging from nuclear power (fission and fusion), to nuclear astrophysics, to nuclear analytical methods for research in nonnuclear fields. Reactivity, nuclear reactions, and interaction of radiation with matter. At the level of Radiochemistry and Nuclear Methods of Analysis by Ehrmann and Vance and Nuclear and Radiochemistry by Friedlander, et al.

NS&E 545 Energy Seminar (also ECE 587 and M&A 545)
Fall, spring. 1 credit. May be taken for credit both semesters. E. Fisher.
For description, see ECE 587.

NS&E 590 Independent Study
Fall, spring. 1-4 credits. Grade option letter or S-U. Staff.
Independent study or project under guidance of a faculty member.

NS&E 591 Project
Fall, spring. 1-6 credits. Staff.
Master of Engineering or other project under guidance of a faculty member.

NS&E 612 Nuclear Reactor Theory
Fall. 4 credits. Prerequisite: 1 year of advanced calculus and some nuclear physics. Offered on demand. K. B. Cady.
Physical theory of fission reactors; fission and neutron interactions with matter; theory of neutron diffusion; slowing down and thermalization; calculations of criticality and neutron-flux distribution in nuclear reactors; and reactor kinetics. At the level of Nuclear Reactor Theory by Lammers.

NS&E 633 Nuclear Reactor Engineering (also A&E 633)
Fall. 4 credits. Prerequisite: introductory course in nuclear engineering. Offered on demand. K. B. Cady.
The fundamentals of nuclear reactor engineering, reactor siting and safety, fluid flow and heat transfer, control, environmental effects, and radiation protection.

Operations Research and Industrial Engineering

ORIE 310 Industrial Systems Analysis
Spring. 4 credits. Prerequisite or corequisite: ENGRD 270 or permission of instructor. J. Callister.
Design of production facilities, including engineering economy, materials handling, process design, and facility layout. Covers operations analysis, including process scheduling, process evaluation, procedural analysis, project management, methods analysis and design, work measurement, inventory control, job evaluation, and quality engineering and control.

ORIE 320 Optimization I
Fall. 4 credits. Prerequisites: 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&E 321 Optimization II
Spring. 4 credits. Prerequisite: OR&E 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&E 350 Financial and Managerial Accounting
Fall. 4 credits. J. Callister.
Course covers principles of accounting, financial reports, financial-transactions analysis, financial-statement analysis, budgeting, job-order and process-cost systems, standard costing and variance analysis, and economic analysis of short-term decisions.

OR&E 360 Engineering Probability and Statistics II
Fall. 4 credits. Prerequisite: ENGRD 270 or equivalent. G. Samorodnitsky.
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, hypergeometric testing, confidence intervals, and point estimation using maximum likelihood and the method of moments.

OR&E 361 Introductory Engineering Stochastic Processes I
Spring. 4 credits. Prerequisite: OR&E 360 or equivalent. K. Athreya.
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&E 416 Design of Manufacturing Systems
Fall. 4 credits. Senior OR&E 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&E 431 Discrete Models
Fall. 4 credits. Prerequisites: OR&E 320 and COM S 211 or permission of instructor. D. Shmoys.
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&E 432 Nonlinear Optimization
This course is an introduction to the practical and theoretical aspects of nonlinear 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&E 434 Optimization Modeling
Emphasis is on modeling complicated decision problems as linear programs, integer programs, or highly structured nonlinear programs. Besides modeling, students are required to assimilate articles from the professional literature and to master relevant software.

OR&E 435 Introduction to Game Theory
Fall. 3 credits. E. Friedman.
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. Economic market games. Applications to weighted voting and cost allocation.

OR&E 436 A Mathematical Examination of Fair Representation
Spring. 3 credits. Prerequisites: MATH 222 or 294 or permission of instructor. 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 house size 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 basic ideas extend 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&E 451 Economic Analysis of Engineering Systems
Spring. 4 credits. Prerequisites: OR&E 320 and OR&E 350.
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 selection and capacity expansion models, and issues in designing manufacturing systems. Includes a student group project.

OR&E 452 Entrepreneurship for Engineers (also MAE 461 and ENGRG 461)
Fall. 3 credits. Enrollment open to upper-class engineers, others by permission of instructor. J. Callister.

For description see MAE 461.

OR&E 462 Introductory Engineering Stochastic Processes II
Spring. 4 credits. Prerequisite: OR&E 361 or equivalent. Not offered 2003–2004.
Course topics include stationary processes, martingales, random walks, and gambler’s ruin problems, processes with 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&E 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&E 361 as well as a prior course in statistics. S. Resnick.
These 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 exceedance 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 field of heavy tailed modeling and the implications of heavy tails in insurance and data networks.

OR&E 467 Credit Risk: Modeling, Valuation, and Management
Spring. 4 credits. Prerequisite: OR&E 361. G. Kiescke.
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 risks. Emphasis will be on credit derivative instruments used for hedging credit risks, including credit swaps, spread options, and collateralized debt obligations.

OR&E 468 Financial Engineering with Stochastic Calculus I
Fall. 4 credits. Prerequisite: knowledge of probability at the level of OR&E 360. K. Giesecke.
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&E 469 Financial Engineering with Stochastic Calculus II
Building on the foundation established in OR&E 468/568, this course will cover the basic models of finance and option 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 Finance and Engineering.**
Spring. 3 credits. Prerequisites: engineering math through MATH 294 and OR&IE 270 and 360. D. Ruppert.
This course is an introduction to the applications of OR techniques, e.g., probability, statistics, simulation, 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**
Fall. 3 credits. Prerequisites: OR&IE 360 and MATH 294 or equivalent, or permission of instructor.
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. 2 credits. Prerequisite: ENGRD 270.
Course topics include multiple linear regression, diagnostics, model selection, inference, one and two factor analysis of variance. Theory and applications both treated. Use of MINITAB stressed.

**OR&IE 480 Information Technology**
Fall. 4 credits. Prereq: OR&IE 350 or permission of instructor.
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. M. Eisner.
Study of ways information technology is used to deliver operations research methodology in real applications, including decision support systems, embedded operations research techniques in spreadsheet 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. Not offered 2003-2004.
This course covers a variety of operations research and game theoretic problems arising in information technology. Examples include web searching, network traffic and congestion control, online auctions, and trust and reputations 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 guideline is 1 credit per 4 hours/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 505, COM S 504, ECE 512, M&E 581)**
Fall. 3 credits. Prerequisite: permission of instructor. R. Roundy.
For description, SYSEN 510.

**OR&IE 513 Applied Systems Engineering II (also CEE 505, COM S 505, ECE 513, M&E 582)**
Spring. 3 credits. Prerequisite: Applied Systems Engineering I (CEE 504, COM S 504, ECE 512, M&E 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 OR&IE 416.

**OR&IE 516 Case Studies**
Fall. 1 credit. Limited to M.Eng. students in OR&IE. E. Eisner.
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. Prerequisites: one of the following: OR&IE 310, OR&IE 416, OR&IE 525, or OR&IE 562. J. Muckstadt, H. Topaloglu.
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 competitors. Discusses dimensions of intercorporate relationships with partners, including decision-making, incentives, and risk.

**OR&IE 520 Operations Research I: Optimization I**
For description, see OR&IE 320.

**OR&IE 521 Optimization II**
For description, see OR&IE 321.

**OR&IE 522 Operations Research I: Topics in Linear Optimization**
Fall. 1 credit. Prereq or coreq: OR&IE 520. Students who have already taken OR&IE 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 OR&IE 361.

**OR&IE 524 Design of Manufacturing Systems II**
Spring. 4 credits. Prerequisites: OR&IE 562, OR&IE 416; or by permission of instructor. Not offered 2003-2004.
This project course focuses on the design and analysis of a globa corporation's operations. Working in teams, students examine issues pertaining to a prototype company on the following topics: information system design, marketing, strategic location of facilities, customer based manufacturing, new 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**
Spring. 4 credits. Coreq: OR&IE 320, OR&IE 360. A. Sapra.
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 551 Economic Analysis of Engineering Systems**
Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 250.
Lectures concurrent with OR&IE 451. For description see OR&IE 451.

**OR&IE 560 Engineering Probability and Statistics II**
For description, see OR&IE 360.

**OR&IE 561 Queuing Systems: Theory and Applications**
Fall. 3 credits. Prerequisite: OR&IE 361 or permission of Instructor. Not offered 2003-2004.
Course covers: basic queuing models; delay and loss systems; finite source, finite capacity, balking, reneging; systems in series and in parallel; FCFS versus LCFS; busy period problems; output, design and control problems; priority systems; 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**

Fall. 3 credits. Prerequisite: OR&IE 321, 361, or permission of instructor. A. Sapra. 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: OR&IE 361 and ENGRD 270 or permission of instructor.

The first part of this course treats regression methods to model seasonal and nonseasonal data. After that, Box-Jenkins models, which are versatile, widely used, and applicable to nonstationary and seasonal time series, are covered in detail. The various stages of model identification, estimation, diagnostic checking, and forecasting are treated. Analysis of real data is carried out. Assignments require computer work with a time-series package.

**OR&IE 564 Introductory Engineering Stochastic Processes II**

Spring. 4 credits. Prerequisite: OR&IE 361 or equivalent. Lectures concurrent with OR&IE 462.

For description, see OR&IE 462.

**OR&IE 565 Applied Financial Engineering**

Spring. 4 credits. Limited to M.Eng. students. P. Protter.

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 OR&IE 464.

**OR&IE 567 Credit Risk: Modeling, Valuation, and Management**

Spring. 4 credits. Prerequisite: OR&IE 361. K. Giesecke.

For description, see OR&IE 467.

**OR&IE 569 Financial Engineering with Stochastic Calculus II**


For description, see OR&IE 469.

**OR&IE 575 Experimental Design**


Course covers sampling, blocking, sample size determination, factorial designs, 2p full and fractional factorials, response surfaces, Latin squares, split plots, and Taguchi designs. Engineering applications. Computing in MINITAB or SAS.

**OR&IE 576 Regression**

Spring; weeks 8-14 (alternates with 575). 2 credits. Prerequisite: OR&IE 476. J. Booth.

Course covers nonlinear regression, advanced diagnostics for model checking, 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. B. Turnbull.

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 360 (may be taken concurrently) and computing experience, or permission of instructor. S. S. Pamboris.


**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 enrolls in the course. (The following projects are pre-approved: FSAE, HEV, 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**

Spring. 3 credits. D. Shmoys.

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**

Fall, spring. 4 credits. J. Muckstadt; fall, H. Topaloglu, spring.

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 630 Mathematical Programming I**

Fall. 4 credits. Prerequisites: advanced calculus and elementary linear algebra. R. Bland.

A rigorous treatment of the theory and computational techniques of linear programming and its extensions, including formulation, duality theory, algorithms; sensitivity analysis; network flow problems and algorithms; theory of polyhedral convex sets, systems of linear equations and inequalities, Farkas' Lemma, and exploiting special structure in the simplex method and computational implementation.

**OR&IE 631 Mathematical Programming II**

Spring. 4 credits. Prerequisite: OR&IE 630. L. Trotter.

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. Not offered 2003–2004.

Necessary and sufficient conditions for unconstrained and constrained optimization. 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 2003–2004.

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**


Topics in combinatorics, 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 411 and OR&IE 630, or permission of instructor. M. Todd.

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 2003–2004.

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.
[ORIE 637] **Semidefinite Programming**  
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.

[ORIE 639] **Polyhedral Convexity**  
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 cones and polytopes; minkowski sums; gale transforms; simplicial and polyhedral subdivision; and applications to linear programming, combinatorial optimization, and computational geometry.

[ORIE 650] **Applied Stochastic Processes**  
Fall; 4 credits. Prerequisite: a 1-semester calculus-based probability course. U. Prabhu.  
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.

[ORIE 651] **Probability**  
Spring; 4 credits. Prerequisite: real analysis at the level of MATH 413 and a previous 1-semester course in calculus-based probability. P. Protter.  
Course covers sample spaces, events, sigma fields, probability measures, set induction, independence, random variables, expectation, review of important distributions and transformation techniques, convergence concepts, laws of large numbers and asymptotic normality, and conditioning.

[ORIE 662] **Advanced Stochastic Processes**  
Fall; 3 credits. Prerequisite: ORIE 651 or equivalent. Not offered 2003–2004.  
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, Levy processes, regenerative phenomena, random walks, and stochastic integrals.

[ORIE 670] **Statistical Principles**  
Fall; 4 credits. Corequisite: ORIE 650 or equivalent. B. Turnbull.  
Topics include review of distribution theory of special interest in statistics: normal, chi-square, binomial, Poisson, t, and F; introduction to statistical decision theory; sufficient statistics; theory of minimum variance unbiased point estimation; maximum likelihood and Bayes estimation; basic principles of hypothesis testing, including Neyman-Pearson Lemma and likelihood ratio principle; confidence interval construction; and introduction to linear models.

[ORIE 671] **Intermediate Applied Statistics**  
Fall; 3 credits. Prerequisite: ORIE 670 or equivalent. J. Booth.  
Course topics include statistical inference based on the general linear model; least-squares estimators and their optimality properties; likelihood ratio tests and corresponding confidence regions; and simultaneous inference. Applications in regression analysis and ANOVA models. Covers variance components and mixed models. Use of the computer as a tool for statistics is stressed.

[ORIE 674] **Statistical Learning Theory for Data Mining**  
Spring; 3 credits. Prerequisites: Probability at the level of ORIE 651, and statistical at the level of ORIE 670. Not offered 2003–2004.  
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.

[ORIE 677] **Sequential Methods in Statistics**  
The statistical theory of sequential design and analysis of experiments has many applications; including monitoring data from clinical trials in medical studies and quality control in manufacturing operations. 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.

[ORIE 678] **Bayesian Statistics and Data Analysis**  
Spring; 3 credits. Prerequisites: ORIE 670 and some knowledge of measure theoretic probability, e.g., co-registration in ORIE 650. D. Ruppert.  
Prior, posterior, 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.

[ORIE 680] **Simulation**  
Spring; 4 credits. Prerequisite: computing experience and ORIE 650 or equivalent, or permission of instructor. S. Henderson.  
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.

[ORIE 728-729] **Selected Topics in Applied Operations Research**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[ORIE 738-739] **Selected Topics in Mathematical Programming**  
Fall; spring. Credit TBA.  
Current research topics in mathematical programming.

[ORIE 768-769] **Selected Topics in Applied Probability**  
Fall; spring. Credit TBA.  
Topics are chosen from current literature and research areas of the staff.

[ORIE 777-779] **Selected Topics in Applied Statistics**  
Fall; spring. Credit TBA.  
Topics chosen from current literature and research of the staff.

[ORIE 790] **Special Investigations**  
Fall; spring. Credit TBA.  
For individuals doing thesis research for master's or doctoral degrees.

[ORIE 799] **Thesis Research**  
Fall; spring. Credit TBA.  
For individuals doing thesis research for master's or doctoral degrees.

[ORIE 891] **Operations Research Graduate Colloquium**  
Fall. Spring. 1 credit. B. Turnbull.  
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.

[SYSN 510] **Applied Systems Engineering**  
(Also CEE 504, COM 504, ECE 512, M&AE 591, ORIE 512)  
Fall; spring. 3 credits. S-U grades only. Not offered 2003–2004.  
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 of goods and services.

[SYSN 710] **Selected Topics in Systems Engineering**  
Fall; Spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[SYSN 711] **Fundamentals**  
Fall; Spring. 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. Staff.  
Fundamental ideas of systems engineering and their application to design and development of various types of engineered systems. Defining system requirements, creating effective project teams, mathematical tools for system analysis and control, testing and evaluation, economic considerations, and the system life cycle. Students majoring in Systems Engineering enroll in SYSN 510. Students in Continuing Education enroll in SYSN 511. Students taking optional Systems Engineering enroll in M&AE 491, CEE 504, COM 504, ECE 512, or ORIE 512. Lectures are identical for all versions.

[SYSN 511] **Applied Systems Engineering**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[SYSN 712] **Advanced Topics**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[SYSN 713] **Graduate Research**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[SYSN 714] **Independent Study**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[SYSN 715] **Seminar**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[SYSN 716] **Colloquium**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.

[SYSN 891] **Graduate Colloquium**  
Fall; spring. Credit TBA.  
Current research topics dealing with applications of operations research.
Theoretical and Applied Mechanics

Basics in Engineering Mathematics and Mechanics

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)  
Spring, fall, or summer. 4 credits. Prerequisite: MATH/TA&AM 191. 
For description, see MATH 192.

T&AM 293 Engineering Mathematics (also MATH 293)  
Fall, spring. 4 credits. Prerequisite: MATH/TA&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/TA&AM 293. 
For description, see MATH 294.

T&AM 310 Advanced Engineering Analysis I  
Fall, spring. 3 credits. Prerequisite: MATH/TA&AM 294 or equivalent. 
Course covers: initial value problems, boundary value problems, 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/TA&AM 294 or equivalent T&AM 310. 
Mathematical modeling of physical and biological systems. Examples range from molecular diffusion, bacteria 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 612 Methods of Applied Mathematics III  
Spring. 3 credits. Prerequisite: T&AM 610 and 611 or equivalent. 
Course topics include: integral transforms, methods, Wiener-Hopf technique, solutions of integral equations and partial differential equations. Problems are drawn from electromagnetics, elasticity, fluid mechanics, heat transfer, and acoustics.

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 multi-scale methods) and symotptic expansion of integrals (method of steepest descent, stationary phase, and Laplace methods). Also covers regular and singular perturbation methods for PDE (e.g. method of composite expansions). Other topics (depending on instructor) may include normal forms, center manifolds, Liapunov-Schmidt 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  

T&AM 617 Advanced Mathematical Modeling  
Spring. 3 credits. Offered alternate years.

T&AM 718 Topics in Bifurcation Theory  
Spring. 3 credits. Offered every third year. 
Provides a basic, rigorous introduction to certain aspects of nonlinear analysis, with an emphasis on techniques based on differential calculus. Applications to nonlinear elasticity and nonlinear oscillations of mechanical systems (including Liapunov Center Theorem, Hopf Bifurcation, and Hamiltonian-Hopf bifurcation) will be presented throughout. The course is intended for students in the physical and mathematical sciences. The minimal prerequisites are linear algebra, advanced calculus, differential equations, and eigenvalue problems. Exposure to nonlinear problems of engineering science or mathematical physics and some background in basic functional analysis is helpful but not required.
Continuum Mechanics

T&AM 455 Introduction to Composite Materials (also CEE 475, M&E 455 and M&AE 555)
Spring. 4 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. 3-10 credits.

T&AM 592 Master of Engineering Design Project II
Spring. 3-10 credits.

T&AM 655 Composite Materials (also M&AE 655 and M&AE 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 theories 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; thermoelasticity; and three-dimensional elasticity.

T&AM 666 Finite Element Analysis (also M&AE 660 and CEE 772)
Spring. 3 credits. Prerequisites: T&AM 663 or equivalent.
For description, see M&AE 660.

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.

T&AM 752 Nonlinear Elasticity
Spring. 3 credits. Prerequisites: T&AM 610, 611, and 751 or equivalents. Offered alternate years.
Review of governing equations. Topics include linearization and stability; constitutive inequalities; exact solution of special problems; nonlinear string and rod theories; phase transformations and crystal defects.

T&AM 753 Fracture
Fall. 3 credits. Prerequisites: T&AM 610 or 611; and 663 and 664 or equivalents.
Offered alternate years.
Course covers fundamentals of linear elastic fracture mechanics: K, small-scale yielding, solutions of elastic crack problems, energy concepts, J-integral. Also covers nonlinear, rate-independent, small-deformation, fracture mechanics: plastic fracture, J-integral, small-scale yielding, fields for stationary and growing cracks; failure mechanisms of polymers, ceramics, composites, and metals: void growth, load transfer between fibers, crazing, fracture testing, fatigue fracture, computation of stress intensity factors; and plate theory and fracture.

T&AM 757 Inelasticity
Spring. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents.
Course covers plasticity: dislocation slip systems; early experimental observations; general principles; limit analysis; and solution of boundary-value problems, plastic waves, one- and three-dimensional. Also covers viscoelasticity: general principles, solution of boundary-value problems.

T&AM 759 Boundary Element Methods
Fall. 4 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents.
Introduction to boundary element methods. Solutions for potential theory, linear elasticity, diffusion, material, and/or geometric nonlinearities. Modern developments: hypersingular integrals, the boundary contour methods, sensitivity analysis.

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 vibrations and stability theory. Newtonian-Eulerian mechanics of rigid bodies; and gyroscopes.

T&AM 578 Nonlinear Dynamics and Chaos
Fall. 3 credits. Prerequisites: MATH/T&AM 295 or equivalent.
Introduction to nonlinear dynamics, with applications to physics, engineering, biology, and chemistry. Emphasizes analytical methods, concrete examples, 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 671 Hamiltonian Dynamics
Spring. 3 credits. Prerequisite: T&AM 570 or equivalent. Offered alternate years.
Course topics include review of Lagrangian mechanics, Kane's equations; Hamilton's principle, the principle of least action, and related topics from the calculus of variations; Hamilton's canonical equations; approximate methods for two-degrees-of-freedom systems (Lie transforms); canonical transformations and Hamilton-Jacobi theory; KAM theory; and Melnikov's method.

T&AM 672 Celestial Mechanics (also ASTRO 570)
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 equations; effects of gravitational potentials, atmospheric drag, and solar radiation forces on satellite orbits; and secular perturbations, resonances, mechanics of planetary rings.

T&AM 673 Mechanics of the Solar System (also ASTRO 571)
Spring. 3 credits. Prerequisite: an advanced undergraduate course in dynamics. Offered alternate years; offered 2003-2004.
Course topics include gravitational potentials, planetary gravity fields; free and forced rotations; Chandler wobble, polar wander, and damping of nutation; equilibrium tidal theory, tidal heating; orbital evolution of natural satellites, resonances, spin-orbit coupling, Cassini states; long-term variations in planetary orbits; dust dynamics; dynamics of ring systems; and physics of interiors, seismic waves, free oscillations. Illustrative examples are drawn from contemporary research.

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 678 Complex Systems
Spring. 3 credits. Prerequisites: T&AM 578 or equivalent. Offered alternate years; Not offered 2003-2004.

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 909 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.

**FACULTY ROSTER**

Abel, John F., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering

Ahner, Beth A., Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Biological and Environmental Engineering

Allbright, Louis D., Ph.D., Cornell U. Prof., Biological and Environmental Engineering

Allmendinger, Richard, Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences

Anesians, Daniel J., Ph.D., Cornell U. Prof., Biological and Environmental Engineering

Anton, A. Brad, Ph.D., California Inst. of Technology. Assoc. Prof., Chemical and Biomolecular Engineering

Apsel, Alyssa B., Ph.D., Johns Hopkins U. Clare Boothe Luce Assistant Professor of Electrical and Computer Engineering

Aquino, Wilkins, Ph.D., U. of Illinois. Assoc. Prof., Electrical and Computer Engineering

Arch, Lynden A., Ph.D., Stanford U. Assoc. Prof., Chemical and Biomolecular Engineering

Armstrong, William, Ph.D., U. of Sussex. Prof., Computer Science

Ast, Dieter G., Ph.D., Cornell U. Prof., Materials Science and Engineering

Atreya, Krishna B., Ph.D., Stanford U. Prof., Operations Research and Industrial Engineering

Aviv, Thomas, Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering

Bae, Minhyung, Ph.D., Universitat Stuttgart. Asst. Prof., Biological and Environmental Engineering

Baker, Graeme, Ph.D., U. of Birmingham. Prof., Computer Science

Baker, Shefford P., Ph.D., Stanford U. Asst. Prof., Materials Science and Engineering

Bala, Kavita, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Mechanical Science

Ballantyne, Joseph M., Ph.D., Massachusetts Inst. of Technology. Prof., Electrical and Computer Engineering

Baranzangi, Muawia, Ph.D., Columbia U. Prof., Earth and Atmospheric Sciences

Bartel, Donald L., Ph.D., U. of Iowa. Prof., Mechanical and Aerospace Engineering

Bartsch, James A., Ph.D., Purdue U. Assoc. Prof., Biological and Environmental Engineering

Berger, Toby, Ph.D., Harvard U. Irwin and Joan Jacobs Professor of Engineering, Electrical and Computer Engineering

Berndt, Antje, Ph.D., Stanford U. Asst. Prof., Operations Research and Industrial Engineering

Bird, John M., Ph.D., Rensselaer Polytechnic Inst. Prof., Earth and Atmospheric Sciences

Birman, Kenneth P., Ph.D., U. of California at Berkeley. Prof., Computer Science

Bisogni, James J., Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering

Blaikley, John M., Ph.D., Glasgow U. (Scotland). Herbert Fisk Johnson Professor of Engineering, Materials Science and Engineering

Bland, Robert G., Ph.D., Cornell U. Prof., Mechanical and Aerospace Engineering

Bohanczyk, Adam W., Ph.D., U. of Warsaw (Poland). Assoc. Prof., Electrical and Computer Engineering

Bonassar, Lawrence J., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Mechanical and Aerospace Engineering

Boozer, John F., Ph.D., Cornell U. Prof., Emeritus, Mechanical and Aerospace Engineering

Brown, Larry D., Ph.D., Cornell U. Prof., Earth and Atmospheric Sciences

Brutsaert, Willfried H., Ph.D., U. of California at Davis. William L. Lewis Professor 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 A., Ph.D., Cornell U. Irving Porter Church Professor of Engineering, Astronomy and Theoretical and Applied Mechanics

Burtscher, Martin, Ph.D., U. of Colorado at Boulder. Asst. Prof., Electrical and Computer Engineering

Cady, K. Bingham, Ph.D., Massachusetts Inst. of Technology. Prof., Theoretical and Applied Mechanics; Nuclear Science and Engineering

Calijon, 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

Carriquiry, Claire T., Ph.D., U. of Massachusetts at Amherst. Assoc. Prof., Computer Science

Cardoza, Richard, Ph.D., Carnegie Mellon U. Asst. Prof., Computer Science

Castello-Chavez, Carlos, Ph.D., U. of Wisconsin at Madison. Prof., Theoretical and Applied Mechanics, Biometry, Applied Mathematics, Ecology and Evolutionary Biology, Statistics, Epidemiology, Latin American Studies

Cathles, Lawrence M., Ph.D., Princeton U. Prof., Earth and Atmospheric Sciences

Caughley, David A., Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering

Chiang, Hsiao-Dong, Ph.D., U. of California at Berkeley. Prof., Electrical and Computer Engineering

Clare Boothe Luce Assistant Professor of Engineering, Electrical and Computer Engineering

Collins, Lance R., Ph.D., U. of Pennsylvania. Prof., Mechanical and Aerospace Engineering

Conley, Stephen J., Ph.D., SUNY. 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, Jerry H., Ph.D., North Carolina State U. Asst. Prof., Earth and Atmospheric Sciences

Cook, John R., Ph.D., North Carolina State U. Prof., Biological and Environmental Engineering

Cool, T. R., Ph.D., California Inst. of Technology. Prof., Applied and Engineering Physics

Datta, Ashim K., Ph.D., U. of Florida. Prof., Biological and Environmental Engineering

DeAngelo, David F., Ph.D., Harvard U. Assoc. Prof., Electrical and Computer Engineering

Delisa, Matthew, Ph.D., U. of Maryland. Asst. Prof., Chemical and Biomolecular Engineering

Demers, Alan, Ph.D., Princeton U. Prof., Computer Science

Derrett, Nicholas, Ph.D., U. of Pennsylvania. Assoc. Prof., Earth and Atmospheric Sciences

Dieckmann, Rudiger, Ph.D., U. Hannover. Prof., Materials Science and Engineering

Duncan, T. Michael, Ph.D., California Inst. of Technology. Assoc. Prof., Chemical and Biomolecular Engineering

Eastman, Lester F., Ph.D., Cornell U. Given Foundation Professor of Engineering, Electrical and Computer Engineering

Elber, Robert A., 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 Daisy, Ph.D., Cornell U. Asst. Prof., Computer Science
Warhaft, Zellman, Ph.D., U. of London (England). Prof., Mechanical and Aerospace Engineering
Weber-Shirk, Monroe, Ph.D., Cornell U. Lecturer, Civil and Environmental Engineering
White, William M., Ph.D., U. of Rhode Island. Prof., Earth and Atmospheric Sciences
Wickam, Lisa, Ph.D., Cornell U. Instructor, Applied and Engineering Physics
Wicker, Stephen B., Ph.D., U. of So. California. Prof., Electrical and Computer Engineering
Wiesner, Ulrich B., Ph.D., U. of Mainz (Germany). Assoc. Prof., Materials Science and Engineering
Wilks, Daniel S., Ph.D., Oregon State U. Prof., Earth and Atmospheric Sciences
Wise, Frank W., Ph.D., Cornell U. Prof., Applied and Engineering Physics
Xu, Chris, Ph.D., Cornell U. Asst. Prof., Applied and Engineering Physics
Yona, Golan, Ph.D., Hebrew U. Asst. Prof., Computer Science
Zabaras, Nicholas, Ph.D., Cornell U. Prof., Mechanical and Aerospace Engineering
Zabih, Ramin, Ph.D., Stanford U. Assoc. Prof., Computer Science
Zehnder, Alan, Ph.D., California Inst. of Technology. Assoc. Prof., Theoretical and Applied Mechanics and Mechanical and Aerospace Engineering
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 Admissions Office, 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 those 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.
ADMISSION
David W. Butler, dean
Leo Renaghan, associate dean for academic affairs
Margaret H. 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 Philippus Miller III, director of alumni affairs
Millie Reed, director of career services
Timothy J. Durnford, director of information technologies
Cheryl S. Farrell, director of student services
Brad Walp, director of enrollment management
Cheryl S. Farrell, director of student services
Neoma Mullens, director of multicultural programs
Walter C. Williams, director of alumni affairs and development

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, an 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.

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 23,000 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 study space, the School Hotel 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 300 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 resources management, finance/accounting, real estate development, food and beverage management, marketing, tourism, strategy, facilities management planning and design, communications, 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 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 123 or the equivalent;
4) completion of two units of practice credit;
5) completion of the university requirement in physical education.

Suggested course programs appear on the following pages. The core courses account for 72 of the 120 credits needed for graduation, the hotel electives account for 12 credits, and 18 credits are allotted for distributive electives. The remaining 18 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. The remaining 18 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.

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Administration, and, thus, communication courses taken elsewhere generally are not accepted against core courses.

Hotel elective courses may not transfer.

Distributive electives ensure that hotel students are exposed to other courses at Cornell, and, thus, only nine credits may transfer. The remaining nine must be taken at Cornell but may be distributed in any combination of humanities, social sciences, or natural sciences provided at least three credits are taken (at Cornell or transferred from elsewhere) in each area. A maximum of six credits, but no more than four per semester, of distributive electives may be taken on an S-U basis. For more information on the distribution requirement, see the handout available in the student services office, room 178 Statler Hall.

Eighteen credits in free electives may transfer.

**Concentration**

While completing the hotel elective courses, undergraduates in the school may select a concentration.

Before selecting a field of concentration, students should consult the coordinator of instruction in that area during the sophomore year to plan the sequence of courses that will best fit their program.

Upon completion, the concentration will be noted on the transcript, provided a cumulative GPA of 3.0 in the concentration was attained.

**Foreign Languages**

Mastery of a foreign language is particularly desirable for students who are planning careers in the hospitality industry and, hence, the second language requirement for graduation. Further information on foreign language courses at Cornell, and placement in language courses, may be found in this book in the College of Arts and Sciences program description under the Modern Languages, Literature, and Linguistics section, and also under the section Advanced Placement for Freshmen.

**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.

**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. Spotters 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. Programs providing an opportunity to study in a foreign country and develop an awareness of the international components of the hospitality industry can contribute to each student's total educational experience. Students in recent years have studied in Italy, Spain, France, England, Australia, and many other countries. Information on the study-abroad programs operating during the summer and academic year is available at the Cornell Abroad office (in Uris Hall).

Students should discuss their plans with the school's director of student services so that all application and credit-evaluation procedures are followed.

**Part-Time Study**

Generally, part-time study is not allowed. Exceptions may be made for employee degree candidates, students who have medical reasons for a reduced schedule, or other extenuating circumstances. In no event shall a student be allowed to enroll on a part-time basis during the last term of study. Further details on part-time study may be found in the school's student handbook (available in room 178 Statler Hall).

**Grading System**

Letter grades ranging from A+ to F are given to indicate academic performance in each course. These letter grades are assigned a numerical value for each term average as follows: A is equivalent to 4.0; B to 3.0; C to 2.0; D to 1.0; F to 0. For good standing, the student be allowed to enroll on a part-time basis. A maximum of four credits each term may be taken on a "satisfactory-unsatisfactory" (S-U) basis during the last term of study. Further details on part-time study may be found in the school's student handbook (available in room 178 Statler Hall).

**Course Requirements for Graduation**

Note: The curriculum is under review and subject to change. For the most up-to-date information on the curriculum and graduation requirements, check with the Student Services Office, Room 178 Statler Hall.

### Required courses

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management and Organizational Behavior</td>
<td>3</td>
</tr>
<tr>
<td>Human Resources Management</td>
<td>3</td>
</tr>
<tr>
<td>Managerial Communication</td>
<td>3</td>
</tr>
<tr>
<td>Law</td>
<td>6</td>
</tr>
<tr>
<td>Food &amp; Beverage Management</td>
<td>4</td>
</tr>
<tr>
<td>Operations</td>
<td>14</td>
</tr>
<tr>
<td>Facilities Management, Planning and Design</td>
<td>6</td>
</tr>
<tr>
<td>Marketing, Tourism and Strategy</td>
<td>6</td>
</tr>
<tr>
<td>Information Systems</td>
<td>6</td>
</tr>
<tr>
<td>Finance/Accounting</td>
<td>12</td>
</tr>
<tr>
<td>Economics</td>
<td>3</td>
</tr>
<tr>
<td>First Year Writing Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Quantitative Analysis for the Service Industries</td>
<td>3</td>
</tr>
<tr>
<td>Specifically required credits</td>
<td>72</td>
</tr>
<tr>
<td>Hotel Electives</td>
<td>12</td>
</tr>
<tr>
<td>Distributive electives</td>
<td>18</td>
</tr>
<tr>
<td>Free electives</td>
<td>18</td>
</tr>
<tr>
<td>Total credits required for graduation</td>
<td>120</td>
</tr>
</tbody>
</table>

**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>Requirement</th>
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</tr>
</thead>
<tbody>
<tr>
<td>H ADM 105, Introduction to Lodging</td>
<td>3</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 106, Introduction to Food Service Operations</td>
<td>4</td>
</tr>
<tr>
<td>H ADM 165, Managerial Communication</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 174, Microcomputing</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 191, Microeconomics for the Service Industries</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>Total</td>
<td>31</td>
</tr>
</tbody>
</table>

**Credits**

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<tr>
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<td>4</td>
</tr>
<tr>
<td>H ADM 165, Managerial Communication</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 174, Microcomputing</td>
<td>3</td>
</tr>
<tr>
<td>H ADM 191, Microeconomics for the Service Industries</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>Total</td>
<td>31</td>
</tr>
</tbody>
</table>
Sophomore Year

Required courses

H ADM 211, Human Resources Management 3
H ADM 221, Managerial Accounting 3
H ADM 222, Finance 3
H ADM 243, Culinary Theory and Practice 4
H ADM 245, Hotel Development and Planning 3
H ADM 275, Information Technology in the Hospitality Industry 3
Quantitative Analysis for the Service Industries 3
Electives 6

Total credits required for the Master of Management in Hospitality program 63

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. Dean David 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 theoretical 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 the case method, self-assessments, experiential exercises, readings, discussions, papers, and group activities.

H ADM 410 Hospitality Management Seminar

Fall. 1 credit. Co-registration in H ADM 110 required. Limited to 30 seniors and graduate students. Elective. Dean David 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 dialogue 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. 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 412 Managing Organizational Change

Spring. 3 credits. Prerequisite: H ADM 211 or equivalent elective. C. Lundberg.

Organizations are continually being influenced by internal and environment factors that represent the need and opportunity to change. Organizational and member success is often dependent on changing in a timely and appropriate manner. In general, organizations have shown an astonishing inability to change themselves, even when change is clearly required. Consequently, organizations need more people who know about change and how to accomplish it. This course covers ways to facilitate and manage change in organizations. Topics include: change processes, organizational diagnosis, action planning, and consultancy.

H ADM 414 Quality Planning in the Hospitality Industry

Spring. 3 credits. Prerequisites: all required hotel undergraduate courses at the 100, 200, and 300 levels. Limited to 25 seniors and graduate students. Elective. T. Hinck.

Covers the analysis of work processes and examines organizations 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 key job functions 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 HOTTS, an interactive hotel simulation that is conducted as a group activity. This is a seminar course, requiring active participation in discussion of readings and case analysis.

H ADM 415 Managerial Leadership in the 21st Century

Spring. 1 credit. Elective. A $25.00 fee for the required notebook will be charged to student's bursar bill; notebook distributed on the first day of class. Friday, January 30 (1:00 P.M.-7:00 P.M.), Saturday, January 31 (9:00 A.M.-12:00 P.M.), Sunday, February 1 (9:00 A.M.-5:00 P.M.), 2004 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 depend upon (their boss, staff, peers/associates, and customers). When quality relationships exist, organizations tend to be characterized by high levels of integrity, customer satisfaction, employee empowerment, and organizational effectiveness. The concepts learned will also help students create quality friendships and family relationships. A final exam is given in the last day of class. Attendance is mandatory for credit.

Due to the popularity of the class, priority is given in the following order: seniors/second-semester grads, juniors/first-semester grads, non-employee, extramural students, sophomores, freshmen, and Cornell employees. Space permitting, the class may be added up to the first day, but the absolute deadline for dropping the course is noon on Friday, January 23, 2004.

H ADM 513 Strategic Human Resources Management for the Hospitality Industry
Fall. 2 credits. Second seven weeks of the semester. Note: the deadline to drop a seven-week course is the midpoint of the course. Prerequisite: H ADM 211 or equivalent. T. Tracey.

Over the past several years, the HR function has taken on a broader role in helping organizations to create and sustain a competitive advantage. The primary focus of this course is to examine the ways in which HR policies, practices, and systems can enhance the competitive capabilities of hospitality organizations. This seminar-style course will be conducted using hospitality case studies and current business problems as a basis for learning. The course also will include the opportunity to conduct a live case study and on-premises HRM problems with a real hospitality firm.

H ADM 611 Negotiations in the Hospitality Industry
Spring. 3 credits. Prerequisite: H ADM 710 or equivalent. Limited to 30 graduate students. 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 614 Leadership and Small Group Processes
Fall. 3 credits. Limited to 30 hotel senior students. Elective. C. Lundberg.

Theoretical and practical applications of organizational behavior are explored through lectures, case studies, and exercises. Students participate in several experiential labs aimed at enhancing their effectiveness as members or leaders of groups. Topics include leadership, decision-making, motivation, power, and change within the small-group context.

H ADM 710 Human Behavior in Organizations
Fall. 5 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 discussions, and self-reflective teamwork.

Human Resources Management
H ADM 210 The Management of Human Resources
Fall, summer. 3 credits. Limited to 40 non-hotel students. Open to freshmen. Elective. M. Tews.

A practically oriented examination of the role of human resources management (HRM), starting with an introduction to the personnel function and an analysis of the social, legal, international, and competitive factors influencing HRM. The course examines recruitment, selection, training, motivation, development, compensation, performance appraisal, and labor relations. The course assumes a managerial perspective and emphasizes class discussion and case analysis.

H ADM 211 Human Resources Management
Fall, spring. 3 credits. Prerequisite: H ADM 115. Limited to 60 hotel students per lecture; not open to freshmen or graduate students. Required. B. Tracey.

Provides students with a broad yet in-depth overview of the policies, practices, and procedures that can be used to attract, select, develop, and retain quality employees. A number of factors will be considered that influence HRM policies and practices and provide opportunities to apply course topics to substantiate situations that students will face as future hospitality professionals. Lectures, discussions, cases, and videos.

H ADM 313 Training in the Hospitality Industry
Fall. 2 credits. First seven weeks of the semester. Note: the deadline to drop a seven-week course is the midpoint of the course. Prerequisite: H ADM 211. Limited to 24 students. Elective. B. Tracey.

How to design, implement, and evaluate both formal and informal training programs. Factors beyond design and implementation that may influence training effectiveness will be examined. A variety of instructional techniques will be used throughout the course, including experiential activities that will enliven the learning process. The course also will include the opportunity to conduct a live case study of one or more training problems with a real hospitality firm.

H ADM 513 Strategic Human Resources Management for the Hospitality Industry
Fall. 2 credits. Second seven weeks of the semester. Note: the deadline to drop a seven-week course is the midpoint of the course. Prerequisite: H ADM 211 or equivalent. Elective. B. Tracey.

The primary focus is to examine the ways in which HRM policies, practices, and systems can enhance the competitive capabilities of hospitality organizations. This seminar-style course will be conducted using hospitality case studies and current business problems as a basis for learning. Includes the opportunity to conduct a live case study of one or more strategic HRM problems with a real hospitality firm.

H ADM 711 Human Resource Management
Spring. 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. M. Sturman.

This course addresses human resource business strategies that enable companies to attract, develop, and retain high-quality employees. Attention is given to topics such as selection, compensation, performance appraisal, and career management, and the focus is on considering the return on the human resource investment in each of the areas covered. Students learn human resource issues and strategies through a variety of methodologies and have the opportunity to apply their knowledge and skills in a semester-long group project.

Managerial Communication
H ADM 164 Leadership through Managerial Communication
Summer. 3 credits. Limited to students enrolled in the three-week Summer Honors Program. Students are enrolled in the course by the School of Continuing Education and Summer Sessions upon acceptance to the Summer Honors Program. Elective. R. Steinauer.

The role and importance of effective communication in managerial work, especially in the hospitality industry, are considered. Subjects include managerial communication, business writing, techniques in persuasion, and identification of cultural issues that may make communication difficult. Students develop abilities in analytical thinking and clear expression. This course focuses on the process of planning, preparing, and executing professional communications in the hospitality industry. Students will write a series of business documents and give several oral presentations. In preparation for their oral presentations and formal business documents, the students attend weekly microcomputer lab sessions that teach Microsoft PowerPoint, Microsoft Word, and basic web page design.

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. Prior to the 2013-2014 semester, limited to 16 students per lecture. Required. N. Dahl, D. Jameson, D. Lennox, C. Snow, R. Steinacher.

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.
This course focuses on communicating challenging messages in business contexts. Writing assignments emphasize delivering persuasive messages 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 analytical reports requiring research.

**H ADM 364 Advanced Business Writing**  
Fall, spring. 3 credits. Priority given to hotel students. Prerequisite: junior, senior, or graduate standing or written permission of the instructor. Hotel undergraduates must have completed the H ADM 165 requirement or had it waived. Non-hotel undergraduates must have completed their college's writing requirement. Limited to 20 students per lecture. Elective. L. Arliss.  

This course focuses on communicating challenging messages in business contexts. Writing assignments emphasize delivering persuasive messages 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 analytical reports requiring research.

**H ADM 365 Managerial Communication II**  
Fall, spring. 3 credits. Priority given to hotel students. Prerequisites: Hotel undergraduates must have completed H ADM 165 and H ADM 115. Limited to 22 juniors and seniors per lecture. Required. J. Brownell, N. Dahl.  

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 661 Organizational Communication for Managers**  
Spring. 3 credits. Priority given to hotel students. Elective. D. Jameson.  

Organizational communication focusing on the complex interactions that occur when people communicate in hospitality and other work organizations. Using business cases and examples, students explore the political, sociological, ethical, and psychological dimensions of business communication; analyze communication problems and barriers; and design organizational strategies to communicate effectively. Elective. D. Sherwyn.  

Anti-discrimination statutes and union management relations 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. From 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 development of real estate. Students learn to recognize and evaluate legal issues in order to inform the decision-making process with respect to real estate, whether as a business executive, an entrepreneur, or in personal life.

**H ADM 489 The Law of the Internet and e-Commerce**  
Fall, spring. 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 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: consumer protection; 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.

**H ADM 436 Culinary Theory and Practice**  
Fall, spring. 4 credits. Prerequisite: H ADM 106. Required. Note: preregistered students who do not attend the first class are automatically dropped from the instructor's record. Because of the group nature of the course, the absolute deadline to drop the course in the fall is September 12, 2003, and the deadline in the spring is January 30, 2004. R. Spies, R. White, T. O'Conner.  

Designed to introduce the student to food and beverage operations through three major components: fundamental food composition and properties, food products and preparation, and food safety. Students prepare recipes, menus, and production schedules. Students develop the ability to recognize properly prepared foods through preparing, tasting, and evaluating foods. They also plan menus, develop recipes, and produce them in a final project. Completion of work experience in the Statler Hotel is a required course activity.

**H ADM 434 Wine and Food Pairing Principles and Promotion**  
Spring. 2 credits. Prerequisite: H ADM 430. Limited to 20 hotel juniors, 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, how food flavors can change a wine's flavor, and the principles of wine and food. Topics include: wine and food pairing principles, cuisines and their flavor components, food trends in restaurant and in the home, special event planning, and wine list development. Students design and present wine and food tastings to industry guests.

**H ADM 339 Wine in Culture and History—I**  
Fall, spring. 2 credits. Non-hotel students may not add the course after the second lecture. Elective. A. Nash.  

Regions: Germany and Champagne. Through lectures, videos, guided 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. 3 credits. Limited to juniors and seniors in the hotel school and seniors and graduate students in all other colleges. Hotel students are strongly encouraged to enroll in the fall semester. Students are exempt from the 21-year old 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 of their absence before the first class are automatically dropped from the instructor's record. 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, September 12, 2003, and the drop deadline in the spring is Friday, February 6, 2004. Course fee of $30.00 includes the cost of a wine glass 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 flavor components in wine, pairing wine and food, responsible drinking, selecting quality and value wine, and wine etiquette. Samples from a variety of countries, regions, and vineyards are evaluated.

H ADM 432 Contemporary Healthy Foods
Fall. 3 credits. Prerequisite: H ADM 305 or equivalent. Limited to 20 seniors and graduate students, or by permission of the instructor. One field trip is required (cost $10). Elective. M. Tabachnick.

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 movement of food and supplies from the producer to the hospitality operator, and the role of the distributor in the movement of food and supplies. Key topics include the preparation, marketing, merchandising, and selling of healthy menus in Statler’s outlets.

H ADM 435 Selection, Procurement, and Supply Management
Fall. 2 credits. Second seven weeks of the semester. Limited to 20 hotel juniors, seniors, and graduate students, others by permission. Drop deadline is October 23, 2003.

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 supply chain, food distributor financial statement analysis, evaluation and selection of suppliers, developing buying strategies, purchasing and inventory management, merchandising. Guest lecturers provide students with insight into various career opportunities in the operations- or rooms-related areas.

H ADM 105 Introduction to Lodging
Fall, spring. 3 credits. Limited to 60 hotel students per section. Required. R. Reynolds, A. Susskind.

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: marketing, menu planning, logistical support, production, service, and controls and quality assurance. Product and systems differentiation in various industry segments are emphasized throughout. Completion of a work experience in the Statler Hotel is a required course activity.

H ADM 301 Service Operations Management
Fall, spring. 3 credits. Limited to 20 students per section. Required. Faculty. Introduces statistical and operations research methods appropriate for the hospitality industry. The goal of the class is to provide students with the skills 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, project management.

H ADM 437 Anheuser Busch Seminar in Quality Brewing and Fine Beer
Fall. 2 credits. Prerequisite: H ADM 430. Offered during the first seven weeks of the semester. Elective. G. Pezzotti.

Anheuser-Busch seminars are held 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 various retail settings or other foodservice outlets. Lecture topics include the brewing process, sensory aspects of beer, international beer types and styles, marketing malt products, purchasing and distribution, 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 165 and H ADM 290 236 or permission of the instructor. 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 menu consideration is also discussed. 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, discussions, and readings 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.

H ADM 634 Food and Beverage Marketing Strategy
Spring. 3 credits. Prerequisite: completion of at least one three-credit marketing course. Limited to graduate students (seniors by permission). Elective. Faculty. Teaches students how to apply marketing, sales, and merchandising techniques to the commercial food and beverage industry. The course addresses: developing a market segment based upon understanding the needs and wants of potential target markets; translating needs and wants into a viable foodservice concept positioning strategy; and marketing strategies used to maintain and increase sales and market share. Course recitation work and analysis involve substantial use of the Consumer Report on Eating Share Trends (CREST) database as provided to Cornell through a special agreement with National Purchase Dairy Group, Inc. (NPFD).
for-profit organizations. Topical coverage includes: tournament, facility, and recreation management; legal, financial, and legislative issues; human relations and resource consideration; and marketing, pricing policies, and quality standards.

**H ADM 305 Restaurant Management**

Fall, spring. Prequisites: H ADM 106 and H ADM 236. Limited to 27 hotel students per lab. Approximate cost of lab manual, certification for alcohol service, utensils for front and back of house is $85.00. Required. Because of the group nature of the course, the absolute deadline to drop the course in the fall is September 12, 2003, and the deadline to drop in the spring is January 30, 2004. B. Lang.

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 restaurant industry. As a class, the principles are incorporated into actions that occur in the student-run operation. Linking theoretical topics to an existing business creates a challenging and compelling learning environment.

**H ADM 401 Seminar in Independent Corporate Restaurant Operations Management**

Fall, spring. 3 credits. Limited to 20 hotel students with written permission of the instructor. Students can expect to incur expenses over the term of the semester of no more than $350.00 due to five required field trips. Elective. G. Pezzotti.

Designed for students who have a strong interest in food and beverage operations and 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 through dinner) 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: D. Reynolds.

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, cases, site visits, 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 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, planning, production, service, financial analysis, and accounting relative to three guest-chef specialty production nights. The chef will be asked to recommend the evening's menu reflecting his/her culinary creativity and producing the meal for the Cornell community using the hotel facility. A final project is required analyzing the relative degree of success experienced by each guest-chef event. The analysis is to be presented in a case as well as proper application of food and beverage management principles.

**H ADM 404 Catering and Special Events Management**

Fall. 3 credits. Prerequisites: H ADM 236, or permission of instructor. Limited to 30 students. One required 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 catering principles, 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 and profitability analysis, and production and planning of 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 the successful implementation of their recommendations. Drawing on their specific knowledge and skills in all the academic disciplines students take 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 students. There is one required field trip to Atlantic City at the cost of 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 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 and spring. 3 credits. Limited to 35 hotel school seniors and graduate students, others by permission. 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 marketing, and success of catering, and special events businesses.

**H ADM 604 Service Operations Management**

Spring. 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 role 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, work force management, and quality management. This course is intended for any graduate student interested in services management.
H ADM 605 Yield Management
Spring. 3 credits. Prerequisite: H ADM 301, H ADM 701, or equivalent. Limited to 30 seniors and graduate students. Elective. S. Kimes.

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
Fall. 2 credits. First seven weeks of the semester. Prerequisites: H ADM 701 and H ADM 702. Limited to 30 graduate students, or by 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 profitably managing capacity. 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 intent of maximizing revenue per available seat-hour. Topics covered include forecasting, overbooking, reservations systems, information technology, process design, pricing, and management and marketing issues.

H ADM 609 Airline In-Flight Management and Food Services
Spring. 3 credits. Limited to 30 seniors and graduate students, others by permission of the instructor. The cost of this field trip is approximately $75.00. Elective. M. Tahiri.

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 era of intense 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. S. Kimes.

Covers statistical and operations research techniques which 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. A field trip costing approximately $600 is required. A. Suskind.

Focuses on the technical, managerial, and human resources skills needed to be successful in foodservice management. Topics such as market-based analysis, concept development, menu planning, operations management, and customer service processes are addressed in 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 per section. Limited to sophomores, juniors, and seniors. Required. S. Robson.

An introduction to the issues and opportunities inherent in the development and planning of hospitality facilities, specifically hotels and restaurants. Course components include the project development sequence, conceptual and space planning, architectural design criteria, construction management, and the interpretation of architectural design and consultant drawings. The emphasis is on setting appropriate facilities requirements, understanding industry practice, and implementing properties decisions within a balanced design, operations, and financial framework.

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, S. Robson.

This intensive studio course provides the graphic skills important for design and experience in different hospitality planning and design situations. Students will prepare a number of design projects using both hand drafting and computer-aided design (CAD) software. These assignments consist of graphic and space allocations for the front and back of house areas, develop production work flow in the preparation and service areas, and select equipment using standards for production capability, quality of construction, and the ease of maintenance. 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 in each studio. Elective. S. Curtis.

Develops an understanding of the features, limitations, and considerations associated with the operation of microcomputer-based computer-aided design (CAD) systems. Using AutoCAD on the IBM 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, spring. 3 credits. Prerequisite: H ADM 255. Limited to 18 students per section. Required. R. Penner.

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 ins and outs of the engineering-maintenance department. The renovation needs of hospitality facilities are examined and key managerial aspects of renovations considered.

H ADM 356 Security and Loss Prevention Management
Spring. 3 credits. Limited to sophomores, juniors, seniors, and graduate students. Elective. D. Stipanuk.

A comprehensive look at risk management within the hospitality environment. The course addresses issues of loss control for hospitality firms. Using a risk management framework, issues in fire protection, customer and workplace safety, OSHA, and corporate security are analyzed.

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 a required course activity. Cost for lodging and transportation estimated at 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 (coregistration or other commercial food production experience is acceptable) or permission of the instructor. Limited to 12 students in each section. Elective. S. Robson.

An introduction to the basic concepts of food-service facilities design and planning with an emphasis on restaurants. The course focuses on determining space allocations for the front and back of house areas, development production work flow in the preparation and service areas, and select equipment using standards for production capability, quality of construction, and the ease of maintenance. 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 452 Sustainable Development and the Global Hospitality Industry
Fall. 3 credits. Limited to juniors, seniors, and graduate students. An overnight field trip is a required course activity. Cost for lodging and transportation estimated at 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.
A multi-dimensional course introducing the global sustainability and environmental movement, with an emphasis on its 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 354 or equivalent introductory AutoCAD course. Limited 24 students. Elective. S. Curtis.

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. The 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 photo-realistic renderings and animations. Course material is learned by completing weekly project assignments and a final project.

H ADM 456 Hospitality Facilities Management
Spring. 3 credits. Prerequisite: H ADM 355, H ADM 751, or permission of instructor. Overnight field trip required. Cost for lodging and transportation estimated at $100, meals are additional. Elective. D. Stipanuk.

Takes a managerial approach to hospitality facilities addressing issues of owning and operating cost management, facilities services and delivery systems management, governmental regulatory compliance, and emerging issues. This year there will be a particular emphasis on environmental issues such as indoor air quality, waste management, and energy conservation. Extensive use of the World Wide Web is anticipated.

H ADM 457 Hotel Development
Fall. 3 credits. Limited to juniors with permission, seniors and graduate students. Overnight field trip required. Cost for lodging and transportation estimated at $100, meals are additional. Elective. D. Stipanuk.

Focuses 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: market studies, franchise requirements, governmental approvals, design construction contracts, the construction process, scheduling, budgeting, and emerging issues and opportunities. Guest speakers in present case studies of actual development projects.

H ADM 459 International Hotel Development
Spring. 3 credits. Limited to juniors, seniors and graduate students. Elective. R. Penner.
The seminar course includes discussion of corporate expansion strategies, the international development process, viewpoints of different stakeholders, and development challenges such as technology, infrastructure, environmental concerns, and public policy issues. Students research a variety of international destinations and the strategies of emerging management companies. Guest lecturers will present and discuss new projects in Europe, Middle East, South America, and Asia and current opportunities for development in the United States.

H ADM 458 Hospitality Facilities Management
Spring. 3 credits. Open to M.M.H. students only, except by written permission of the instructor in advance of preenrollment. Limited 30 students per section. M.M.H. requirement. M. Redlin.

Provides an overview of project development, hotel planning, and the construction process including the role of the development team, feasibility, functional planning and design, interpretation of architectural drawings, architectural and engineering criteria, construction management, contracts, and scheduling. In conjunction with other (M.M.H.) core courses, student teams prepare the program documentation for a new hotel or one undergoing major rehabilitation.

H ADM 465 Hospitality Marketing and Finance
Fall. 3 credits. Limited to 50 hotel students per section. Required. B. Carroll.

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 readings, lectures, discussions, problem sets, and guest speakers.

H ADM 468 Hospitality Management
Fall. 3 credits. Limited to 60 hotel students per lecture, not open to freshmen. Required. Faculty. R. Kwortnik.

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, in-class 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 programs.

H ADM 470 International Hotel Development
Spring. 3 credits. Limited to 45 juniors and seniors. Elective. M. Lynn.

Deals with relationships between the franchisor and the franchisee, advantages and disadvantages of franchising, structure of and services offered by franchisors. Case studies of leading lodging and restaurant companies currently offering franchises will be discussed. There are also guest speakers from the franchising industry.

H ADM 471 Marketing Research
Fall. 3 credits. Prerequisite: H ADM 243. Elective. M. Lynn.

Helps students become better consumers of marketing research. Topics include issues involved in designing, conducting, and interpreting focus groups, depth interviews, surveys, experiments, and choice models. Special emphasis will be placed on what each method should and should not be used for and why.

H ADM 472 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. M. Noden.

An introductory course in the study of tourism. The origins and evolution of contemporary tourism are carefully examined. Students are familiarized with the various supply components of the tourism industrial base and their integration on an international scale. The effects of mass volume tourist demand on destination development are explored through the use of selected limited case studies. A series of guest lectures by well-known experts from the travel industry highlight the economic operations and effects of tourism in both the public and private sectors.

H ADM 473 Hospitality Sales
Spring. 3 credits. Prerequisite: H ADM 243, H ADM 741 or equivalent. Limited to 24 students. Elective. Faculty.

Involves an extensive study of personal selling to encourage the use of intuition, judgment, logic, problem-solving methodology, and other tools as part of the overall sales mix. The course is very interactive. Students will be involved in numerous sales role-plays, some of which will be videotaped. 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 474 Consumer Behavior
Fall. 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, geo-demographics, 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 accounting, finance, marketing, economics, and information systems. Limited to seniors.  
Because of the group nature of the course, the absolute drop deadlines are September 11 (fall) and January 10 (spring). Required. Bergh, J. Harrison.  
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 integrating material 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 cases in which students break into competing teams to formulate strategies and tactics in a realistic marketing environment. Students will be examined include Hilton, Marriott, Accor, Choice, Four Seasons, Club Med, Harrah's, Shangri-La, Yum Brands, Starbuck, Disney, and Southwest Airlines. Learning will be assessed via in-class contributions, written analysis of cases, a midterm and a final exam.

H ADM 445  Services Marketing  
Fall. 3 credits. Prerequisite: a previous marketing course or permission of the instructor. Limited to 40 students. Elective. R. Kwontnik.  
Students preparing for management positions will develop a deeper understanding of the marketing principles and challenges unique to services firms, especially those in the hospitality industry. The main course goal is to develop critical analytic skills and knowledge needed to create and implement service strategies for competitive advantage. Course content includes key differences in goods vs. services marketing and service gaps analysis, services consumer behavior and satisfaction, service quality, marketing, service recovery, service design (including analysis of service as theater), service blueprinting and the "servicescape," and services pricing, promotion, and distribution. Lectures, discussion, cases, and guest-speaker presentations.

H ADM 447  Managing Hospitality Distribution Strategies  
Spring. 3 credits. Prerequisites: H ADM 141 and H ADM 243. Elective. B. Carroll.  
Provides a framework for managing marketing distribution strategies. Presents and analyzes the structure and interrelationships among distribution channels within the travel and hospitality industry. Theories of marketing distribution management and analysis are evaluated and applied within the context of that system. Topics include dimensions of hospitality marketing distribution, economics of the major hospitality distribution segments, managing hospitality distribution strategies, and the role of convention and visitors bureaus, national business organizations, and associations in distribution management.

H ADM 448  Marketing Communications  
Spring. 3 credits. Prerequisite: a previous marketing course. Seniors only. Elective. C. Dev.  
Applied perspective on correctly managing communication programs for brands in the hospitality industry. Includes advertising, promotion, direct marketing, public relations, and Internet marketing. Key elements of marketing communications and how to use them effectively and efficiently will be examined. Learning will be assessed via in-class contributions, written analysis of cases, a midterm and a final exam.

H ADM 449  Services Marketing  
Spring. 3 credits. Prerequisite: a previous marketing course or permission of the instructor. Limited to 40 students. Elective. C. Dev.  
Develops a deep understanding of the basic concepts of marketing management, experience with the techniques, analyses, and frameworks necessary for solving marketing management problems. Topics include competing in the hospitality industry, economics of hospitality, marketing management, competitive advantage, and service-related marketing. 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 results). Also used will be a variety of individual written projects and presentations, including a services-marketing audit.

H ADM 470  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. J. Harrison.  
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 planning and implementation, with appropriate criteria for choosing among alternatives, and deriving actionable implementation plans.

H ADM 471  Service Excellence  
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. R. Kwontnik.  
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 results). Also used will be a variety of individual written projects and presentations, including a services-marketing audit.

H ADM 174  Microcomputing  
Fall, spring. 3 credits. Open to M.M.H. students only, limited to hotel freshmen and transfers in the fall. Open enrollment in the spring. Limited to 30 students per section. Required. P. Clark, M. McCarthy, G. Piccoli.  
Provides a foundation in information technology (IT) and how it relates to everyday 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 standardization, efficiency, and recognizing the importance of good computer management.

H ADM 274 Microcomputing
Spring. 3 credits. Limited to 30 non-hotel students per lecture. Elective. P. Clark.
An introduction to business computing to develop a computer literacy. Students develop their skills in the areas of: text, spreadsheets, presentation, and file management, and website management. The course is entirely lab-oriented and students work using Windows 2000. Software used is the latest in word processing, spreadsheet, presentation, database and web design.

H ADM 275 Information Technology for Hospitality Managers
Fall, spring. 3 credits. Prerequisite: H ADM 174. Limited to hotel students. Required. R. Alvarez, E. Wagner.
Composed of two blocks. Block 1: lecture. the goal of this block is to provide the students with a broad-base knowledge of information technology (IT) management issues. Block 2: lab. the goal of this block is to provide the students with advanced Microsoft Excel model-building skills and concepts.

H ADM 374 End-user Business Computing Tools
Fall. 3 credits. Limited to 30 students. Elective. E. Wagner.
Prepares students to create and manage information in a knowledge-based organization. The 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 information 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 476 Visual Basic for Applications: End-user Programming
Fall. Spring. 3 credits. Limited to 30 students per lecture. Elective. M. Talbert.
This is an introductory programming course for end-users (business managers, consultants, and so on). 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. 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.

H ADM 477 Advanced Business Modeling
Fall and spring. 2 credits. Second seven weeks of the semester. Note: the deadline to drop a seven-week course is the mid-point of the course. Limited to 21 seniors and graduate students, with preference given to M.M.H. students. Prerequisite: H ADM 174. 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. Topics covered include: business planning and forecasting, numerical methods, advanced formulas and functions, user-interface design, data protection and validation, importing external data, and output presentation.

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 will provide students with analytical tools that can help them make effective decisions about (or not) of IT in organizations. Students will learn the managerial implications of recent technology trends, the economic premises of the new competitive landscape dominated by pervasive networks (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 IT advantage can be sustained. Course includes lectures, case study discussions, guest presentations, and project work. Much of the class activities center around analysis and discussion of readings and case studies. Class meetings are very interactive.

H ADM 575 Internet Technologies
Spring. 3 credits. Prerequisite: H ADM 174 or equivalent. Elective. 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. Students should expect a considerable demand on outside time for practice necessary to gain programming fluency in the languages introduced. 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.

H ADM 772 Information Technology for Hospitality Managers
Fall. 3 credits. M.M.H. requirement. Open to M.M.H. students 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 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 design, deployment, and management; the systems development and selection process; IS resource assessments, planning, and management. This course assumes no IT- or IS-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 students. Elective. I. HERSHEY.
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 students. Required. D. Dittman.
An introduction to the basic principles of 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 123 Financial Accounting Principles
Fall, spring. 3 credits. Limited to non-hotel students. Elective. Faculty.
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 undergraduates. Non-hotel students only. Elective. Faculty.
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 221 Managerial Accounting
Fall. 3 credits. Prerequisites: H ADM 121 and H ADM 174, or equivalents. Required. G. Potter.
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 students, others by permission. Required. St. Gibson.
Provides students with accounting cash flow information for financial planning, capital structure decisions, capital budgeting evaluation, and short-term and long-term financial decision models. Covers 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. Restrictions: H ADM 121, H ADM 221, and H ADM 222, or permission of instructor. Each section limited to 54 hotel students. Required. A. N. Geller.
Integrates the areas of financial accounting, managerial accounting, and finance and applies the theoretical 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 students outside the School of Hotel Administration. Students with background in economics, quantitative analysis, and computers are advised to consider H ADM 424: Security Analysis and Portfolio Management. Elective. Faculty. 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, asset allocation, 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 analyzing and managing to reasonable and manageable 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 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 hospitality industry real estate practitioners tie course material to current industry practices.

H ADM 326 Corporate Finance
Fall. 3 credits. Prerequisite: H ADM 321. Limited to juniors and seniors. Elective. D. Quan.
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 30 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. Scafetta.
An introduction to tax advantages and disadvantages of various organizational structures, including corporations, partnerships, S-corporations, joint ventures, etc., with an emphasis on the analysis of individual securities. The course covers the various securities available for portfolio management, portfolio theory, and analysis of expected return based on risk. Next, the course covers the valuation of individual equity and debt securities. Through a semester-long term project, students are required to apply concepts and tools covered in the course to develop an investment recommendation on a publicly traded security. Recent developments in investments research are covered and current financial databases are used for practical applications of the models and techniques presented in the course in developing this recommendation.

H ADM 525 Securitization and Structured Financial Products
Fall. 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 the mathematics 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 requires 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 528 Advanced Topics in Real Estate and Finance
Spring. 2 credits. Limited to 20 seniors, graduate students, or permission of the instructor. Prerequisites: H ADM 323, H ADM 428, 621. Offered during the first seven weeks of the semester. Elective. D. Quan.
This is an intense seven-week course which takes an analytically oriented approach at understanding advanced real estate finance topics. It is intended for students who are highly motivated to learn advanced techniques and are not afraid of mathematical rigor. The course emphasizes the use of financial and economic principles and makes extensive use of statistics and mathematics. Students are required to have a solid background in the basics of finance, microeconomics, and macroeconomics.

H ADM 621 Hospitality Real Estate Finance
Fall. 3 credits. Prerequisite: H ADM 722 or equivalent. Limited to graduate students. Elective. J. deRoos.
Focuses on real estate financing for hotel and restaurant projects. The following topics are addressed: 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 of hospitality industry real estate practitioners tie course material to current industry practices.

H ADM 622 Capital Investment Analysis
Spring. 3 credits. Prerequisite: A course in principles of corporate finance. Limited to graduate students, H ADM 721, Financial Economics, or its equivalent. For undergraduate students, H ADM 222 and by permission. Elective. S. Carvell.
Covers how financial managers must make capital investment decisions in order 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 how equity and debt securities are priced in a dynamic capital market and how the firm’s cost of capital and capital structure are linked with shareholder wealth maximization. Cases are used to illustrate these concepts, and guest speakers conduct occasional seminars.

**H ADM 624 Reporting and Analysis of Financial Statements**
Spring. 3 credits. Limited to 60 juniors, seniors and graduate students. Elective. Faculty.

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 transactions and the implications 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 evaluate and interpret the published financial information, specifically in the context of valuation, debt and compensation contracts, and credit assessment.

**H ADM 628 Real Estate Finance and Investments**
Spring. 3 credits. Prerequisites: H ADM 323 or H ADM 450 or H ADM 651. Limited to 40 graduate students. Elective. J. deRoo.

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 expanded 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. Securization 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 722 Hospitality Financial Management**
Spring. 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. G. Potter.

Covers both managerial accounting and financial management as they are practiced in the hospitality industry. Topics include budgeting, cost management, strategic analysis, capital budgeting analysis, capital structure decisions, leasing, and international financial management.

**H ADM 490 Housing and Feeding the Homeless**
Fall. Variable credit hours (2–3) in the fall and 2–3 in the spring. Elective. Limited to hotel school juniors, seniors, and second-year M.M.H. students. Prerequisite: permission of the instructor. Student-elected board members of Hotel Ezra Cornell (H.E.C.) receive free elective credit for their participation in the planning, organizing, staffing, directing, and controlling of H.E.C. ‘79 to be held on April 1–4, 2004. Next year’s board will continue to implement the business plan that has been accepted by the board of directors of H.E.C. ’77. “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 good 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 178A Statler Hall. Eligible students who are considering a board position for H.E.C. should pre-enroll 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 students; priority is given to seniors and graduate students. There is a course fee of $575, which includes the cost of a uniform and cleaning. Note: pre-registered students who do not attend the first class are automatically dropped from the instructor’s record and no credit is awarded. Deadlines for this course are: 2 days in an agency that serves homeless, hungry, 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.) credits: whereby 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 credit hours (2–3) in the fall and 2–3 in the spring. Elective. Limited to hotel school juniors, seniors, and second-year M.M.H. students. Prerequisite: permission of the instructor. Student-elected board members of Hotel Ezra Cornell (H.E.C.) receive free elective credit for their participation in the planning, organizing, staffing, directing, and controlling of H.E.C. ‘79 to be held on April 1–4, 2004. Next year’s board will continue to implement the business plan that has been accepted by the board of directors of H.E.C. ‘77. “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 good 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 178A Statler Hall. Eligible students who are considering a board position for H.E.C. should pre-enroll 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 493 Management Intern Program I—Operations**
Fall, spring. 6 credits. Prerequisites: students are expected to have completed the following courses: H ADM 105 or 115, 211, 121, 221, 222, 236, 243, 255, 105, 174. 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.
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 faculty committee. The application process begins the semester before the planned internship. At the beginning of each semester, an MIP information meeting is presented. 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 494 Management Intern Program II—Academic
Fall, spring. 6 credits. Elective. Faculty. Limited to juniors in the hotel school with approval of the Management Intern Program faculty committee. The application process begins the semester before the planned internship. At the beginning of each semester, an MIP information meeting is presented. Students accepted to MIP enroll in both H ADM 493 and 494. Students enrolled in H ADM 494 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 Corporate Healthcare
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective. M. Tabachni.
There is increasing evidence linking job induced stress to overall health and happiness or lack thereof. Adding to workplace stress are the needs of its diverse and changing population. These stresses affect the financial health of the corporation as well as the psychological and physical health of the individual. The purpose of this course is to encourage future managers to evaluate the work environment and to enhance opportunities for diverse worker productivity which can increase the corporation's competitive edge. The emerging fields of complementary and alternative medicines are explored as preventive and cost effective methods of improving workers' health. Business models for encouraging workplace wellness, systems for implementation, reward and accountability of managers and corporate officers 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 commit themselves to a certain number of credits of independent academic work per week per credit hour if they choose to do an independent study project, and the work must be performed in the 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 elective requirement, but, rather, toward free electives. Students cannot earn academic credit for independent study when the equivalent material is offered in a regular course, and credit is not earned for teaching a course. Students should consider all aspects of their situation before committing themselves to an independent study project.

H ADM 690 Honors Monograph Faculty
Limited to professional master's students who: either have a minimum GPA of 3.7 or are in the top 10% 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 the 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, 172 Statler.

H ADM 698 Graduate 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.

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.

H ADM 793 Industry Mentorship Program
Fall. 0 credits. M.M.H. requirement. Faculty.

H ADM 794 Management Development
Year long. 0 credits. M.M.H. requirement. D. Jameson.
All first-year students in the Master of Management in Hospitality program must enroll in H ADM 794 both semesters. This requirement includes participation in the M.M.H. Assessment Center, program benchmarking, team project, and other activities related to students' professional development. Satisfactory completion of the second semester of H ADM 794 documents achievement of all program benchmarks.

H ADM 795 Cornell Graduate Hospitality Management Project
Yearlong. 0 credits. M.M.H. requirement. M. Redlin.
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 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.

FACULTY ROSTER
Alvarez, Roy, M.Ed., Auburn U. Senior Lecturer
Berger, Florence, Ph.D., Cornell U. Prof.
Bergh, Donald, Ph.D., U. of Colorado at—Boulder. Assoc. Prof.
Brownell, Judith, Ph.D., Syracuse U. Prof.
Butler, David W., Ph.D., U. of Wisconsin-Madison. Dean
Canina, Linda, Ph.D., New York U. Assoc. Prof.
Carvell, Steven A., Ph.D., SUNY Binghamton. Assoc. Prof. and Asst. Dean
Chang, Charles S., Ph.D., U. of California, Berkeley. Asst. Prof.
Clark, Preston, M.S., Syracuse U. Lecturer
Cullen, Thomas, Ph.D., Cornell U. Assoc. Prof.
Cussis, Steven, B.L.A., Syracuse U. Lecturer
Dahl, Nicholas, M.A., Oregon State U. Lecturer
DeRoo, Jan A., Ph.D., Cornell U. Hospitality Valuation Services Professor of Hotel Finance and Real Estate.
Dev, Chedkian S., Ph.D., Virginia Polytechnic. Assoc. Prof.
Dittman, David A., Ph.D., Ohio State U. Herbert E. Westfall Professor of Accounting
Enz, Cathy A., Ph.D., Ohio State U. Prof. and Lewis B. Schramm, Jr. Professor of Innovation and Dynamic Management
Geller, A. Neil, Ph.D., Syracuse U. Robert A. Beck Prof. of Hospitality Financial Management
Gibson, G. Scott, Ph.D., Boston College. Asst. Prof.
Gould, Shelly, B.S., Cornell U. Teaching Support Specialist
Harrington, Jeffrey, Ph.D., U. of Utah. Peelen Professor of Global Hospitality Strategy
Hinkin, Timothy, Ph.D., U. of Florida. Prof.
Kelly, Sheryl E., Ph.D., Cornell U. 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
Lundberg, Craig C., Ph.D., Cornell U. Blanchard Professor of Human-Resources Management
Lynn, Wm. Michael, Ph.D., Ohio State U. Assoc. Prof.
McCarthy, Reneta, M.P.S., Cornell U. Lecturer
Mutkoski, Stephen A., Ph.D., Cornell U. Banfi Vintners Professor of Wine Education and Management
Nash, Abby, B.A., Cornell U. Lecturer
Norkus, Gregory X., M.S., Cornell U. Senior Lecturer
O'Connor, Therese A., M.S., Elmira College. Senior Lecturer
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.
Pullman, Madeleine, Ph.D., U. of Utah. Assoc. Prof.
Quan, Daniel W. C., Ph.D., UC at Berkeley. Assoc. Prof.
Redlin, Michael H., Ph.D., Cornell U. Prof.
Reynolds, Dennis, Ph.D., Cornell U. Asst. Prof.
Robson, Stephani, M.S., Cornell U. Lecturer
Sherwyn, 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
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
ADMINISTRATION
Patsy M. Brannon, dean
Jennifer Geimer, associate dean
S. Kay Ondorf, associate dean
Brenda Bricker, director, undergraduate affairs
Darryl Scott, director, admission, student and career services
Joanne LaValle, college registrar

FACILITIES
The college is housed in Martha Van Rensselaer, Savage and Kinzelberg 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 audiovisual classroom for distance learning. Also included are learning resource centers for career planning, field and international study, a historical costume collection, a human metabolic research unit, an animal research facility, cold rooms, a constant temperature and humidity laboratory, and an early childhood research and care program. Specialized equipment for teaching and research includes biochemical and chemical instruments for spectroscopy, chromatography, radioisotope analysis, electrophoresis, microscopy, and ultracentrifugation; physical testing equipment; and cameras, videotape, and sound recording equipment.

DEGREE PROGRAMS
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 admissions 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 help prospective students understand college programs and requirements, as well as college and university resources and services. The college registrar (145 MVR) assists undergraduates with questions about academic credit and graduation requirements.

The Student Body
The College of Human Ecology undergraduate enrollment is 1,400. Roughly 400 students graduate each year; last year 245 freshmen and 195 transfer students matriculated. One hundred fourteen 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 two-thirds of the student body comes from New York State, with the remainder coming from other parts of the United States and abroad. In 2001, 29 percent were identified as members of minority groups. Approximately 200 graduate students have members of the college's faculty chairing their special committees. The college awarded 46 master's degrees and 14 doctorates last year.

Mature Students
The college recognizes that students who interrupted their formal education and are returning to school need have needs different from those of younger undergraduates. To facilitate the education of mature students, defined as those 25 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 registrar before registration each semester.

Special Students
Students eligible for special status are those visiting from other institutions and interested in particular programs in the college, those with a bachelor's degree who are preparing for graduate study or jobs and careers in human ecology-related fields, or those who have interrupted their education and are considering completing degree programs. Students accepted in the nondegree status of special student may enroll for a maximum of two semesters. During the second semester of attendance, a special student must either apply for admission as a transfer student or plan to terminate studies in the college at the end of the semester. Special students are expected to take a minimum of 12 credits each semester and to take one-half to two-thirds of their work in the statutory divisions of the university. Courses taken while a person is classified as a special student may be counted toward the requirements of the bachelor's degree. Those interested in becoming special students should make appointments to discuss admissions procedures in the Office of Admission (170 MVR, 255-5471).
Empire State Students
Occasionally a student who is completing requirements for a degree through the Empire State College Program is interested in taking a human ecology course. This can be done by registering through the Division of Summer Session, Extramural Study, and Related Programs (BZO 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 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 who enter the College of Human Ecology after the first semester of their freshman year are considered transfer students. An internal transfer student is one who transfers to Human Ecology from one of the other colleges at Cornell University. An external transfer student is one who transfers from Human Ecology from an institution outside of Cornell University. Internal transfer students should take special care to learn the policies of Human Ecology because each college at Cornell operates under a different set of rules. Staff in the Office of the College Registrar (145 MVR, 255–2235) and in the Office of Admission, Student, and Career Services (172 MVR, 255–5471) are available to answer students’ questions. External transfer students may transfer a maximum of 60 credits to the college after admission. Both internal and external transfer students should contact the Office of the College Registrar to discuss how the transfer credits will apply to the various degree programs.

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, and may elect to complete more than one College of Human Ecology major. 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 the 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 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 meet 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 social and organizational changes, technological advances, new markets, 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 multidisciplinary problem-solving and creative abilities, as well as 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 product design. 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, telecommunication, and building technology. 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, lifestyle, social class, and stage-in-life cycle on environmental needs and requirements is also a focus of the program. Career opportunities are available in design firms and in urban planning and other public agencies as well as in the facility management and product design division of private companies. Human factors and ergonomics is good preparation for graduate study leading to a Ph.D. degree in the social sciences and a career in academic or other research-oriented settings in either the public or private sector. It can also serve as the basis for graduate study in an environmental planning or design discipline such as architecture, facility planning and management, interior design, landscape architecture, or city and regional planning. Electives in the social sciences and in research methods and statistics are encouraged.

Academic Advising
All DEA majors are matched with a faculty adviser during their first semester by the director of undergraduate studies, William Sims, in E214 Martha Van Rensselaer Hall.

Consultation with faculty advisers about future goals, departmental requirements, sequences of courses, and career development. 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 internships 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 the 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...
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 broad range of factors 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 related to health. This major is offered by faculty in the Division of Nutritional Sciences. More information about this program can be found in a separate section of this catalog that describes the division’s programs.

HUMAN DEVELOPMENT

Human Development majors explore the psychological, social, cultural, and biological development of people from conception to old age, focusing on the processes and mechanisms of growth and change over the life course. A wide range of issues are included in the study of human development, including biological, cognitive, and emotional development; the role of family, neighborhood, workplace, and culture in development; and the influence that developing humans have on their environment. The Human Development major provides an excellent foundation for many careers, such as medicine (particularly family medicine, pediatrics, and psychiatry), clinical psychology and other mental health professions, law, business (especially human resources), child and family advocacy, and education (from preschool and elementary school teaching to school administration). The major prepares students for academic careers as professors in human development, psychology, or sociology departments. Learning about human development also helps students understand more clearly their own development and the development of those around them.

The faculty of the Department of Human Development comes from several disciplines, including developmental and clinical psychology, sociology, and history. The diversity of faculty expertise results in a wide-ranging view of human development. The research of the department’s faculty is extensive. It includes basic research on issues such as the neurobiology of personality, the role of childhood attachments in the development of adult romantic relationships, the acquisition of language in infants, and the effects of environmental toxins on children’s cognitive development. It also includes applied research useful for the creation of public policy, such as studies of the causes and consequences of child maltreatment and studies of the effectiveness of reading programs for Headstart preschoolers, apprenticeship programs for high school students, and support programs for older adults moving into retirement communities.

Curriculum

Human Development is the most flexible major in the College of Human Ecology. While all students learn the fundamentals of human development, each student can focus on 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 include 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, retirement homes, 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 Law Guardian’s Office of Tompkins County.

Faculty Research. Many students work as research assistants on faculty projects. Students use research techniques ranging from laboratory procedures to family observations tolarge 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 interracial couples, development in families that adopt school-age children, and connections between speed of visual processing in infants and later scores on intelligence tests.

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 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 interrelationships of food patterns, nutritional status, and health. This field draws upon chemistry, biology, and the social sciences to understand questions such as: How are nutrients used by the body? What factors influence human food choice? What nutrients and dietary patterns are recommended to promote growth, maintain health, or reduce the risk of chronic disease? Students in this program may also fulfill the courses required for professional membership in The American Dietetic Association, which will enable them to be employed as nutrition counselors, clinical nutritionists, sports nutritionists, or administrators of 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 American Dietetic Association (ADA). Courses in foods, nutrition and disease, microbiology, management, statistics, and economics are added to the core curriculum (specific requirements). Evaluation of academic credentials for active membership and registration in ADA should be completed before graduation. Seniors should initiate this academic evaluation process in March if they
Advisers in the dietetics program can also help students plan to meet the experience or supervised practice component required for active membership and/or eligibility to take the Registration Examination to be certified as a registered dietitian (R.D.). For additional information about meeting ADA requirements, contact Gail Canterbury, Dietetics Program Administrative Assistant, 335 MVR.

**Exercise Science Minor**

Students can complete the Applied Exercise Science Concentration at Ithaca College, which includes courses in fitness measurements, exercise physiology, and biomechanics of human movement. Nutrition courses of special interest relate to growth and development, regulation of body weight, and community nutrition and health. For information about the Applied Exercise Science Concentration, contact the DNS Academic Affairs Office (309 MVR, 255-4410).

**Policy Analysis and Management**

The Policy Analysis and Management (PAM) major produces graduates skilled in policy analysis, program planning, and evaluation and possessing management skills applicable in the public, nonprofit, and private sectors. In addition, the Policy Analysis and Management graduate will have concentrated knowledge in one of three policy areas: family/social welfare, health, or consumer policy. Graduates are well-qualified for a wide variety of public, not-for-profit, and private sector employment emphasizing either program analysis and evaluation or management. The major also attracts large numbers of pre-law students, pre-MBA students, and students intending to pursue graduate education in public affairs and policy analysis programs. The potential exists to pursue a five-year program resulting in a BS and a Master of Health Administration.

The PAM major combines theoretical underpinnings from economics, sociology, political science, and government to critique and analyze our society's values, laws, policies, and programs. It also gives students the knowledge to build management skills for use in public, not-for-profit, and for-profit settings. Ideas of social justice, equity, and efficiency will be studied concurrently with strategic planning, human resources, supervision, and organizational development. Research methods, statistics, and planning and evaluation concepts will be learned and used to direct 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, neglect, and abuse policies and programs that impinge on or regulate marriage, divorce, and fertility. Health programs and policies include such politically sensitive programs and issues as health care access, Medicare, Medicaid, long-term care, managed care, public health issues, and substance abuse policies. Consumer programs and policies include regulations and laws governing advertising, product safety, food and drug safety, and public utility markets, and also deal with issues such as the invasion of privacy, Internet security, and children's television. 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, Introduction to Policy Analysis, Research Methods, Multivariate Statistics, Intermediates, and Public Finance. 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 an honors thesis. Please check with the undergraduate advising coordinator, Professor Sharon Tennyson, 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, biomedical materials, 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 the properties 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 coursework is further enhanced by field and international experiences. Gallery space provides the setting to display design work. In addition, the Cornell University Costume Collection, housed in the department, provides a valuable resource; items from the collection are made available to students for classroom and special study use.

**Academic Advising**

All TXA majors are matched with a faculty adviser by the director of undergraduate studies, Ann Nettel (211 MVR). Students are strongly urged to discuss their goals, course selection and sequence, electives, and career plans with their faculty adviser. Students in apparel design must begin working with their advisers early to develop a professional portfolio of their work. Students are free to change advisers; changes must be recorded with the director of undergraduate studies. Although advisers must provide the PIN number to lock in courses during course enrollment each term, it is the student's responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for his/her major and college.

**Ownership and Exhibition of Student Work**

All apparel design work done as part of the academic program is the property of the student until it is approved 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. Most transfer students will need at least one extra semester to fulfill the requirements of the major. Transfers in the design option should plan on two additional semesters.

**Option I: Apparel Design**

The study of apparel design includes both aesthetic and functional considerations in the design of body coverings. The program emphasizes a problem-solving approach that enables the student to bring a background in apparel, textiles, and human factors to the design process.

**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 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 apparel and home furnishings. The fiber science option provides a strong base in mathematics and the physical sciences combined. 

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with supporting courses in engineering, consumer economics, and the social sciences.

Career Opportunities

Grades of programs in the Department of Textiles and Apparel, and for research or 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 relationship between biology, society, and ethics 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 mathematics, biology, humanities, and social sciences. In addition, majors are required to 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 and the environment, 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 adviser 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 objectives that cannot be met satisfactorily within the framework of existing majors in the College of Human Ecology may petition to develop an individual curriculum. To be approved, the curriculum must be within the focus of the college and be interdisciplinary in design, include at least 46 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 at grade before the second semester of the junior year.

If an individual curriculum seems advisable, the individual curriculum coordinator will provide direction in formulating 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

Several programs allow students to receive academic credit for fieldwork and internship experience, study abroad, study in absentia, college-wide certificate programs, and joint programs with other schools and colleges at Cornell. Students may petition the college registrar to have concentrations that are formally recognized elsewhere within the university noted on their transcripts when accompanied by appropriate documentation from the program.

Study Abroad

Each year nearly 100 Human Ecology students spend a semester or more off campus in places spanning the globe, such as Australia and Zaire. There they supplement their Cornell studies with a wide range of cross-cultural and academic experiences. Study abroad opportunities are available through Cornell Abroad, U.S. college-sponsored programs abroad, and individual applications at foreign universities.

All study abroad students must meet college study abroad requirements and remain registered at Cornell during the overseas study. Credits earned count towards the 60 Cornell credits required for graduation. Study abroad credits do not count toward the maximum number of endorsed credits that Human Ecology students are permitted to earn. Typically, students considering study abroad begin their planning at least by September or October of their sophomore year.

To start:

- Carefully consider what it is you hope to get out of a study abroad experience (academically and culturally). The Cornell Abroad Center (474 Uris Hall) houses the largest on-campus collection of materials on programs around the world. The Human Ecology Career Development Center (162 MVR) has additional materials.
- Pick up an application from the Office of the Registrar (145 MVR).
- Meet with the college's study abroad adviser (172 MVR). The adviser, with the college registrar, will help you complete the application, plan for your semester off campus, and secure the necessary signatures.
- Submit your application to the Office of the Registrar. Deadlines are early February for study abroad the following fall term, and early September for study abroad the following spring term. Please note that some programs fill up quickly and applications to these most popular programs should be submitted several months before these deadlines.

Independent Research

Research opportunities for undergraduates are extensive and valued as an important part of the learning experience. The opportunity to engage in substantive research with some of the leading scientists in their fields is so compelling that approximately half of the college's undergraduates conduct research projects. Students may become involved in research with the guidance of faculty members by conducting research assigned in a class, joining a faculty member's research group, completing an independent study research project, or carrying out an honors program project.

For further information, contact individual faculty members or the director of undergraduate studies (DUS) in your department.

Honor Programs

Students interested in college honors programs that lead to the degree "bachelor of science with honors" usually apply to the appropriate honors committee no later than the end of their sophomore year. Generally, a minimum grade point average of 3.3 and demonstrated potential for honors-level research is required. Students take approved courses in research methodology and evaluation, attend honors seminars, complete a written thesis, and defend it in an oral examination.

In addition to the college honors program, special programs are offered by the Department of Human Development and the Division of Nutritional Sciences.

If you are interested in the honors program, it is important to contact the director of undergraduate studies (DUS) in your department or division for information and guidelines.

Field Study and Internships

Field study and internships provide experiential learning opportunities in real-life circumstances where classroom knowledge is transferred and applied. Students are able to master new skills, develop and implement plans of action, solve problems, interact in multicultural situations, and build networks for future job opportunities. By applying techniques of research methods, critical thinking, and self-directed learning, students learn to think conceptually while becoming agents of change.

Check with the Director of Undergraduate Studies for major specific information. The Career Development Center (162 MVR) and career counselors in 172 MVR can provide resources and assistance. Internships and other experiential opportunities are available through Cornell Studies for major specific information. The Career Development Center (162 MVR) and career counselors in 172 MVR can provide resources and assistance. Internships and other experiential opportunities are available through Cornell Studies for major specific information. The Career Development Center (162 MVR) and career counselors in 172 MVR can provide resources and assistance.

Concentration/Certificate in Gerontology

For students interested in pursuing study related to aging, the College of Human Ecology, under the auspices of the Gerontology Center, offers the option of completing an undergraduate concentration in gerontology. This program is designed to develop an understanding of and competence in dealing with the processes and issues of aging. Study in gerontology enriches the practical experience of students and prepares them for professional careers in the field of aging.
fessional work in this area. The program draws on the resources of several departments and colleges at Cornell and Ithaca College to shape a curriculum suited to each student's professional goals and interests.

The concentration is available in combination with any major offered by the university. The concentration is available in combination with any major offered by the university. The concentration is available in combination with any major offered by the university. The concentration is available in combination with any major offered by the university. The concentration is available in combination with any major offered by the university. The concentration is available in combination with any major offered by the university.

Experiential learning opportunities are strongly recommended. Students can participate in experiences in the Ithaca area, the Urban Semester in New York City, Cornell-in-Washington, the Capital Semester, or a placement arranged individually.

Both Cornell and Ithaca College offer courses that incorporate a service-learning component into their curriculum. Cornell's course, "Housing for the Elderly," (PAM 375) has placements in a variety of local agencies (e.g., Office of Aging, Housing Authority, Ithaca) where students gain valuable experience with the different ways communities make it possible for adults to remain independent. This course and others at Ithaca College are sponsored by the Ithaca Partnership for Service Learning in Elder Care. They offer a variety of options for combining volunteer-service with classroom experiences. Opportunities for undergraduates to become involved in research projects, such as the Pathways to Life Quality Study, a new Cornell University-Ithaca College collaboration, studies of residential changes and adjustments in the later years are also available. 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 prequisites, early and careful planning is essential.

Specific program requirements may be obtained in the Office of the Cornell Registrar (145 MVR, 255-2235) or from Nancy Wells, Bronfenbrenner Life Course Center (E220 MVR, 254-6330).

General Concentration

Students may develop a concentration in additional fields taught at Cornell by taking 12 credits in an approved area. Computer science, Africana Studies, Women's Studies, communications, or business are just a few examples of concentrations that are possible.

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 receive in the Olin Hall dormitory of the Well 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 bilingual and bicultural internship settings are available in Chinese, Spanish, Greek, Russian, Yiddish, and other languages. Examples of internships follow:

Health and medicine—New York Presbyterian Hospital/New York Weill Cornell Medical Center, Queens Medical Center for Women and Children, South Bronx Health Center for Children and Families, Memorial Sloan Kettering Hospital, Hospital for Special Surgery, Montefiore Hospital, Bellevue Hospital, Our Lady of Mercy Hospital

Private and public law—NOW Legal Defense and Education Fund, Agenda for Children Tomorrow, Skadden Arps, Slate, Meagher, & Flom, Lawyers for Children, DA's Office, Legal Aid Society, AALDEF, Committee Against Anti-Asian Violence, Center for Children's Rights, NAACP, Dorsey & Whitney


Private and public schools—Beginning with Children, Banana Kelly High School, East Harlem School at Exodus House, The Hetrick Martin Institute, Nuestros Ninos, Theodore Roosevelt High School, The Choir Academy of Harlem, El Puente, Genesis KRC 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 of $3,500. Students intern directly for New York State legislators in Albany to explore their interests in greater depth, doing research projects, meeting with lobbyists and constituents, writing reports for legislation and publication, and working on legislative hearings. This is great experience for law school, graduate school, and employment. It is available for the spring semester only with preference given to juniors and seniors. Visit the Career Development Center (162 MVR) for more information and applications. Contact Prof. William Rosen, 259 MVR, the director of the program.

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 courses at Ithaca and Wells, and those students pursuing a concentration in exercise science through a specially arranged program with Ithaca College.

Cornell students are eligible to register only for Ithaca and Wells College courses that are relevant to their program and that do not duplicate Cornell courses. Ithaca and Wells College credit counts as Cornell credit, but not as Human Ecology credit. Students are accepted on a space-available basis. Participation in this program is not guaranteed, and both Ithaca and Wells have the right to accept or reject students for any reason deemed appropriate. The program is available only during the fall and spring semesters. For further information, contact the college registrar (145 MVR, 255-2235).
Double-Registration Programs
Cornell undergraduates from PAM and other fields across the college and campus are eligible to apply to the Sloan Program in their junior year for a five-year accelerated B.S./M.P.S. degree in health administration. In their senior year, these students will take the first year of 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 notified during the spring semester of their senior year that they are invited to continue for the final year of Sloan as a graduate student. Those students accepted for the five-year program will participate in a health care administrative internship during the summer after earning their B.S. degree and following the first year of Sloan academic coursework. The following graduate year they will complete the second year of required Sloan courses and electives and will earn a Master in Professional Studies, with Cornell certifying completion of the requirements for a graduate degree in health administration.

Students applying to the accelerated M.P.S. program need to complete the initial application to the Sloan five-year program through PAM. In general, 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/2003curr.cfm.

Double-Registration Program for Law
A small number of highly qualified applicants may be admitted to the Cornell Law School after only three years of undergraduate education. The requirements for admission under these circumstances are more stringent than for acceptance after four years of undergraduate study. Applicants must present outstanding qualifications and strong professional motivation. The junior year applicant follows the ordinary application procedures for Cornell Law School admission.

Interested students should contact the Law School director of admissions (Myron Taylor Hall, 255–5141) to discuss the admissions criteria. Because students accepted to this program will be spending their senior year away from Human Ecology, they need to plan ahead to ensure that distribution 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 program meets graduation requirements for the major and the college.

Directors of undergraduate studies in each department are available to answer questions about the advising system and the undergraduate major. Students who are exploring alternative majors should work closely with college counselors.

Office of Admission, Student, and Career Services
The Office of Admission, Student, and Career Services (ASCs) (172 MVE) is a center for student orientation activities; academic, personal, and career advising; study abroad; and minority 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.

The Office of Admission, Student, and Career Services (ASCS) (172 MVE) is a center for student orientation activities; academic, personal, and career advising; study abroad; and minority student 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 event the first year that a student is registered and participating.

Minority 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. Accordingly, the college focuses particular efforts on a broad range of services for students of color. This includes not only recruitment but also support 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 Educational Affairs (COSEP), State Programs (EOP), and the Minorities Development 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:

BEMTA (Black Biomedical and Technical Association). A university organization that provides enrichment activities for minority stu-
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 four committees are recruitment and retention, student relations, career development, and peer advising. For more information contact Verdene 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 upperclassmen. They meet weekly for discussions, guidance, and explorations of the Cornell campus and the Human Ecology. For more information, contact Verdene 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 of enrichment activities and programs for pre-med and pre-law New York State residents. Services are targeted at populations who are historically underrepresented in scientific, technical, health-related, or licensed professions and/or who are economically disadvantaged and who demonstrate interest in, and potential for, a CSTEP-targeted profession. For more information, contact Verdene Lee (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 degree requirements. The college encourages students to incorporate courses from these cultural programs and from study abroad experiences in their degree programs. See information on study abroad opportunities.

Africana Studies and Research Center
American Indian Program
Asian American Studies Program
East Asia Program
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
Women's Studies Program

International Students

The International Students and Scholars Office (ISSO, B50 Caldwell Hall, 255-5243) provides a broad range of services to international students. All international students should maintain contact with the ISSO. Counselors in 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 counselors and resources in the Career Development Center to help students assess possible career outcomes and access educational and extracurricular programs and resources to prepare for those careers. Assistance is available through one-on-one advising or group programming. The office works with the Cornell Career Services (103 Barnes Hall, 255-5221) to facilitate access to larger, 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 (Pre-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 500 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.

AlumNet. Students have access to Human Ecology alumni who can provide information on their careers and offer suggestions on a job search in their particular field or location. Students can query alumni on a host of variables and review selected alumni résumés to learn more about specific careers.

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 résumé and cover letter, and interview successfully.

MonsterTRAK. Exclusively for Cornell students, MonsterTRAK provides a listing of job opportunities available. Most are full-time jobs, although some summer opportunities are listed. Search by career 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. Unofficial transcripts and curriculum sheets are available in the Human Ecology Registrar's Office (145 MVR Hall).

Cornell Credit Requirements

- To graduate, a student must earn a minimum of 120 academic credits. An unlimited number of credits may be taken in Cornell's statutory colleges.

- 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. An additional 15 in absentia credits earned after matriculation may be applied. AP, IB, and transfer courses may be applied toward fulfillment of specific requirements regardless of whether the credit is transferred (i.e., courses may be waived). 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).

- Of the 120 credits required to graduate, at least 60 credits must be earned at Cornell University, applicable to transfer students.

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 selections. 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

  b) Category II—Requirements for a major

  c) Category III—Electives (see definition below)

  d) Category IV—Physical education

- Students must complete a minimum of 40 Human Ecology credits in Category II.

- Within Category II, students must earn nine credits in Human Ecology departments outside the major.

- These Human Ecology courses outside the major may not include HE 100, HE 101, or any 400 course. Any non-major 400 course will count as elective credit and not towards the 40 required HE credits. A maximum of three credits of special studies outside the major (400, 401, and 402), or any internship credit may be applied to this requirement. A maximum of five credits of HE 470, HE 480, HE 490 may be used. Seven credits of PAM 392 may be used in this category.

- Human Ecology courses used to satisfy distribution requirements in Category I:

  1) WILL NOT count towards the 40-credit minimum in Category II.

  2) Will satisfy the nine-credit requirement for course work outside the major.

  (Exception: B&S majors must refer to the "NOTE" on B&S curriculum sheets at the end of Category II requirements for appropriate guidelines.)

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

- Students are allowed 21 credits of endowed courses as electives in their major; 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 (exclusive of physical education). An unlimited number of credits may be taken in the statutory colleges of Cornell. Students may choose to take additional statutory credits 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.

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 (Exception: mature students).

Requirements for Majors

- Students must fulfill the requirements specified for a major that they are in effect at the time of their matriculation or thereafter.

Grade Point Average

- Students must earn a minimum cumulative grade point average of 1.7 (C-) or better to graduate.

- To be eligible for the Dean's List, students must have a semester GPA of 3.7 with no F or U grades. At least 12 credits of letter grades are required.

S-U Grade Options

- The S-U grading option may NOT be used for courses in Category I or required courses in Category II unless it is the only grade option offered for those courses. S-U's MAY be used for the nine credits of Human Ecology coursework outside of one's major and for electives in Category III.

- Students may apply no more that 12 credits of S-U towards graduation. If a required course is only offered S-U, it will
not count towards this limit. Also, Honors Research 499 taken S-U does not count.

Students may take more S-Us if they choose, but the additional credit cannot be applied towards graduation.

**First-year Writing Seminars**

All freshmen must complete the First-year Writing Seminars during their first two semesters. Those who do not fulfill this requirement will be referred to the Committee on Academic Status (CAS) and will be required to complete the writing requirement during the third semester or a hold will be placed on the student’s record. First-year Writing Seminars must be taken at Cornell and will not be approved for in absentia study. Students who receive a 5 on their English AP exam can be exempt from one semester of their First-year Writing Seminar requirements. No other AP scores will allow a student this exemption.

**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 towards graduation.

**“00” Courses**

- “00” courses do not count towards graduation requirements but do count towards full-time semester status.

**Wells, Ithaca College, and Study Abroad Credits**

Any credits earned with the Wells or Ithaca College exchange program are considered Cornell credits for the purpose of fulfilling the 60 Cornell credit graduation requirement. They can not be used for Human Ecology credit. Study Abroad courses may also count as Cornell credit.

**Physical Education**

- Students must earn two credits of physical education within their first two semesters. These two credits do not count as part of the 50 CAS credits, or as part of the 120 total credits required for a degree, or towards 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 page 13 of this book for specifics.

**Advanced Placement Credit**

Refer to section above entitled “Cornell Credit Requirements” to calculate how many 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 (pages 6 and 7).
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 baccalaureate is evaluated individually.

**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 departmental language placement test. The latter is given during orientation week in September and again in December, January, and May. Human Ecology students who plan to work with non-English speaking people in this country or abroad often find it necessary to be proficient in another language. Many study abroad programs in non-English speaking countries require the equivalent of two years of college-level language study. For more detailed information, see Advanced Placement Credits.

**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. Students 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 exchange programs simultaneously maintain their status as students registered in the College of Human Ecology.

**Humanities**

Only certain classes will count for Category I, Humanities; 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 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 basic authorization for a student's access to services and education. Completion of registration is essential to enable the university to plan for and provide services and education, guided by the highest standards for efficiency and safety.

Unauthorized, unregistered persons who use university services and attend classes have the potential to use university resources inappropriately and to displace properly registered students. In addition, the university assumes certain legal responsibilities for persons who participate as students in the university environment. For example, policy states that New York State health requirements must be satisfied. Because these requirements are intended to safeguard the public health of students, the university has a responsibility to enforce the state regulations through registration procedures.

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

To become a registered student at Cornell University, a person must complete course enrollment according to individual college requirements; settle all financial accounts.
including current semester tuition; satisfy New York State health requirements; and have no holds from the college, the office of the Judicial Administrator, Gannett Health Center, or the Bursar. 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, 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 on the bursar's bill is considered late. Late registrants are assessed a finance charge on the bursar's bill starting from the date the bill is due. According to university policy, all students must be registered before the end of the third week of classes. If for any reason a student registers after that time, the Bursar's Office will charge a late fee. Students who fail to register by the third week of the term may be withdrawn from the university. Should withdrawn students wish to return, they must reapply through the admissions committee.

**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 or counselors for more information.) Students of mature status may carry 6 to 11 credits without petitioning, but they are expected to attend classes and to do assigned work until the petition has been forwarded. Prorated tuition will only be considered for requests of 10 credits or fewer. All requests should be made to the college registrar by the first week of classes and no later than the third week of the term.

**Course Enrollment**

**Initiating the Process**

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). CoursEnroll takes place electronically, using 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 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. 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 CUinfo.

Incoming students will receive tentative schedules upon their arrival to campus, and will meet with faculty advisers during the orientation period.

**Course Loads**

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.

**Except for those with mature student status, students must carry at least 12 credits (exclusive of physical education) to maintain full-time status. In special cases, a student may petition to carry between 8 and 12 credits.** Forms for petitioning and advice on how to proceed are available from the Office of Admission, Student, and Career Services (172 MVR).

**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.

Some procedures required for course enrollment are also required for course enrollment changes. For example, students must obtain the instructor's permission for a course requiring it, and must complete the same forms for special studies courses. Aside from the procedures listed below for course enrollment changes, all drop/add requests for nutritional science majors must be signed by a faculty adviser.

**Deadlines for Add/Drop and Grade Option Changes**

• **During the first three weeks of the term,** courses may be added, dropped, or the grade option changed.

• **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.**

• **From the fourth week of the term,** instructors have the right to consider students' requests for course changes on an individual basis or to announce at the beginning of the term a specific date between the fourth and seventh weeks beyond which they will no longer approve course changes.

• **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 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 to do assigned work until the petition has been formally approved or denied.

**Permission of Instructor**

Certain courses may be taken only with the permission of the instructor as indicated in this book. Undergraduates must obtain permission of the instructor to take any graduate course. Students must request the instructor's permission during the CoursEnroll period by placing their name on a list maintained by the departmental advising assistant.
Students interested in taking a course in the Department of Art in the College of Architecture, Art, and Planning are required to register with the departmental secretary (100 Olive Tjaden Hall) before enrolling in the course. To ensure that students are registered with the correct departmental secretary, they must also check with their faculty adviser before departure to consider the schedule of classes that they will take upon their return to campus. Once abroad, the student can use the web to access the Cornell University Courses of Study and the Course and Time Roster for the coming term. The roster is available on the web in approximately the first week of October and the first week of March. Using these resources, the student can e-mail the course requests to the student's faculty adviser for approval, the faculty adviser can then e-mail them to the college registrar. A student who does not have access to the Internet while abroad can wait for the Course and Time Roster to arrive via airmail from the Cornell Abroad Office. The student can then e-mail, fax, or mail the course requests to their faculty adviser and ask the faculty adviser to submit the course requests to the college registrar. The Course and Time Roster becomes available only the day that pre-enrollment begins; thus, students who rely on receiving the mailed copy will experience some delay in submitting their course requests.

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, and instructors are responsible for determining the criteria to fill their classes from waiting lists. Waiting lists are maintained only for the first three weeks of each semester.

Limited Enrollment Classes

Students who do not attend the first two class sessions of courses with limited enrollment may be dropped from the course list. Students can avoid being dropped from a class by notifying the instructor that unavoidable circumstances have prevented their attendance.

Cross-listed Courses

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, students must complete a special form, which can be obtained in the registrar's office in 145 MVR.

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 requirements.

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 whose supervision the study would be done and then prepares a plan of work. If the faculty member agrees to supervise the study, the student completes a special studies form and obtains signatures from the department chair and the departmental dean. These forms are available in 145 MVR or only in departmental offices. Add/drop forms are only available in 145 MVR.

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. A student can only use 12 credits of 400, 401, 402, or 403 courses towards graduation and only three 400-, 401-, or 402-credits can be used to satisfy the nine-credit-outside-the-major requirement. To register in a special studies course taught in a department outside the college, follow the procedures established by that department.

Changes in Status

General Petition Process

The petition process permits students to request exceptions to existing regulations. Petitions are considered individually, weighing the unique situation of the petitioning student with the intent of college and university regulations. In most cases, extending circumstances are needed for a petition to be approved if it involves waiving a deadline. These situations beyond a student's control, such as a documented medical emergency. Students can avoid the necessity to petition by carefully observing the deadlines that affect their academic program. See the Course Enrollment Changes section above 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 Registrar's staff (145 MVR).

A general petition may be needed to carry fewer than 12 credits, withdraw from a class after the seventh week deadline, add a course after the third week deadline, change a grade option after the third week deadline, be exempt from one or more of the college's graduation requirements, substitute a required course in one's major with another course, or stay an additional semester to complete the graduation requirements.

Although many kinds of requests can be petitioned in the college, options other than petitioning may be preferable in some cases. To explore whether a petition is appropriate, the student may discuss the situation with a college counselor or the college registrar.

If a student decides to submit a general petition, the form is available in the 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 Registrar's Office 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. Students not in good standing may study in absentia but will not receive transcript credit until their Academic Status has been returned to good standing. In some cases, students may petition for in absentia credit after the work has been completed, but there is no guarantee that such credit will be awarded without advance approval.

In absentia petition forms are available in the Human Ecology Registrar's Office (145 MVR) or on the web at www.human.cornell.edu/student/forms/. The student completes the form, attaches catalog descriptions for the courses that will be petitioned, and 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 Bursar's Office, 260 Day Hall, for the current amount). Students will receive a letter in their mail folder from the college registrar notifying them of the petition decision.

A student may take up to 15 credits in absentia as long as the courses do not duplicate courses already taken and the in absentia courses are applicable to the requirements of the college. Students who study abroad during
the summer or winter term are limited to a maximum of 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.

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 particular professional goals, and (3) those goals are consistent with the focus of the college. The in absentia petition is used to request more than 15 credits in absentia. Wells and Ithaca College credit are not considered in absentia credit and are not included in the 15 credit limit.

The college registrar requests approval from the appropriate department if a student wants to apply in absentia credit to requirements in his or her major. If in absentia credit is sought for a modern foreign language in which the student has done work, approval by the Department of Modern Languages and Linguistics (College of Arts and Sciences) must be obtained. The department will recommend the number of credits the student should receive and may require the student to take a placement test after returning to Cornell.

The student is responsible for having the registrar of the institution where in absentia study is taken send transcripts of grades to the Human Ecology Registrar's Office at 145 MVR Hall. Only then will credit be officially assessed and applied to the Cornell degree. Credit for in absentia study will be granted only for those courses with grades of C- or better. In absentia courses on the Cornell University transcript, but the grades are not calculated in the student's GPA.

A student who holds a Regents' or Children of Deceased or Disabled Veterans Scholarship may claim that scholarship for study in absentia if the study is done in a college in New York State and if it is for a maximum of 15 credits acceptable to the College of Human Ecology. The rules regarding study in absentia apply to transfer students with the additional stipulation that at least 60 credits must be taken at Cornell. At least 40 of the 60 credits must be in the College of Human Ecology unless the student has transferred equivalent human ecology credit. (No more than 20 credits of equivalent credit may be applied to the 40 credits required in human ecology course work.)

Leaves of Absence
A student may request a leave of absence before the beginning of the semester or during the first seven weeks of the semester for which a leave is sought. A leave may be extended for a second semester by making a written request to the Office of Admission, Student, and Career Services. Note that in absentia status and leave of absence status are mutually exclusive. Students on leave must notify the college registrar in MVR 145, in writing, of their intention to return to campus prior to the beginning of the semester. Those whose leave period has expired will be withdrawn from the college after the seventh week of the semester they were due back.

Students considering a leave of absence should discuss their plans with a counselor in the Office of Admission, Student, and Career Services. The counselor can supply the necessary forms for the student to complete and file with the Human Ecology Registrar's Office (145 MVR). Leaves initiated after instruction begins will be charged a percentage of the semester tuition. (Refer to Bursar Information in this book for a billing schedule.)

Requests for a leave of absence received after the first seven weeks of the semester, or requests for a leave of absence from students who have already had two semesters' leave of absence, will be referred for action to the Committee on Academic Status. The committee may grant or deny such requests, attaching conditions as it deems necessary. Leaves of absence after the first seven weeks are generally granted only when there are compelling reasons why a student is unable to complete the semester, such as extended illness.

A student who requests a leave of absence after the first seven weeks is advised to attend classes until action is taken on the petition. A student whose petition for a leave of absence is denied may choose to withdraw or to complete the semester. If the petition for leave is approved the student's courses will remain on the transcript with "W's."

The academic records of all students who are granted a leave of absence are subject to review, and the Committee on Academic Status may request grades and other information from faculty members to determine whether the student should return under warning or severe warning or in good academic standing.

Under certain documented medical circumstances a student may be granted a medical leave of absence. Medical leaves are initiated by the student with Gannett Health Center. If Gannett Health Center recommends a medical leave for the student, the college registrar may grant the leave. A medical leave is for an indeterminate period of time not to exceed five years. Students who are granted a medical leave of absence are encouraged to maintain contact with a counselor in the Office of Admission, Student, and Career Services (255-2532) to arrange their return to campus. The counselor will advise the student on procedures to obtain a recommendation from Gannett Health Center to the college registrar for the student's return. The student should plan sufficiently in advance to assure time for academic standing.

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Withdrawal
A withdrawal is a termination of student status at the university. Students may voluntarily withdraw at any time by notifying a counselor in the Office of Admission, Student, and Career Services and filing a written notice of withdrawal in the Human Ecology Registrar's Office. A student considering such an action is urged to discuss plans with a counselor in the Office of Admission, Student, and Career Services (172 MVR). In some instances a student may be given a withdrawal by the student's Major or Dean. 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 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. Fall semester grades are mailed to student's 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 (credits hours X grade quality points) and divide by the total credit hours taken. Grades of INC, R, S, SX, U, UX, and W should not be included in any GPA calculations. A grade of F has no quality points, but the credits are counted thereby lowering the average. A cumulative GPA is just the sum of all semester products divided by all credits taken. 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:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Quality Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.3</td>
</tr>
<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>2.7</td>
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<tr>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>1.7</td>
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<tr>
<td>D</td>
<td>1.3</td>
</tr>
<tr>
<td>D+</td>
<td>1.0</td>
</tr>
<tr>
<td>D-</td>
<td>0.7</td>
</tr>
<tr>
<td>F</td>
<td>0.0</td>
</tr>
</tbody>
</table>

S-U Grades
Some courses in the college and in other academic units at Cornell are offered on an S-U basis, that fact is indicated in this book. 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 S, 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 Dean's List must take at least 12 credits of A-F grades. See the section, "Awards and Honors" for more details about the Dean's List.

No more than 12 S-U credits will count towards a student's 120-credit graduation requirement. However, a student may take more than one S-U course in any one semes-
Grade Disputes

Students who find themselves in disagreement with an instructor over grades have several options:

1. Meet with the instructor and try to resolve the dispute.
2. Meet with the chair of the department in which the instructor has their appointment.
3. Meet the associate dean for undergraduate studies in the college in which the course was taught.
4. Meet with the university ombudsman (118 Stimson Hall, 255-4321).

A student may also seek advice from their faculty advisor or with a counselor in the Office of Admission, Student, and Career Services (172 MVR).

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 received an F, the credits from the second registration will count toward their degree requirements and the grade will 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 not count towards their degree requirements and the grade received will not be included in their cumulative GPA.

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 period, the grade of incomplete will be changed to a regular grade on the student's official transcript. If the work is not completed within the designated time period, the grade of incomplete automatically will be converted to an F.

When a student wants to receive a grade of incomplete, the student should arrange a conference with the instructor (preferably before classes end and the study period begins) to work out the agreement. A form, called explanation for reporting a final grade of F or incomplete, which must be signed by both the instructor and the student, needs to be submitted by the instructor to the Human Ecology Registrar's Office. This form is submitted with the final grade sheets whenever a grade of incomplete is given. This form is for the student's protection, particularly in the event that a faculty member with whom a course is being completed leaves campus without leaving a record of the work completed in the course. If circumstances prevent a student from consulting the instructor, the instructor may, if requested by the student, initiate the process by filling out and signing part of the form and turning it in to the Human Ecology Registrar's Office with the grade sheet. Before a student will be allowed to register for succeeding semesters, he or she must go to the Human Ecology Registrar's Office to fill out and sign the remainder of the form.

If the work is satisfactorily completed within the required time, the course appears on the student's official transcript with an asterisk, and the final grade received for the semester in which the student was registered for the course. A student who completes the work in the required time and expects to receive a grade must take the responsibility for checking with the Human Ecology Registrar's Office (about two weeks after the work has been handed in) to make sure that the grade has been received. Any questions should be discussed with the course instructor.

Grades of Incomplete

A grade of incomplete is given when a student does not complete 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.

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ACADEMIC STANDING

Criteria for Good Standing

The College of Human Ecology has established a set of minimum academic standards which all students must meet or exceed each semester. These standards are as follows:

1. A student must maintain a semester and cumulative grade point average of 1.7 or higher.
2. A student must successfully complete at least 12 credits per semester, excluding physical education courses.
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, 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).
4. A student must be making "satisfactory progress" toward a bachelor's degree.

Upon the completion of each semester the Committee on Academic Status (CAS) reviews each student's academic record to ensure the above academic standards are upheld. The committee then takes appropriate action for students whose academic achievement is considered unsatisfactory as defined by the above criteria. The five voting faculty members, along with several nonvoting student services staff, consider each case individually before deciding on a course of action. The committee may take any of the following actions depending on the seriousness of the student's academic difficulties:

1. Take no action.
2. Return the student to Good Standing.
3. Place the student on a Review List, which means the case will be monitored throughout the semester.
4. Place the student on a Warning status.
5. Place the student on a Severe Warning status.
6. Place the student on a Severe Warning with Danger of Being Dropped status, implying that if the student does not show considerable improvement during the semester the committee will likely drop the student at the end.
7. Suspend the student for one or more terms during which the student may not register at Cornell (except in extramural status with CAS approval).
8. Permanently withdraw the student from the college and Cornell University.

Students who have been suspended or withdrawn have the right to appeal the decision in front of the committee in the subsequent semester. Students who have been placed on warning due to incomplete or missing grades may request their status be updated to good standing once they have cleaned up their records. These requests should be made with a general petition and submitted to the Office of the Registrar.

Academic Integrity

Academic integrity is a critical issue for all students and professors in the academic community. The University Code of Academic Integrity states that (1) a student assumes responsibility for the content and integrity of the academic work he or she submits, such as papers, examinations, or reports and (2) a student shall be guilty of violating the code and subject to proceedings under it if he or she:

a. Knowingly represents the work of others as his or her own.
b. Uses or obtains unauthorized assistance in any academic work.
c. Gives fraudulent assistance to another student.
d. Fabricates data in support of laboratory or fieldwork.
e. Forges a signature to certify completion or acceptance of work.
f. Uses an assignment for more than one purpose, implying that if the student does not meet new or previously unknown information. Any information given to the committee is held in the strictest confidence.

Academic Records

Students may obtain their Cornell academic record in several ways. The Cornell transcript, which is the official record of the courses, credits, and grades that a student has earned, can be ordered with no charge at the Office of the University Registrar (B7 Day Hall). For more information call (607) 255-4232. Students who merely want an
Students are eligible for membership if they have attained junior status and have a cumulative average of not less than B. Transfer students are eligible after completing one year in this institution with a B average.

Current members of Kappa Omicron Nu elect new members. Not more than 10 percent of the junior class may be elected to membership and not 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.

Information about admission to the programs and their requirements may be obtained from the appropriate department or division. Students in other departments who wish to qualify for honors should consult the Office of the Dean of Students (172 MVR) during their sophomore year or the first semester of their junior year. Most honors candidates 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 requirements for Bachelor of Science degrees in January or May of the same academic year or the prior August. Names of seniors who meet these requirements are presented to the faculty of the college for approval.

The primary objectives of the honor society, Phi Kappa Phi, are to promote the pursuit of excellence in higher education and to recognize outstanding achievement by students, faculty, and others through election to membership. Phi Kappa Phi is unique in that it recognizes scholarship in all academic disciplines. To be eligible for membership students must rank in the top 10 percent of the senior class, or in the top 5 percent of the junior class. Provisions also exist for the election of faculty members and graduate students whose work merits recognition.

Gamma Sigma Delta is an honor society of the faculty in the colleges of Human Ecology, Agriculture and Life Sciences, and Veterinary Medicine. The common bond is promotion of excellence in work related to 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.

**Awards**

**The Elsie Van Buren Rice Award in Oral Communication** is awarded for original oral communication projects related to the college's mission by undergraduate students in the College of Human Ecology. The contest is held each year in February and awards prizes totaling $1,500.

**The Flora Rose Prize** is given biennially to a Cornell junior or senior whom, in the words of the donor, "shall demonstrate the greatest promise for contributing to the growth and self-fulfillment of future generations." The recipient will receive a cash prize of $500.

**The Florence Halpem Award** is named for the noted psychologist, Dr. Florence Halpem, in recognition of her lifelong interest in "innovative human service, which betters the quality of life." In that spirit the award is presented to an undergraduate in the College of Human Ecology who has demonstrated, through supervised 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 **American Council on Consumer Interests (ACCI)** offers a student membership for those interested in consumer economics. Contact the Department of Policy Analysis and Management for further information.

The **Cornell Design League** was formed to give students interested in apparel a chance to express their creativity outside of the classroom by producing a fashion show every spring. It has become concerned with all aspects of a professional presentation. Consequently, it also provides a creative outlet for those interested in graphics, photography, illustration, or theater production. Although many of its designers are part of the Department of 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 work with 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.

**Human Ecology Ambassadors** is a group of undergraduates who assist the Office of Admission, Student, and Career Services by participating in group conferences with prospective students to provide information from a student's perspective, assisting with recruitment and yield activities for potential
students, conducting high school visitations, assisting with on-campus open-house programs for high school students and potential transfer students, helping with prospective students and alumni phonathons.

In addition, ambassadors attend regular meetings and serve as coordinators for activities in the Office of Admission, Student, and Career Services.

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, 255-2532).

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 list-serv, 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, 255-2532) 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 minority students 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 visitations.
- 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 Verden Lee in the Office of Admission, Student, and Career Services (172 MVR, 255-2532) for more information.

The PreLaw Undergraduate Society (PLUS) is sponsored by Human Ecology and welcomes members from the Cornell community. Meetings provide information and support for students considering careers in law. Programs include information on applications and admissions, law school applications, LSAT preparations, tour of the Cornell Law School and information panels with current law students, and Mock Trial and internship opportunities.

Guest speakers include practicing attorneys, law faculty, and current law school students. Contact 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 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, 255-8013) for more information.

The Students for Gerontology (SGF) is composed of students from a wide variety of majors who are interested in career and internship opportunities that contribute to the well-being of our aging population. Programs sponsored by this organization focus on developing linkages with community organizations and other student gerontology groups. SGF meets monthly. Contact Nancy Wells, facility adviser, Bronfrenbrenner 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 curriculum changes, and new course approval.

Students also have the opportunity to serve on the Admissions Policy Subcommittee, and the Academic Integrity Hearing Board.

The Selection Committee for the Chancellor's Award for Excellence in Teaching or Professional Service handles the nomination and selection process for this prestigious yearly award. The committee consists of three teaching faculty members, one professional staff member, and three undergraduate members.

The Human Ecology Alumni Association Board of Directors includes two student board members—one junior and one senior. One student is selected each spring to begin a two-year term as student representative. The two students co-chair the board's Student Activities Committee, which works to increase the visibility of the Alumni Association among the student body by funding a variety of activities. The student representative gains an important perspective to board deliberations about programming and annual goals.

The Committee on Academic Status does not include student representatives, but has a faculty representative from each department. This committee is responsible for upholding the academic standards of the college and takes action when appropriate. The committee also hears appeals regarding student petitions and requests to be readmitted.

INTERDEPARTMENTAL COURSES

HE 100 Critical Reading and Thinking
6-week summer session. 2 credits.
Enrollment limited. Priority is given to freshmen and sophomores; juniors and seniors are admitted with permission of the instructor. Letter or S-U grades.

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 and required of 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 Cornell college work is stressed. In addition, students are introduced to library and computing resources through hands-on projects.
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 hospital or clinic member of New York Presbyterian Hospital and Weill Medical College of Cornell University. This is a four-day internship and one day of seminars each 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 a number of neighborhoods and speak with local leaders about diversity issues in context, in practice, and in use, to learn how multicultural issues are experienced by people and how they make sense of them.

HE 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 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.

DESIGN AND ENVIRONMENTAL ANALYSIS

F. Becker, chair; W. Sims, director of undergraduate studies; S. Danko, director of graduate studies; A. Basinger, J. Elliott, P. Eshelman, G. Evans, K. Gibson, R. Gilmore, A. Hedge, J. Jennings, J. Laquerria, L. Maxwell, N. Wells

Note: A minimal charge for photocopied course handouts may be required.

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

DEA 4+1 Master's Degree Program

Outstanding students who complete their four year undergraduate degree in DEA are eligible to complete a Master of Arts/M.A. (Interior Design) or a Master of Science/M.S. (Human Environment Relations) degree in one additional year of graduate study.

Through careful planning many of the courses required in the M.A. or M.S. programs can be taken during the undergraduate years, creating an opportunity to focus the fifth year of study on completing course and thesis requirements.

As early as the freshman year, students can plan their curriculum toward completing a fifth year master's. Typically, this means students will take 4 to 5 courses in their fall term as a graduate student, and 2 to 3 courses plus their thesis research in the spring term.

Students should expect to complete their thesis by the end of the summer term of their fifth year.

Admission to the 4+1 Master's program is not automatic. Students must meet with their advisers early in their graduate programs to plan carefully for this possibility. In the fall of the senior year, interested students must submit an application to the Graduate School. The GRE exam is not required for admissions, but students must submit a statement of intent, letters of reference, and transcripts.

Students who have compiled a strong undergraduate record in the department are usually good candidates for admission into the graduate program in Design and Environmental Analysis. Students interested in this program should meet with their DEA adviser as early as possible to discuss and plan for application to this program.

DEA 101 Design Studio I

Fall. 3 credits. Limited to 20 students.


This studio course introduces the fundamental vocabulary and principles of two- and three-dimensional design. Students experiment with the development of image and form through problem-solving activities. Visit http://instruct1.cit.cornell.edu/courses/dea101/.

DEA 102 Design Studio II

Spring. 3 credits. Limited to Option I DEA majors only. B- or higher in DEA 101 required to register for this course. Option I majors must take DEA 102 and 115 concurrently. Approximate cost of materials, $200, shop fee, $10. T R 1:25-4:25. P. Eshelman

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

Fall. 3 credits. Limit 130. Lab Fee: $25. M W F 11:15-12:05. S. Danko.

Students from any academic area may examine how design and design thinking can improve our 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: local to global. Topics include: nurturing innovation, visual literacy, design criticism, design and culture, semiotics, proactive/reflexive decision making, and ethical issues. Note: this course has evening exams.

DEA 115 Design Graphics

Spring. 3 credits. Option I DEA majors only. Prerequisite: DEA 101; must take DEA 102 and DEA 115 concurrently. Minimum cost of materials, $100; technology fee $10. M W F 9:05-11:00. K. Gibson.

A studio drawing course for interior designers. Discussion groups on drawing techniques are held to develop a visual understanding and vocabulary. Students are introduced to the functions of line, shape, and value. Perspective, spatial, and conceptual drawing are emphasized.

DEA 150 Introduction to Human-Environment Relations


This course analyzes 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, well-being, moods, aesthetics, performance, interpersonal relationships, and organizational effectiveness as well as the ecological consequences of human attitudes.

DEA 202 Design Studio IV
Spring. 4 credits. Each section limited to Option I DEA students. Prerequisites: DEA 201 and 203. Prerequisites or corequisites: DEA 204. Minimum cost of materials, $120; diazo machine fee, $8; field trip fee, $10. T R 12:20-2:25. R. Gilmore.

Interior design studio. Emphasis of the course is on continued development of basic proficiency in design skills through exposure to a selected set of interior design problems of limited complexity. Each problem of three to five weeks duration is structured to emphasize different aspects of the design process.

DEA 203 Digital Communications
Fall. 2 credits. Limit 27. Limited to DEA majors. Lab fee $10. F 8:00-11:00. J. Elliott.

Digital information technologies for designers of the built environment. Students explore issues in relation to text and image and form and content through a series of weekly projects. They work towards the development of a professional web-based portfolio of self-promotional materials. The primary course objective is to reinforce principles of visual communications while learning the rudiments of vector, raster, and html graphic software. Visit http://instruct1.cit.cornell.edu/courses/dea203/

DEA 204 Introduction to Building Technology

Introduction to building technology for interior designers and facility managers. Emphasis is placed on developing basic understanding of buildings and building systems and their implications for interior design and facility management. Covers basic building types; structural systems; construction materials and methods; HVAC systems; plumbing, electrical, lighting, fire, and security systems; and telephone, computer, and other communication systems. Visit http://courseinfo.cit.cornell.edu/courses/dea204/

DEA 250 The Environment and Social Behavior
Fall. 3 credits. Limited to 16. Priority order: DEA seniors, juniors, sophomores, freshmen. Prerequisite: DEA 150 and written permission of instructor. Field trip fee $65. T R 9:05-11:15. J. Grover.

A combination seminar and lecture course for students interested in the social sciences, design, or facility management. Through project and readings and readings the influence of environmental form on social behaviors such as aggression, cooperation, communication, community, and crime is explored. Also covered are the influences of space in life cycle, family structure, and social class on environmental needs and purposes. Implications for the planning, design, and management of complex environments such as offices, hospitals, schools, and housing are emphasized.

DEA 251 History and Theory of the Interior

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, examinations, and a field trip will be included. Visit http://instruct1.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 305 and 459. Minimum cost of materials, $150; shop fee, $10; optional field trip, approximately $10. T R 12:20-2:25.

Intermediate-level interior design studio. The course is organized around a series of interior and interior-product design problems of intermediate-level duration, three to five weeks in duration. Focus is on development of design skills and on understanding of a selected set of generic problem types.

DEA 302 Design Studio VI
Spring. 5 credits. Prerequisites: DEA 301 and 303 or permission of instructor. Corequisite: DEA 305. Minimum cost of materials, $150; shop fee, $10. M W 12:20-4:25.

Intermediate-level interior design studio with an introduction to computer applications. Emphasis on using the microcomputer as a design tool in the process of creating and planning interior spaces. Continued development of design skills and problem solving in relation to a selection of problem types.

DEA 303 Introduction to Furnishings, Materials, and Finishes
Fall. 2 credits. W 2:30-4:25. R. Gilmore.

Basic understanding of construction types and systems; interior products and equipment such as work-stations; window, wall, and floor coverings; ceiling and lighting systems; and materials and finishes. Emphasis is placed on criteria for selection of furnishings, materials, and finishes for typical interior design and facility management problems.

DEA 304 Introduction to Professional Practice of Interior Design

Introduction to organizational and management principles for delivery of interior design and facility management services. Covers basic organizational structures and basic management functions within interior design and facility management organizations, work flow and scheduling, business practices, legal and ethical responsibilities and concerns, contracts, basic contract documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

DEA 305 Construction Documents and Detailing

Comprehensive study of drafting, detailing, schedules, and specifications. Emphasis on drawing conventions, symbols, dimensioning, detailing of interior elements, terminology, construction methods, and materials.

DEA 325 Human Factors: Ergonomics-Anthropometrics
Fall. 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 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. Visit web site at http://ergo.human.cornell.edu.

DEA 350 Human Factors: The Ambient Environment

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 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. Visit web site at http://ergo.human.cornell.edu.

DEA 400-401-402-403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional. Department faculty.

For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of DEA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multiplicity description of the study they want to undertake on a form available from the department office. This form must be signed by the instructor directing the study and the department head and filed at course registration or within the change-of-registration period in 145 MVR, College Registrar's Office, along with an add/drop slip. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department head is necessary. Students, in consultation with their advisers and the instructor should register for
one of the following subdivisions of independent study.

DEA 400 Directed Readings
For study that predominantly involves library research and independent reading.

DEA 401 Empirical Research
For study that predominantly involves data collection and analysis or laboratory or studio projects.

DEA 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

DEA 403 Teaching Apprenticeship
For study that includes teaching methods in the field and assisting faculty with instruction, students must have demonstrated a high level of performance in the subject to be taught and in the overall academic program.

DEA 407 Design Studio VII
Advanced interior design studio organized around a series of interior design problems, three to five weeks in duration. Focus is on development of design skills and on competence in solving a selected set of generic interior design problems.

DEA 408 Design Studio VIII
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. T. D'Amato.
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) F G 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 pursues the boundaries of current restaurant design by developing a concept plan for an innovative restaurant in an additional setting. Students work in teams to develop design 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 the design process that emphasizes support of human behavior. Information about specific social issues is included, being, child care and education is the starting point for assignments. Students analyze 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
Series of seminars led by Cornell faculty and other facility management professionals. Topics include strategic space planning, space standards, office design, furniture management, energy conservation, environmental protection, and regulatory issues. Visit http://instruct1.cit.cornell.edu/courses/dea/451_659.

DEA 453 Planning and Managing the Workplace
Fall: 3 credits. Limited to juniors and seniors. Purchase of course packet required. T 7:30-10:30 a.m., F 2:55-4:10. A. Hedge.
Intended for students interested in the planning, design, and management of facilities for complex organizations. The purpose of the course is to explore how characteristics of the workplace, including building, design, furniture and equipment, and policies governing their use and allocation, affect individual and organizational effectiveness. Special topics, such as the human implications of new information technology, telecommuting, work at home, are also covered. Visit http://instruct1.cit.cornell.edu/courses/dea/453_653.

DEA 454 Facility Planning and Management Studio
For advanced undergraduates interested in facility planning and management. Purpose is to provide basic tools, techniques, and concepts useful in planning, designing, and managing facilities for large, complex organizations. 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 of 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 design research, unobtrusive and obtrusive data-collecting tools, the processing of qualitative and quantitative data, and effective communication of empirical research findings.

DEA 459 Programming Methods in Design
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 environmental 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 building systems and creation of new methods or techniques are emphasized. Visit http://instruct1.cit.cornell.edu/courses/dea/459_650.

DEA 460 Design City
Fall: 1 credit. S-U grades only. Required fee approx. $150 includes hotel and chartered bus. R P all day, both days. K. Gibson, J. Jennings.
Field study of historic and contemporary interiors with guided tours to architectural and interior design firms, installations, exhibits, and showrooms in New York City, Toronto, or other major cities. Topics and themes change yearly. May be repeated for credit; freshmen may not take course for credit.

DEA 470 Applied Ergonomic Methods
This course covers ergonomic 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 ergonomic 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. W 7:30-10:30. 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 on 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.
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 graduate 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 perceptual, emotional, intellectual, cultural, and environmental blocks to creative thinking and expand the student's repertoire of creative problem solving strategies for use in day-to-day professional practice. Case studies of creative individuals and organizations from a variety of fields are presented.

DEA 648 Advanced Applications in Computer Graphics
Fall. 3 credits. Limited to 18 graduate and advanced undergraduate students. Prerequisites for undergraduates: DEA 302 or permission of instructor. M 4:30-7:30. S. Danko.
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. W. Sims.
A course intended for graduate students who want a more thorough introduction to environmental programming methods than is provided by DEA 459. Each student is required to attend DEA 459 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. See DEA 459 for more detail. Visit http://instruct1.cit.cornell.edu/courses/dea459-650.

DEA 651 Human Factors: Ergonomics-Anthropometrics
Fall. 4 credits. Recommended: DEA 150 and a 3-credit statistics course. T R 8:40-9:55. A. Hedge.
A course intended for graduate students who want a more thorough grounding in human factors than is provided by DEA 325. Each student is required to attend DEA 325 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. See DEA 325 for more detail.

DEA 652 Human Factors: The Ambient Environment
A course intended for graduate students who want a more thorough grounding in human factors considerations than is provided by DEA 350. Each student is required to attend DEA 350 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. For detailed description, see DEA 350.

DEA 653 Planning and Managing the Workplace
Spring. 4 credits. Letter grades only. Purchase of course packet required. T 7:30-10:30 p.m. F. Becker.
Intended for graduate students who want a more thorough grounding in the planning, design, and management of facilities for complex organizations than is provided by DEA 453. Each student is required to attend DEA 453 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. See DEA 453 for more detail.

DEA 654 Facility Planning and Management Studio
Spring. 4 credits. Prerequisite: DEA 459/650 or permission of instructor. Letter grades only. Minimum cost of materials, $200. For graduate students in facility planning and management. T R 1:25-4:25. W. Sims.
For description, see DEA 454.

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 457. Each student is required to attend DEA 457 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. See DEA 457 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. M 3:35-4:25. F. Becker, W. Sims.
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/dea651-659.

DEA 660 The Environment and Social Behavior
Fall. 4 credits. Prerequisite: DEA 150 and written permission of instructor. Field trip fee $65. T R 2:55-4:10. G. Beer.
Intended for graduate students who want a more thorough understanding of the influence of environmental form on social behavior than is provided by DEA 250. Each student is required to attend DEA 250 lectures, meet with the instructor and other graduate students for an additional class each week, and complete additional readings and projects. See DEA 250 for more detail.

DEA 668 Design Theory Seminar
Spring. 3 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 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.

HUMAN DEVELOPMENT

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

HD 115 Human Development
Fall or summer. 3 credits. S-U grades optional. M W F 1:25-2:15. Staff.
Provides a broad overview of theories, research methods, and current knowledge of human development from conception into adulthood. Course material covers infancy, childhood, and adolescence. Topics include biological, intellectual, linguistic, social, and
emotional development as well as the cultural, social, and interpersonal contexts that affect the developmental processes and outcomes of these domains.

**HD 200 Exploring Human Development**

Fall. 1 credit. Letter grades only. Limited to Human Development freshmen. TBA. HD faculty.

This course is a series of small group discussions with HD freshmen and a HD faculty member. Each faculty member sets the topics and style of discussion. Discussion groups meet one hour each week during the fall semester. No exams are given. Grading is done on attendance, participation, and short written assignments.

**HD 216 Human Development: Adolescence and Youth**

Spring. 3 credits. Prerequisite: HD 115 or PSYCH 101 or permission of instructor. S-U grades optional. T R 11:40-12:55.

Staff

Provides a broad overview of theories, research, and issues in the study of human development from early childhood to late adolescence (youth). Attention is focused on the major biological, cognitive, and social changes during adolescence. The psychosocial issues of adolescence, including identity, autonomy, intimacy, sexuality, achievement, and problems, and the contexts in which adolescent development occurs, particularly families, peer groups, schools, work, and popular culture. Empirical research, theories, case studies of the lives of real adolescents, and, to a lesser degree, public policies are discussed.

**HD 218 Human Development: Adulthood and Aging**


S. Cornelius

Provides a general introduction to theories and research in adult development and aging. Psychological, social, and biological changes from youth through late adulthood are discussed. Both individual development within generations and differences among generations are emphasized.

**HD 220 The Human Brain and Mind: Biological Issues in Human Development**

Fall. 3 credits. Prerequisite: HD 115 or PSYCH 101. S-U grades optional. T R 2:55-4:10.

F. Temple

What do we know about the biology of the mind? As long as the 1600's, 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 an introduction to the biology underlying human behavior. After studying basic concepts in neurobiology and neuropsychology, the course covers a variety of topics including how the brain reacts to drugs and hormones, and what happens when it changes. Underlying seeing, hearing, thinking, talking, feeling emotions and desires, and dreaming. We try to understand what is and is not yet understood about the biological mechanisms underlying the human experience. We discuss the biology of clinical disorders throughout. This course gives the background necessary for other courses in HD that focus on biological mechanisms of human development and serves as a prerequisite for many of them.

**HD 230 Cognitive Development**

Spring. 3 credits. Letter grades only. Prerequisites: HD 115 or PSYCH 101. T R 2:55-4:10.

Q. Wang

This course surveys current theory and research on various aspects of cognitive development across the lifespan, with emphasis on infancy and early childhood. Topics include perception, representation and concepts, reasoning and problem solving, social cognition, memory, metacognition, language and thought, and academic skills. Students will develop a broad understanding of the mechanisms involved in cognitive development and learn to critically assess developmental research. The class is structured in a combination of lecture, seminar, and fieldwork.

**HD 233 Children and the Law**

Spring. 3 credits. Prerequisites: HD 115 and an introductory statistics course. TBA.

S. Ceci

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 exposed the need for more training of researchers and judges to bring their work into the courtroom. Students will be responsible for reading and writing about their own childhood and adolescence. This course is designed to give students a humanities perspective on approaches to childhood.

**HD 242 Participation with Groups of Young Children**

Fall or spring. 3 credits. Limited to 20 students (if space allows). Prerequisites: HD 115 and permission of instructor. S-U grades optional. W 1:25-3:50.

J. Ross-Bernstein

This course is designed to integrate developmental theories with supervised experience in child care centers, the intention being to help students develop the ability to understand and relate effectively to young children. The seminar involves preparation, observation, reflection, writing, and sharing of viewpoints. Placements are in local nursery schools, day care centers, Head Start programs, and kindergartens.

**HD 250 Families and the Life Course**

Fall or spring. 3 credits. S-U grades optional. T R 10:10-11:25.

S. Cornelius

This course provides an introduction to social scientific research on family roles and functions in American society. Topics include the history of the family, family change over the life course, and the impact of cultural and economic forces on families.

**HD 251 Social Gerontology: Aging and the Life Course**


S. Ceci

This course analyzes the social aspects of aging in contemporary American society from a life course perspective. Topics to be covered include: (1) an introduction to the field of gerontology, its historical, 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 of gender, ethnicity, and social class; (4) and the influences of society on the aging individual. Guest speakers will provide an introduction to various careers in the field of gerontology.

**HD 253 Gender and the Life Course**

Fall. 3 credits. S-U grades optional. TBA.

S. Cornelius

Not offered 2003-2004. 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**

Fall or spring. 3 credits. S-U grades optional. TBA.


This course investigates 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
This course is concerned with the interrelationships of physical and psychological growth and development in humans during infancy and early childhood. Intrinsically 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
Spring. 4-8 credits. Limited to 20 students (limit depends on availability of placements and instructor). Prerequisites: HD 115 and HD 242; and permission of instructor. Recommended: HD 346. S-U grades optional. T 12:20-2:15. J. Ross-Bernstein.

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. Each student is 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 educational, therapeutic, or special-purpose interventions for them.

HD 352 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 science of interpersonal relationships. Examines the basic nature of human affective 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 roles 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 T R 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, noradrenergine, and serotonin), corticotropic hormone and opiates in determining individual differences in temperament and personality.

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 data collection and analysis, or laboratory or studio projects.


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 does adolescent experience in the United States changed in the past 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 interaction of 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 Psychology of Aging
Fall. 3 credits. Enrollment limited to 25 students. Prerequisites: HD 218, 250, and 251 or permission of instructor. Letter grades only. Offered alternate years. T R 1:25-2:40. S. Cornelius.

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 the naturalness of old age and the right to die. Although these issues are addressed primarily from a psychological viewpoint, interdisciplinary perspectives are considered and incorporated 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 and 251 or permission of instructor. T R 1:25-2:40. Offered alternate years. Not offered 2003-2004. S. Cornbliss.

This course examines 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 selective thinking, 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 433 Developmental Cognitive Neuroscience]
Spring. 3 credits. Prerequisites: one neurobiology class such as HD 220 OR one cognitive psychology/development class. S-U grades optional. T R 1:25-2:40. E. Temple.

What are the brain mechanisms underlying human behavior and cognition? How do those underlying brain mechanisms develop? These are the questions that developmental cognitive neuroscience tries to address and those we explore in this course. The course explores methods used in the field (including brain imaging techniques), recent findings on the development of brain mechanisms underlying human behaviors such as, language, attention, and memory, as well as the brain mechanisms that may underlie various developmental disorders, such as developmental dyslexia, autism, and attention deficit (hyperactive) disorder (AD(H)D). 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 437 and LING 436)]
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HD 653/LING 700, a supplemental graduate seminar. Prerequisites: at least one course in developmental psychology, cognitive psychology, cognitive development, neuropsychology, biology, or linguistics. S-U grades optional. A supplemental lab course is available (HD 437, COGST 450, PSYCH 437, LING 450). T R 2:55-4:10. Not offered 2003-2004. 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 issues of relationships between language and thought that are discussed, as are the fundamental linguistic issues of "Universal Grammar" and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.

[HD 437 Lab Course: Language Development (also COGST 450, PSYCH 437 and LING 450)]

This laboratory course is an optional supplement to the survey course, Language Development (HD/COGST/PSYCH/LING 436). The lab course will provide students with a hands on introduction to scientific research, including design and methods in the area of first language acquisition.

[HD 438 Thinking and Reasoning]

Examines the topics of problem solving, transfer, and creativity; pre-causal and causal reasoning; models of good thinking based on formal logic, pragmatic syllogisms, and probability theory; expert-novice differences; cognition and attitudes; extra-rational and moral 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 accurately 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 439 Cognitive Development: Infancy through Adolescence]

The 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., problems of reasoning) 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 and 348. Recommended: 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 Troubling 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]

This seminar takes an interdisciplinary approach to address the central role of culture in human development. It draws on diverse theoretical perspectives, including psychology, anthropology, education, ethnography, and linguistics, to understand human difference, experience, and complexity. It takes empirical reflections upon major developmental topics such as cultural aspects of physical growth and development; culture and cognition; culture and language; culture, self, and personality; cultural construction of emotion; culture issues of sex and gender; and cultural differences in pathology.

[HD 456 Families and Social Policy]
Spring. 3 credits. Prerequisite: one course in cultural studies of inequality or in sociology. S-U grades optional. T BA. 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. Prerequisite: a course in statistics and one of the following: HD 250, SOC 101, SOC 251, or R SOC 101. Letter grades only. T R 10:10-11:25. Offered alternate years. E. Wethington.

This course critically examines theories and empirical research on the relationships among social group membership, economic status, 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 36 seniors and juniors. Prerequisites: HD 115, HD 250, and a college level statistics course. T R 10:10-11:25. 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 children's development. Particular attention is given to the relevance of mainstream theoretical formulations of African American's parental and familial functioning.
HD 459 Disease in American Culture and Society (also AM ST 430)  
Fall. 4 credits. Limited to 15 students. Prerequisites: HD 241, or HD 258, or HD 359, or permission of instructor required. Not offered 2003–2004. J. Brumberg.  
How a society defines, explains, treats, and tries to prevent disease reveals a great deal about its basic ideals, values, and institutions. Diseases are not simple biological "facts," but the product of a complex amalgam of biological and social forces. This course uses the history of specific diseases to examine: (1) the ways in which the social and cultural environment shape the experience of illness; (2) the ideas that Americans have held about why some people get sick and others do not; (3) how those ideas reflect larger cultural as well as scientific trends; (4) the ways in which power relationships are involved in defining and responding to the threat of disease; (5) and the impact that disease has had on American society. A short response paper must be written for each session. An additional bibliographical essay or research paper will be prepared with the instructor.  
HD 464 Adolescent Sexuality (also FGSS 487)  
Spring. 3 credits. Instructor permission required. T R 10:10–11:25. R. Savin-Williams.  
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 being prepared, 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 common stressors for 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 response to 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 the concepts of 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 483 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 early intervention and family support. Policy-related topics include parental leave, developmentally appropriate practices, universal pre-kindergarten, cultural diversity, parent involvement, and early education 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. S. Cornelius.  
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. Prerequisite: permission of thesis 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.  
These series of courses provides an opportunity for undergraduates to explore an issue, 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 lecture, 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 only open to undergraduates with instructor’s permission.  
General Courses  
[HD 617 Adolescence]  
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 2003–2004. Staff.  
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 640 Infancy  
Fall. 3 credits. TBA. 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, but 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  
Spring. 3 credits. Letter grades only. TBA. 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 2003–2004. Staff. Overview of current theories and empirical research on functional and organically based psychological disorders. Topic areas covered include autism, schizophrenia, anxiety disorders, affective disorders, and personality disorders. Focus is on the developmental and etiology of psychopathology.

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, parent-teen relationships, self-esteem, youth and history, work, and moral development.

HD 633 Seminar in 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 in Infancy
Focuses on selected topics in the development-mental psychology and psychobiology of infancy (including fetal development). Special topics 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.

Individualized Special Instruction
HD 700-899 Special Studies for Graduate Students
Fall or spring. Credits and hours to be arranged. Credits 1-15 (3 hours work per week per credit). S-U grades at discretion of instructor.

HD 701 Practicum
For study that predominantly involves field experience in community settings.

HD 703 Teaching Assistantship
For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

HD 704 Research Assistantship
For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

HD 705 Extension Assistantship
For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

HD 706 Supervised Teaching
4 credits. For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.

HD 806 Teaching Practicum
4 credits. For advanced graduate students to independently develop and teach an undergraduate topics course under the supervision of a faculty member.

HD 899 Master's Thesis and Research
Fall or spring. Credit to be arranged. Credits 1-15 (3 hours work per week per credit). Prerequisite: permission of thesis adviser. S-U grades only.

HD 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. Credits 1-15 (3 hours work per week per credit). Prerequisite: permission of thesis adviser. S-U grades only.

POLICY ANALYSIS AND MANAGEMENT

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, R. Geddes, A. Mathios, W. Rosen. Topics include theory of demand and consumer behavior including classical and indeterminate curve analyses; theories of production and cost; models for the following markets—perfect competition, monopoly, monopolistic competition, oligopoly, and inputs; general equilibrium; welfare economics; public goods; and risk. A section is mandatory.

PAM 204 Economics of the Public Sector
Fall or spring (not taught spring 2004). 3 credits. Prerequisites: PAM 200. S-U grades optional. S. Tennyson, 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. K. Joyner, 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.

Students learn the logic and methods of social science research, as well as how to create researchable questions out of their issues of interest. Readings, written assignments, and

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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.

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Fall or spring. 3 credits. Prerequisites: PAM 210 or equivalent. Sections TBA. J. Kuder, M. Waller.

Students learn the logic and methods of social science research, as well as how to create researchable questions out of their issues of interest. Readings, written assignments, and
in-class exercises focus on stating hypotheses, designing studies and samples to test hypotheses, measuring variables, and simple statistical analysis. PAM majors should take this course no later than their junior year.

**PAM 220 Introduction to Management: Principles and Differences Among Sectors**
Fall. 3 credits. D. Tobias.
This course is a basic introduction to major 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 223 Consumer Markets**

**PAM 230 Introduction to Policy Analysis**
Fall or spring (not taught fall 2003). 4 credits. R. Avery, J. Germer.
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 methodologies 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 the public policy analysis of the consumer, health, and family/social welfare areas and also includes an introduction to the technical skills required to undertake policy analysis.

**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 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 the college registrar's office.
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 values. 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. W. Rosen. 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 public hearings, work on constituent and 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 stipends.

PAM 400-401-402 Special Studies for New Graduates
Fall and spring. Credits to be arranged. S-U grades optional. Staff. For advanced independent study by an individual student for or on an experimental basis with a group of students not otherwise provided through courses offered in the department or elsewhere at the university. Students prepare a monograph 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 responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

PAM 403 Teaching Apprenticeship
Prerequisite: Students must have taken the course (or equivalent) in which they will be assisting and have demonstrated a high level of performance. For study that includes assisting faculty with instruction.

PAM 420 Management Information Systems for the Public Sector
Spring. 3 credits. L. O'Neill. 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 problem of applying IT, the nature of IT, the role of IT in the organization, including ethics, security, and public policy. Students will also become proficient users of Access database software. As an incoming college graduate, each student will be expected to be comfortable with IT, 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
Spring. 3 credits. Prerequisite: ECON 101 and a course in statistics. S. Tennyson. 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 of risk-tradeoffs, and models of decision making under risk. With this background, alternative approaches to risk management are analyzed. The impact of 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 2003-2004. A. Parrot.

PAM 435 The U.S. Health Care System
Fall. 3 credits. R. Battisella. 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 clinics, 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. Not offered 2003-2004. K. Simon. Uses the economic tools of policy analysis to understand the health care system and critical 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 United States as its main institutional framework, but also pays attention to health care topics of international concern, particularly through the group projects in the second half of the semester.

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 presented 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
Spring. 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. The impact of legislative, public, social, or religious policies on the incidence of such violence is considered. Violence against women is committed to protect women's virginity, because women are viewed as property, for political reasons, as hate crimes, and in the name of culture, religion, and tradition. The types of violence discussed in this course include: rape, child sexual abuse, homicide, battering, hate crimes, gay bashing, kidnapping, ethnic cleansing, war crimes, forced prostitution, female genital mutilation, honor killings, public beating, lashing, stoning, torture, female infanticide, trafficking of women, forced abortions, acid attacks, and sati (self-immolation). Each student is required to evaluate the impact of one current policy and critique the potential value of one pending policy relating to violence against women.

PAM 454 Contemporary Issues in Human Sexuality and Research
Spring. 2 credits. Permission of instructor required. A. Parrot. An in-depth seminar in theoretical and applied methodology for the study of human sexuality. Topics covered include current and contemporary issues, educational strategies, policy formation, legal jurisdiction, cultural mores, social attitudes, and individual sexual behavior.

PAM 457 Innovation and Entrepreneurship in the Health Care Industry
Spring. 3 credits. Prerequisite: PAM 435 or permission of the instructor. J. Ruden. 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 473 Social Policy
Spring. 3 credits. Prerequisites: GOVT 111 or SOC (R SOC) 105 or permission of the instructor. S-U grades optional. 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, mental health, and housing. Implications for change and the significance of current 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 may take PAM 499 for up to 15 credits. See Professor Sharon Tennyson for more details.

PAM 547 Microeconomics for Health Policy
Spring. 4 credits. S-U grades optional. Staff.

This course introduces microeconomic theory and its application to decision making in the health care 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.

This course focuses on consumer and ethical issues faced by 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, grant and contract law, and the ethics of transplant surgery and funding, reproductive technology, AIDS research and funding, medical staff privileges; and confidential communications. Courses readings, guest speakers, problems, case studies, and research for term paper/projects will be used to demonstrate important points, which will be reinforced by examples and applications. The course emphasizes the understanding of sound administrative practice and the principles of good medical care. In planning and carrying out the research, students work closely with a skilled practicing administrator and with members of the faculty. 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 diagnoses 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 2003-2004. Staff.

PAM 561 Economics of Health and Medical Care

PAM 562 Health Care Financial Management
Spring. 3 credits. Staff.

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 be used to demonstrate important points, which will be reinforced by examples and applications. The course emphasizes the understanding of sound financial management knowledge and skills 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.

J. Kuder.

Designed to strengthen student's abilities to use the tools of financial management in guiding strategic decisions made in the health care industry. The class does this by 1) expanding and deepening students' knowledge and skills in general financial management and financial risk management, 2) describing and examining the unique features of the health care industry that make the problems, the problems, the problems, 3) the health care industry, and the problems, and 4) the solutions, and 5) by providing the tools of financial management in guiding strategic decisions made in the health care industry. The class does this by 1) expanding and deepening students' knowledge and skills in general financial management and financial risk management, 2) describing and examining the unique features of the health care industry that make the problems, the problems, the problems, and 4) the solutions, and 5) by providing the tools of financial management in guiding strategic decisions.
PAM 567 Health Policy
Fall. 3 credits. K. Simon.
This course addresses major health policy issues and the critical processes that influence them. It focuses in particular 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 legislative and executive processes; the forces involved including economic, social, ethical, and political factors; and key players in health policy, such as special interest groups, lobbyists, public agencies, the press, elected officials, and legislative staff.

PAM 569 Regression Analysis and Managerial Forecasting
Fall. 3 credits. Prerequisite: at least one statistics course. L. O'Neill.
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. Roufael.
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 interpret the annual financial reports of an organization. Collaborative learning, cases, discussions, readings, researches, presentation, speakers, problem solving, videotapes, and lectures are used as teaching pedagogy.

PAM 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. Swidler.
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, habits and other pragmatic logics from anthropology, and concepts such as bureaucracy, power, status, symbolic interaction, and social learning from sociology and psychology.

PAM 603 Experimental, Quasi-Experimental, and Economic Evaluation
Spring. 3 credits. Strongly recommended: background in statistics (e.g., BTRY 601 or equivalent) and micro-economics (e.g., PAM 200, PAM 547 or ECON 639).
E. Peterson.
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 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 Research
Fall. 3 credits. M. Walzer.
Exposes students to several 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 mixing different methods in policy and evaluative work. Topics of non-probabilistic sampling, questionnaire design, scale measurement, and reliability will also be covered.

PAM 605 Economics of Family Policy
Fall. 3 credits. Prerequisite: PAM 604 or ECON 609-610 or consent of instructor.
S-U grades optional. E. Peters.
This course examines household decision making in both single agent and multiple agent (e.g., game theoretical or bargaining) frameworks. The first half of the course focuses on: (1) fertility; (2) household production; (3) and time allocation models of behavior; (4) and intergenerational transfers across households. These kinds of behaviors are more fruitfully studied using multiple 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 for family 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 R SOC 608)
Fall. 3 credits. S-U grades optional. 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 versus period analysis, sources and quality of demographic data, population estimation and projection, and stable population models.

PAM 608 Economics of Consumer Demand (also AEM 670)
Fall. 3 credits. Prerequisite: PAM 200, ECON 315, or concurrent enrollment in one of those, and 2 semesters of calculus. S-U grades optional. C. Ranney.
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 neoclassical theory of demand, quality, complete demand systems, conditional demand, demographic scaling and translating, consumption, and savings. Becker and Lancaster models of demand are introduced.

PAM 611 Social Demography
Fall. 3 credits. Prerequisites: STBTRY 601, SOC 505, or equivalent. Not offered 2003-2004. W. Trochim.
This course considers demographic behavior from a sociological perspective. Topics include fertility, cohabitation, marriage, divorce, inequality, immigration, and health. Close attention is paid to the effects of social policies on demographic behavior. To a lesser extent, this course addresses the effects of social policies and demographic behavior on individual well-being. Although a background in demographic methods is not required, some of the assigned articles are based on these methods.

PAM 616 Strategies for Policy and Program Evaluation
Fall. 3 credits. Prerequisites: PAM 612 and 613 or 617 or equivalent. Not offered 2003-2004. W. Trochim.
Explores current issues of ethics and public policy against a background of theories of ethical behavior. Questions of how public officials and managers of public and nonprofit agencies and private entities 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
Fall. 3 credits. Open to seniors who have had a course in American government and to graduate students. J. Ziegler.
Explores current issues of ethics and public policy against a background of theories of ethical behavior. Questions of how public officials and managers of public and nonprofit agencies and private entities 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 633 Seminar in Pharmaceutical Policy Issues
Fall. 3 credits. S-U optional. S. Tennyson.
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 pharmaceutical policy. Specific topics vary and depend in part on the interests of the invited speakers. Students are required to write critiques of invited papers and a literature review on a selected topic in pharmaceutical policy.

PAM 639 Graduate Microeconomics for Policy Analysis
Spring. 3 credits. Prerequisites: Principles of Economics, Calculus. Priority given to Ph.D. Students. Undergraduates welcome with permission of the instructor. J. Gawley. 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 price and quantity decision-making, the theory of the firm, general equilibrium, welfare economics, monopolies and oligopolies, strategy, and market imperfections.

PAM 640 Consumers, Information, and Regulatory Policy
Fall. 3 credits. Prerequisites: PAM 639 or calculus and intermediate microeconomics. This course examines information problems in markets and how they impact consumers, focusing on market mechanisms and regulatory actions that address those information problems. Topics include consumer decision-making, adverse selection, and principal-agency theory. The course gives an overview of market mechanisms that deal with information issues such as marketing, advertising, warranties, third-party certification, licensing, and self-regulation; the major regulatory institutions that govern consumer policy including the Food and Drug Administration and the Federal Trade Commission; and the way the legal system provides consumer protection. The market for pharmaceuticals is a particular focus. Primary reading material is drawn from economics journals, policy journals, and papers from the Journal of Public Policy and Marketing.

PAM 642 Applied Econometrics II (also ILRLE 742)
Spring. 4 credits. S-U or letter grades. Not offered 2003-2004. Staff. Course covers statistical models for methods 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. Course includes 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.

PAM 760 Challenges and Trends in the Health Services Industry
Fall and spring. 1 credit. S-U grades only. The goal of this 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. Credit to be arranged. For students recommended by their chair and approved by the instructor in charge of independent advanced work. S-U grades optional.

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
A. Lemley, chair; C. C. Chu, director of graduate studies; A. Netravali, director of graduate studies; S. Ashdown, N. Breen, C. Coffman, M. FREY, C. Jirousek, V. D. Lewis, S. Loker, S. K. Obendorf, A. Racine.

TXA 114 Introduction to Computer-Aided Design
Fall, summer 6-week session. 3 credits. Limited to 14 students per section. Priority given to TXA students. S-U grades optional. Minimum cost of materials $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 digital images. Basic Photoshop software commands are introduced. Hands-on demonstrations and studio work. Students develop two-dimensional designs based on historical, cultural, and museum sources for portfolios and display.

TXA 117 Fashion Graphics (Drawing the Clothed Figure)
Spring. 3 credits. Enrollment limited to 21 students. Priority given to apparel design students. Prerequisite: a basic drawing course. Letter grades only. Minimum cost of supplies $125. Lab fee: $50. V. D. Lewis. Students will develop both familiar and unfamiliar methods that will enable them to draw the fashioned body and ancillary expressions of fashion. Drawing is explored as a communicative tool for generating ideas and as a creative tool for image creation.

TXA 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. Augmented by slide presentations, artifacts, video, and an Internet-based electronic textbook, lectures emphasize the varieties of visual expression seen in works of art and design. Social, cultural, and historic interpretations of visual expression are discussed.

TXA 135 Fibers, Fabrics, and Finishes
Spring. 3 credits. S-U grades optional. A. Netravali.

An introduction to fibers, fibrous materials, and dyes and finishes. Special emphasis is given to the use of fibrous materials in apparel, residential and contract interiors, and industrial applications. Topics covered include fiber properties, fabric structure, coloration of fibrous materials, dimensional stability, flammability, product specifications, and performance standards.

TXA 136 Fiber and Yarn Analysis Laboratory
Spring. 4 credits. Limited to 36 students. Students are required to take TXA 135 and TXA 136 concurrently. Letter grades only. 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 an unknown fiber (midterm) and an unknown bi-component yarn (final).

TXA 145 Introduction to Apparel Design
Spring. 4 credits. Limited to 36 students with 18 students per lab section; priority 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 patternmaking and garment assembly.

TXA 237 Structural Fabric Design
Fall. 3 credits. Prerequisite: TXA 135 Recommended: College algebra. S-U grades optional. M. FREY. This course covers the elements of technical fabric design with an emphasis on woven and knitted fabrics. Topics include structure of woven and knitted fabrics, openness, manufacturability, equivalence, and color effects.

TXA 254 Draping
Fall. 4 credits. Limited to 30 students; 15 in each lab. Prerequisite: TXA 125 and TXA 145; one drawing course recommended. Letter grades only. Minimum cost of materials, $125; lab fee, $10. S. Ashdown. This studio course examines the process of creating a three-dimensional garment from the two-dimensional fabric. The principles and processes of draping, advanced flat pattern making, and fitting are studied through projects. Drawing exercises focus on the communication of three-dimensional garments in two-dimensional sketches. Assigned problems require the students to make judgments regarding the design process, the nature of materials, body structure, function, and fashion.

TXA 265 Apparel Patternmaking
Spring. 3 credits. Limited to 50 students. Prerequisites: TXA 114, 117, 125, 145, 264, and TXA 135 (may be taken concurrently). Letter grades only. $250 for fabrics, studio, and portfolio supplies. S-U grades optional. A. Racine. 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-
A project-based course in which students create garments from various stages from concept to final garment. Technical topics covered include flats, specifications, and costing of garments and design. Students learn computer-aided design technologies, communication of technical details, flats, specifications, and costing of garments and how those 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 previous major or institution. Students prepare a multiplicity of description of the study they want to undertake on a form available from the College Registrar's Office. The form is submitted by the instructor directing the study and the department chair. Credit is awarded at 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 major, 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 grades 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 335 and Statistics. S-U grades optional. Lab fee, $15. N. Breen. This course covers evaluation of fibers, yarns, fabrics, and garments, with emphases on the meaning of standards, testing philosophy, quality control, and statistical analysis. Day-to-day tests done in textiles and apparel industry are discussed. Laboratory sections introduce students to various test methods, data generation for analysis, and evaluation.

TXA 436 Fiber Chemistry
Spring. 3 credits. Senior and first-year graduate students. S-U grade optional. Offered alternate years. C. C. Chu. The chemical and physical properties of important fibers, such as cotton, wool, silk, polyesters, nylons, acrylics, polyolefins and spandex, and their polymerization processes are discussed. The general chemical and physical properties of each are given. Degradation reactions for certain fibers such as polyolefins and acrylics are discussed.
TXA 439 Biomedical Materials and Devices for Human Body Repair
Spring. 2–3 credits. 2 credits meets T only; 3 credits meets T and R. Juniors and seniors only. Prerequisites: 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, hearts, joints, 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 125 and a marketing course. S–U grades optional.
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 456 Textiles, Apparel, and Innovation
Fall. 3 credits. Prerequisite: TXA 237. Recommended: TXA 432. S–U grades optional. Field trip fee, $100. Offered alternate years; next offered 2004. 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 lectures, 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. 3 credits. Enrollment limited to 25. Prerequisites: TXA 117, TXA 204, 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 advanced work by graduate students recommended by their chair and approved by the department chair and instructor.

TXA 620 Physical Properties of Fiber-Forming Polymers and Fibers
Spring. 3 credits. Permission of instructor. Offered alternate years; next offered 2005. A. Netravali.
Formation 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 optional. Offered alternate years; next offered 2005. 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 durable 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 the chair of the graduate committee and instructor. Apparel Design faculty.

TXA 639 Mechanics of Fibrous Assemblies
Fall. 3 credits. Prerequisite: solid mechanics or permission of instructor. Offered alternate years. 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 644 Human Factors: Anthropometrics and Apparel
Fall. 3 credits. Open to advanced undergraduate students. Prerequisites: course in statistics and permission of instructor. Offered alternate years. S–U grades optional. S. Ashdown.
Seminar course focusing on the human form and its relationship to clothing. Includes discussion of quantification of body sizes and human variation; historical, cultural, and aesthetic concepts of fit; apparel sizing techniques; national and international sizing systems and standards; impact of sizing systems on various populations (elderly, handicapped, etc.).

TXA 660 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. 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 similar course for graduates. Letter grades only. Offered alternate years. 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 educational 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. Offered alternate years; next offered 2005. S–U grades optional. 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 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
Assoc. Prof., Policy Analysis and Management.
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.
Brannen, Patsy, Ph.D., Cornell U. Prof., Nutritional Sciences, Dean.
Brumberg, 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, Marinella, 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
Cochrane, Moncrieff, Ph.D., U. of Michigan. Asst. Prof., Policy Analysis and Management
Cochran, Moncrieff, Ph.D., U. of Michigan. Prof., Human Development
Cornelius, Steven W., Ph.D., Pennsylvania State U. Asst. Prof., Textiles and Apparel
Danksi, Sheila, M.I.D., Rhode Island School of Design. Assoc. Prof., Design and Environmental Analysis
Deupue, Richard, Ph.D., U. of Oklahoma. Prof., Human Development
Dunifton, Rachel, Ph.D., Northwestern U. Asst. Prof., Policy Analysis and Management
Eckenerode, 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
Green, 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
Hazen, 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
Jirosek, Charlotte, Ph.D., U. of Minnesota. Assoc. Prof., Textiles and Apparel
Joyner, Kara, Ph.D., U of Chicago. Asst. Prof., Policy Analysis and Management
Kanekel, Donald, Ph.D., U. of Chicago. Prof., Policy Analysis and Management
Koslowski, Barbara, Ed.D., Harvard U. Assoc. Prof., Human Development
Laquatra, 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 D., 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
Moenn, 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
Pillemere, 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
Sachsen-Williams, Ritch C., Ph.D., U. of Chicago. Prof., Human Development
Simon, Kosali, 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
Tobias, Donald J., Ph.D., Michigan State U. Assoc. Prof., Policy Analysis and Management
Trockim, William M. K., Ph.D., Northwestern U. Prof., Policy Analysis and Management
Waller, Maureen R., Ph.D., Harvard University. Asst. Prof., Human Development
Wells, Nancy, Ph.D., U. of Michigan. Asst. Prof., Design and Environmental Analysis
Wethington, Elaine, Ph.D., U. of Michigan. Assoc. Prof., Human Development
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
Beckmann, Randi, M.S., Elmira College. Lecturer, Human Development
Breen, Nancy, Ph.D., Syracuse U. Lecturer, Textiles and Apparel
Delara, Thomas, M.B.A., Barry U. Lecturer, Design and Environmental Analysis
Dempster-McClain, Donna I., Ph.D., Cornell U. Sr. Lecturer, Human Development
Gilmore, Rhonda, M.A., Cornell U. Lecturer, Design and Environmental Analysis
Menezes, Jason, M.S. U. of Kentucky. Lecturer, Design and Environmental Analysis
O'Donnell, Mary, Ph.D., U. of Missouri. Lecturer, Policy Analysis and Management
Racine, Anita, Ph.D., Cornell U. Sr. Lecturer, Textiles and Apparel
Rosen, William, Ph.D., U. of California. Sr. Lecturer, Policy Analysis and Management
Ross-Bernstein, Judith, M.Ed., Northwestern U. Sr. Lecturer, Human Development

Roufael, Nazik, Ph.D., Cairo U. Lecturer, Policy Analysis and Management
Segal, Harry, Ph.D., U. of Michigan. Sr. Lecturer, Human Development
Waldron, Kristine, M.A., Syracuse U. Lecturer, Policy Analysis and Management
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

Industrial and Labor Relations

Degree Programs

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<td>M.S.</td>
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SCHOOL OF INDUSTRIAL AND LABOR RELATIONS

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 new 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 14853-3901.

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 industrial and labor relations systems and labor markets in other parts of the world. Countries include those in Western Europe, as well as 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 faculty 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 provided advising 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 assistance 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.

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 solving as interns in congressional offices, labor organizations, personnel offices, and state and federal agencies. For more information, see “Special Academic Programs,” below.

Study abroad 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.

Study in Absentia
Registration in absentia enables a student to seek admission in another American institution for a semester or a year and transfer credit toward completion of the Cornell degree. This study option requires the development of a plan of study, a statement of appropriate reasons for study away from the university (e.g., availability of courses not offered at Cornell), academic standing, approval of the plan by the dean of student services, and payment of a special in absentia registration fee.

Leave of Absence or Withdrawal
If a student desires to withdraw or to take a leave of absence from the university, an interview should be scheduled with a counselor in the Office of Student Services. Counselors will assist students in petitioning for approval of a leave of absence and in contacting the appropriate offices or departments of the university.

REQUIREMENTS FOR GRADUATION
To earn the Cornell Bachelor of Science degree in industrial and labor relations, the student must successfully complete 120 credits. This requires eight terms for an average of 30 credits a year although some students accelerate their studies.

Freshman Year
Fall Semester
Freshman Writing Seminar 3
Introductory Microeconomics (ECON 101) 3
History of American Labor: Nineteenth Century (ILRCB 100) 3
Introduction to Micro Organizational Behavior and Analysis: The Social Psychology of the Workplace (ILROB 170) 3
ILR Colloquium (ILRID 150) 1
Elective 3 16

Spring Semester
Freshman Writing Seminar 3
Introductory Microeconomics 102 3
History of American Labor: Twentieth Century (ILRCB 101) 3
Introduction to Macro Organizational Behavior and Analysis (ILROB 171) 3
Elective 3 15

Physical Education, fall and spring

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 (ILHR 260) Fall
Elective 3 15

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.

Minimum of 9 credits for Internship (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 nine 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 three 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 College of Architecture, Art, and Planning; the College of Arts and Sciences; the Johnson Graduate School of Management; the College of Engineering; and the School of Hotel Administration) must pay for each credit taken in excess of 34, whether or not the courses are passed. For the precise fee per credit, students should call the Office of the Bursar.

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 was not 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 requirement 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 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 hamper 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 coursework, 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 3.5 or better; for sophomores of 3.4 or better; and for juniors and seniors of 3.6 or better;
2) a minimum course load of 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 eight 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 reenroll at the end of any term when 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) to achieve 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 four 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 equity 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 several special academic programs. For additional information, students should contact a counselor in the Office of Student Services. Counselors will explore the program with students to help them decide if it suits their interests.

Five-Year Master of Science Degree Program

With early planning it is possible to earn the M.S. degree in a fifth year of study. This program is designed specifically for those who wish to concentrate study in an area of specialization in the school for a Master of Science degree. Students considering this program should consult a counselor in the Office of Student Services after their freshman year.

Internships

The Credit Internship Program has provided students with a vivid understanding of problems in labor and industrial relations through observation and participation in "real-life" labor problem solving. A number of selected students spend a term of their junior year in Albany, New York City, or Washington, D.C., in close contact with practitioners. Their activities include independent research under direction of ILR faculty members and seminars drawing on fieldwork experience with employers, labor organizations, and government agencies. More information about this program is available from the Office of Student Services.

Honors Program

Undergraduates who are ranked in the top 20 percent of their class at the end of the junior year may propose a two-semester research project, an honors thesis, for review by the Committee on Academic Standards and Scholarships. When approved, the candidate for graduation with honors works for two semesters (three credits in each term) to research, write, and then defend the thesis.

Study Abroad

Cornell students with strong academic records and the necessary preparation in required and elective courses are encouraged to consider study abroad. The university currently has contact with universities in more than 40 countries that permit undergraduates to register for courses while maintaining Cornell registration and financial aid for a semester or a year. Information about those opportunities may be requested from Cornell Abroad, 474 Uris Hall. Some study abroad programs require the development of language proficiency and preparation in appropriate courses at Cornell. Students should consult the Office of Student Services and Cornell Abroad in the freshman and sophomore years to be sure that they comply with the academic and procedural requirements for study abroad.

COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY


ILRBC 100 Introduction to U.S. Labor History: Nineteenth Century

Fall. 3 credits. J. Cowie, C. Daniel, I. DeVault, N. Salvatore. This first semester of a two-semester sequence covers the major changes in the nature of work, the workforce, and the institutions involved in industrial relations in the United States through the end of the nineteenth century.

ILRBC 101 Introduction to U.S. Labor History: The Twentieth Century

Spring. 3 credits. Prerequisite: ILRBC 100. J. Cowie, C. Daniel, I. DeVault, N. Salvatore. This second semester of a two-semester sequence covers the major changes in the nature of work, the workforce, and the institutions involved in industrial relations in the United States from the end of the nineteenth century up to the present.

ILRBC 201 Labor and Employment Law

Fall and one section in spring. 3 credits. M. Gold, J. Gross, R. Lieberwitz, 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 role 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," occupational safety and health, and union democracy. Also serves as an introduction to judicial and administrative systems.

ILRBC 300 Collective Bargaining

Fall and spring. 3 credits. M. Cook, H. Katz, S. Kuruvilla, L. Turner. A comprehensive introduction to industrial relations and collective bargaining in the United States; the negotiation, scope, and day-to-day administration of contracts; the major substantive issues in bargaining, including their implication for public policy; industrial conflict; the major challenges facing unions and employers today; U.S. industrial relations in international and comparative perspective.

ILRBC 301 Labor Union Administration

Fall. 3 credits. Staff. Study and analysis of the structure and operations of American unions, including the complicated internal life of the organizations, the varied environments in which unions develop and grow or decline, the relationship of national unions, local unions, and members in the many different sections of internal union government; the ways in which unions are set up to handle organizing, collective bargaining, contract administration, and political activity; and the widespread movement toward merger and consolidation of unions 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.

ILRBC 302 Strangers and Citizens: Immigration and Labor in U.S. History

Fall or spring. 3 credits. J. DeVault. This course explores immigrant workers' experiences in the nineteenth and twentieth centuries from different perspectives. Students examine what it meant to the immigrants themselves to arrive as strangers in the United States while also examining the ways in which 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.

ILRBC 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 sit-coms to understand the ideological and political influences on our pre-conceptions of workers, and how those forces influence our notions of authenticity, the historical experience, and the politics of social class.

ILRBC 304 Seminar in American Labor and Social History

Fall or spring. 4 credits. Permission of instructor. C. Daniel, I. DeVault, N. Salvatore. An undergraduate seminar whose topic changes depending on semester and instructor.

ILRBC 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.

ILRBC 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 decline of organized labor, the rise of industrial restructuring, the decline of organized labor, 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 organization in the context of changing government-business relations. Students examine distinctive features of American business development—such as the preeminence of "big business," corporate governance by managerial hierarchies, and the multinational scope of corporate operations—by exploring the circumstances of their creation, the private-sector limits of their reach, and their consequences for economic development and industrial relations.

ILRCB 384 Women and Unions (also WOMNS 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 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 included are the changing nature of work; political organization and the rise of Jim Crow; protest, accommodation, and separatism; and the continued evolution of black social and cultural expression after slavery.

ILRCB 386 African American Social History, 1910-The Present: 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 to the civil rights movement. 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: undergraduates, ILRCB 201 and 300; graduate students, ILRCB 500 and 501.
K. Bronfenbrenner.
Explores various aspects of unions' attempts to organize workers: including why some workers join unions and others do not; strategy and tactics implemented by unions and management during organizing campaigns; the 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: Volunteelism and Philanthropy
Spring. 3 credits. Prerequisites: junior or senior or permission of instructor. M. Gold.
The philosophy, practice, economics, and law of volunteering labor and donating money.

ILRCB 404 Contract Administration
Fall. 3 credits. Prerequisites: ILRCB 500 and 501 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 by-laws from a diversity of national and local public and private sector agreements, the course examines how U.S. unions represent their members in different industries and different collective bargaining environments.

ILRCB 407 Contempories Trade Union Movement
Spring. 3 credits. Prerequisites: undergraduates, ILRCB 100, 101; graduate students ILRCB 502. R. Sebber, R. Hurd.
An examination of contemporary trade union issues, including union power, political action, collective bargaining agreements, and organizing efforts. The course covers the structural, functional, and strategic aspects of contemporary unions. Speakers from the union movement will address the class.

ILRCB 408 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, random drug testing of employees, affirmative action, discipline for off-duty conduct, whistle-blowing, worker safety and cost/benefit analysis, comparable worth, strikes by employees providing crucial services, and crossing a picket line.

ILRCB 408 Liberty and Justice for All
Fall or spring. 3 credits. Prerequisites: junior or senior or permission of instructor. M. Gold.
Major theories of ethics are examined, then applied to contemporary issues such as affirmative action and reverse discrimination, the right to life (from abortion to capital punishment), comparable worth, and constitutional rights such as freedom of speech.

ILRCB 495 Honors Program
Fall and spring (yearlong course). 3 credits each term.
Average term restrictions to the ILR senior honors program may be obtained under the following circumstances: (a) students must be in the upper 20 percent of their class at the end of their junior year; (b) an honors project, entailing research leading to completion of a thesis, must be proposed to an ILR faculty member who agrees to act as thesis supervisor; and (c) the project, endorsed by the proposed faculty sponsor, is submitted to and approved by the Academic Committee on Academic Standards and Scholarships.

ILRCB 497-498 Internship
Fall or spring. 3 credits. Prerequisites: ILRCB 497, 498, 6 credits.
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before permission for approval by the director of Off-Campus Credit Programs. Upon approval of the internship, the Office of Student Services will register each student for 497, for 3 credits graded A+ to F for individual research, and for 498, for 6 credits graded S-U, for completion of a professionally appropriate learning experience, which is graded by the faculty sponsor.

ILRCB 499 Directed Studies
Fall and spring. 3 credits.
For individual or group research projects conducted under the direction of a member of the ILR faculty, in a special area of labor relations not covered by regular course offerings. Sophomores, juniors, and seniors with a preceding semester of 3.0 term average, are eligible to submit projects for approval by the Academic Standards Committee. Students are recommended to consult with a counselor in the Office of Student Services at the time of CourseEnroll in order to arrange for formal submission of their Directed Study.

ILRCB 500 Collective Bargaining
Fall. 3 credits. Open only to graduate students. Recommended: ILRCB 501 taken previously or concurrently. M. Cook, H. Katz, S. Kuruvilla, L. Turner.
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 strategies; the 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. Compesa, M. Gold, R. Lieweke, 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
A study of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of a mock arbitration hearing, preparation of arbitration opinions and post-hearing briefs.

ILRCB 604 Theories of Equality and Their Application in the Workplace
Fall or spring. 3 credits. R. Lieberwitz. An examination of the various aspects of equality in the workplace, focusing on issues of race, gender, and national origin, and the ways in which societal discrimination on these bases is 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, 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: seniors, 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; 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 unemployment law, work, 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 examine issues such as: discrimination; law, economics, and the state; work and business; power, conflict, and protest; and rights and justice.

ILRCB 608 Collective Bargaining Simulation
Fall. 3 credits. Open only to juniors, seniors, and graduate students. Limited to 14 students. One evening extended examination period. The course provides an opportunity for students to participate in a simulated negotiation, set in a hypothetical company and union environment for a moderately sized bargaining unit, either as members of a management or a union team. The course stresses the process of negotiations over their outcome. Negotiation problems are highly realistic, with attention given to dynamic legal, economic, political, and communication concerns. Participants plan for negotiations, cost proposals, negotiate contract language; and bargain wages, benefits, and other economic items, in the context of a company and union with an established contract, history, policies, and culture (which are supplied by the course leaders). Students are required to read, "Game, Set, Match—Winning the Negotiations Game," but the primary thrust is on using practical methods for the negotiation process. This is a participation-based hands-on course. Students wishing merely to observe should not take this program. There is a group planning paper requirement. This course is recommended for graduate and undergraduate students who have taken or who are taking collective bargaining and labor law. Participants are required to adhere to high standards for "completed staff work."

ILRCB 609 Special Topics: Labor Law Policy Seminar
Spring. 3 credits. K. Stone. The United States' collective bargaining system, which had its origins during the New Deal period, has come under intense attack. The intellectual premises of the system have been challenged by scholars on both the right and the left, and at the same time the decline in the labor movement has undermined its political support. This seminar looks at the theoretical attacks on the New Deal collective bargaining system and at some of the current proposals for its replacement. Among the topics to be discussed are: the theory of regulation embodied in the National Labor Relations Act and its critique; alternative concepts of labor markets and their policy ramifications; the emergence of the global economy and its ramifications for domestic labor regulation. There are also discussions of alternative systems of labor regulation, such as is found in West Germany, Sweden, and Japan.

ILRCB 650 Service Work and Workers in Historical Perspective
Fall or spring. 3 credits. J. DeVault. Takes a historical perspective on the development of a service economy in the United States. Readings include general and theoretical works, but the main focus is recent historical scholarship on specific occupations and situations in the "nonproductive" workforce. Students explore primary sources for research on the subject and write research papers.

ILRCB 651 Industrial Relations in Transition
Spring. 3 credits. Limited to seniors and graduate students. H. Katz. Considers whether recent developments such as concession bargaining, worker participation...
programs, and the growth of nonunion firms represent a fundamental transformation in industrial relations practice. Reviews recent research and new theories arguing that such a transformation is occurring, including the work of Peter Drucker, Bluestone and Harrison, and Kochan, McKersie, and Katz. Also reviews the counterarguments and evidence put forth by those who believe no such transformation is under way. Course material focuses on industrial relations practices in the private sector in the United States, although some attention is paid to developments in Western Europe, the United Kingdom, and Japan.

ILRCB 655 Employment Law I
Fall. 3 credits. Prerequisites: ILRCB 201, 501, or permission of instructor. Classroom presence and participation are mandatory. This course can be taken either before or after ILRCB 656. There are considerable reading responsibilities. L. Adler.

The approach taken is similar to ILRCB 656, but the subject matter differs. The subject studied include employment at will and its exceptions; the role of the Constitution in the U.S. workplace; the law of electronic and traditional privacy at work; and the slowly evolving rights of contingent workers in the old and new economies. One study primarily reviews federal and state court decisions and focuses upon the way that employees' rights are advanced or constricted by law.

ILRCB 656 Employment Law II
Spring. 3 credits. Prerequisites: ILRCB 201, 501, or permission of the instructor. Classroom presence and participation are mandatory. This course can be taken either before or after ILRCB 655. L. Adler.

The approach taken is similar to ILRCB 655, but the subject matter differs. The areas covered include the meaning and validity of pre-employment bargaining agreements; the critical distinctions in the status and thus the rights of employees, independent contractors, and contingent workers; what rights the working poor, the homeless, and workforce individuals have on the "job," and the origin and application of the workers' compensation laws that apply when people are injured or contract disease from their work. One study primarily reviews federal and state court decisions and focuses upon the way that employees' rights are advanced or constricted by law. There are considerable reading responsibilities.

ILRCB 661 International Labor Law
Spring. 3 credits. Prerequisites: undergraduates, ILRCB 201; graduate students, ILRCB 501. Will fulfill ILRC distribution requirement for undergraduates. L. Compa.

Examines labor rights and labor standards in a world economy regulated by bilateral and multilateral trade agreements, in a context of sharp competition among countries and firms. Course readings and discussions will focus on the intersections of labor, human rights, and international trade law and policy in this new global economic context. A prior course in a related topic may be helpful for the course but is not required—the first classes are meant to establish a foundation in each area. While labor law is a unifying theme, the course is more policy-oriented than legalistic. After the introductory classes on labor rights, human rights, and trade, we will turn to a series of topics that reflect the links between labor rights and trade.

ILRCB 662 Seminar in Labor Relations Law and Legislation
Fall or spring. 3 credits. Limited enrollment. Prerequisite: permission of instructor.

This course covers legal problems in public employment and other areas of labor relations affecting the public interest.

ILRCB 663 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, N. Salvatore.

Areas of study are determined each semester by the instructor offering the seminar.

ILRCB 664 Employment Discrimination and the Law
Fall or spring. 3 credits. Prerequisite: ILRCB 201/501 or equivalent. M. Gold, R. Lieberwitz.

An examination of the laws against employment discrimination based on race, color, religion, sex, national origin, age, and disability.

ILRCB 665 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 666 Collective Bargaining in the Public Sector
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 300 and 201; graduate students, ILRCB 500 and 501. Staff.

An examination of the development, practice, and extent of collective bargaining between federal, state, and local government 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 along with implications of collective bargaining for public policy and its formulation.

ILRCB 667 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 utilize 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 provide an introduction to a number of both quantitative and qualitative research techniques utilized 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 utilized 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.

ILRCB 668 Labor Law
Fall or spring. 3 credits. Limited to 20. J. R. Lieberwitz.

This course covers legal problems in public employment and other areas of labor relations affecting the public interest.

ILRCB 669 Constitutional Aspects of Labor Law
Fall or spring. 3 credits. R. Lieberwitz.

In-depth analysis of the constitutional decisions that interpret the United States Constitution as it applies in the workplace. This course 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 ILROB 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 apply the appropriate role for theory and empirical analysis in moving research in collective bargaining toward a more analytical perspective, and to identify and appraise the underlying paradigms used to study collective bargaining-related issues.

ILRCB 705 The Economics of Collective Bargaining
Spring. 3 credits. Prerequisites: ILRCB 500, ILLRF 540 (or their equivalents) and an understanding of multiple regression analysis; or permission of instructor. Staff.

Focuses on both the economic analysis of unions and collective bargaining in our economy and on the economic forces that affect collective bargaining. The method is to identify and conceptualize the structural determinants of relative bargaining power. On this basis, the course examines both the economic outcomes of collective bargaining and current bargaining trends in a variety of industries. Tentative theoretical analyses of unionism (neo-classical, institutionalist) are compared. The course will also discuss the statistical and empirical results of research on the union effect on economic outcomes (wages, prices, inflation, profits, productivity, earnings inequality) are also evaluated. The effect of technology, corporate structures, and public policy on union bargaining power is outlined, and a number of case studies of collective bargaining in the private sector are reviewed. A term paper is required.

ILRCB 706 Labor in Global Cities
Fall. 3 credits. L. Turner.

This class will grow out of research Prof. Turner is conducting that targets selected cities to assess labor market revitalization by looking at politics, organizing, coalition building, etc., in selected urban contexts. Each student will choose a city of particular interest (for MLR students particular purposes as well) and become an expert on that city's key unions, key political actors, and corporations. The idea will be to develop overall pictures of new union vitality (if and when it exists) based not only on particular unions, industries, and nations but also on regions, coalitions, and local politics. In addition to the empirical research focus, Ph.D.
students can address major theories of industrial relations and comparative political economy, while MILR students can look at union career ladders in their particular urban regions. Following career ladders will bring MILR students with key labor leaders and allow them to explore whether labor movement revitalization (or its absence) is associated with new career ladders and different kinds of jobs for labor activists and/or careerists.

ILRRCB 708 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 reference disciplines (such as social psychology, sociology, and economics) are presented through lectures and readings, this course focuses primarily on improving practical skills. Class participants not only learn to enhance their individual abilities in dyadic and group situations, but also learn to analyze contexts for the most effective application of these skills.

ILRRCB 783 Seminar in American Labor History (also HIST 683)
Fall and spring. 3 credits. Graduate students only.
Permission of instructor required. N. Salvatore.
This course explores the relationship of a scholarly biographical writing to the field of American social history. More and more historical biographies look to incorporate social analyses at the center of their biographical structures. Students read, discuss, and analyze the varied strengths and weaknesses of a number of these efforts. The author's understanding of the play between biographical subject and the larger social context, and its meaning for the structure of the book, are a point of inquiry that encourages numerous approaches and interpretations.

ILRRCB 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.

ILRRCB 798 Internship
Fall and spring. 1-3 credits. Staff.
Designed to grant credit for individual research under direction of a faculty member by graduate students who have been selected for an internship. All requests for permission to register for ILRRCB 798 must be approved by the faculty member who will supervise the project.

ILRRCB 799 Directed Studies
Fall and spring. Credit TBA.
For individual research conducted under the direction of a member of the faculty.

ILRRCB 880 Workshop in Collective Bargaining, Labor Law, and Labor History
Fall and spring. 2 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
L. Dyner, chair; R. Batt, B. Bell, J. Bishop, J. Boudreau, V. Briggs, C. Collins, L. Nishii, Q. Roberson, S. Snell, W. Wasmuth, P. Wright

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 concept 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. Homighouse.
Provides basic skills in the use of personal computers using the Windows environment. Course covers the basics of Lexis Nexis, 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, J. Bishop.
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. The course explores programmatic issues pertaining to such groups as youth, disabled, and rural workers. It also covers policies issues pertaining to welfare reform, direct job creation, worker relocation, economic development, targeted tax credits, and prices operating in those regions.

ILRHR 362 Career Development: Theory and Practice
Fall. Spring. 2 credits. 7 weeks. Limited to 30. S-U only. L. Gasser.
Covers the components of career management, individual factors and organizational realities in the development of both careers and organized programs for career management. Two complementary learning tasks are required, information-gathering for career decision making based on self-assessment activities, and comprehension of organizational circumstances and practices encountered as careers develop. Grades are based on short writing assignments and a research paper.

ILRHR 367 Employee Training and Development
Fall. 3 credits. Prerequisite: ILRHR 260. B. Bell.
Faced with increasing competition, globalization, technological complexities, and dynamic labor markets, firms are increasingly struggling to determine the best approaches to training and developing their workforces. This course provides an introduction to the issues, concepts, and processes with which they are wrestling, as well as specifics on planning, designing, implementing and evaluating training and development programs. After completing this course, participants should be able to conduct a needs assessment, evaluate employee readiness, evaluate the strengths and weaknesses of various training and development techniques, solve transfer of learning problems, and design evaluation procedures.

ILRHR 456 International Human Resource Management
Fall. 3 credits. Prerequisite: ILRHR 260 or equivalent. L. Nishii.
Provides an examination of international human resource management issues in multinational enterprises. The course has two major objectives: to enhance understanding of key strategic and functional issues related to IHRM, and to develop analysis of practical IHRM issues in multinational enterprises. Includes topics such as strategic issues for IHRM cross-cultural management issues, coordination issues, and expatriate management.

ILRHR 460 Human Resource Strategies for Entrepreneurial Firms
Spring. 3 credits. Open to juniors and seniors. Prerequisites: 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 emphasis for the course is on the integration of concepts, application to real-life business situations, and the acquisition of general management skills and knowledge.

ILRHR 461 Working in the New Economy
Spring. 3 credits. R. Batt.
Draws on qualitative studies of the workplace to examine how workers and managers are affected by changes in technologies, business strategies, labor markets, and other external...
ILRHR 468 Human Resources Management Simulation
Spring. 2 credits. Limited to 30 juniors and seniors. Prerequisite: ILRHR 260 or equivalent. 7 weeks. W. Wasmuth. Uses a simulation open-systems approach as means to enhance students' skills in strategic planning and managerial decision making. Attention is given to the implications and efforts of strategic human resource management and is 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 required.

ILRHR 469 Immigration and the American Labor Force
Fall. 3 credits. V. Briggs. Assesses the role that immigration policy plays as an instrument of resource development in the United States. Immigration policy will be placed in an evolutionary context but primary attention will be given to the post-1965 revival of mass immigration. In addition to legal immigration policies pertaining to illegal immigration, border communities, "maquiladoras," refugees, asylees, and nonimmigrant workers are also examined. Comparisons are also made with immigration systems of other nations.

ILRHR 470 Organizational Behavior
Fall. 4 credits. Prerequisites: ILRHR 260/560 or equivalents, plus at least two courses in education. Prerequisites: ILRHR 260/560 or equivalents. Offered in the context of the course. Students will prepare background papers on the speakers, their companies, and their topics. Course participants will discuss these papers before the visits, the teams will revise their background papers into white papers that reflect insights picked up during the class sessions as well as in informal meetings with the CHROs.

ILRHR 495 Honors Program
Fall and spring (yearlong course). 3 credits each term. For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 497-498 Internship
Fall and spring. 3 and 6 credits. For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 499 Directed Studies
Fall and spring. For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 560 Human Resource Management
Fall and spring. 3 credits. Open to graduate students only. B. Belle. 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.

ILRHR 565 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 will critically examine 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 that will be 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 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 limited to 30. L. Dyer. Offers students an opportunity to learn about strategic business and human resource issues from the perspectives of senior HR executives. During the course of the semester, five chief human resource officers (CHROs) representing various segments of the economy will meet with the class for lively give-and-take sessions on subjects of topical interest to their organizations. Teams of students will host the CHROs. Before the visits, the teams will prepare background papers on the speakers, their companies, and their topics. Course participants will discuss these papers before the visits to assure readiness to address the issues at hand when the CHROs arrive. After the visits, the teams will revise their background papers into white papers that reflect insights picked up during the class sessions as well as in informal meetings with the CHROs.

ILRHR 661 Applied Personal and Organization Development
Fall. 3 credits. Seniors and graduate students. C. Warzinski. An experiential course that deals with OD and its role in the organizational change process. Combines the opportunity for hands-on practice in a workplace setting. Students are responsible for researching and writing a paper that examines a specific method, technique, or critical issue; preparing an in-class demonstration/presentation illustrating applications of a chosen subject; and completing a final project requiring a comprehensive proposal that describes an appropriate and logically supported intervention strategy.

ILRHR 662 The Agile Enterprise: Exploring the Dynamics of Marketplace and Organizational Agility
Fall. 4 credits. Prerequisites: ILRHR 260/560 and additional course work in business and human resource strategy. L. Dyer.
increasingly, dynamic external 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. this includes thinking about the agile enterprise one thing, 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.

ILRR 664 e-HR: Human Resource Management and the WEB in the Information Age
Fall. 3 credits. J. Boudreau, S. Basfsky.

teaching designed to teach students skill-based techniques in human resource methodology. students are taught to act as their own consultants in both a classroom and workforce setting as they access data and find statistical information to support their research topics. the first five weeks of the semester consist of weekly meetings with the reference librarians at the Martin P. Catherwood Library. these meetings cover a different research technique each week, and students are given readings and a hands-on assignment to gain practical experience on these techniques.

ILRR 665 Business Strategy and Human Resources
Fall. 4 credits. Limited. Prerequisite: ILRR 260/560 plus 3 other courses in human resource studies and permission of instructor. P. Wright.

As the 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 enable students to 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.

ILRR 666 Strategic HR Metrics
Fall. 4 credits. Prerequisites: ILRR 260/560 or equivalent, one course in statistics, one elective in human resource studies. J. Boudreau.

Human resources are important organizational assets (just as capital, raw materials, and energy are). Recognizing this requires that human resource managers, labor leaders, 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 will introduce the concepts of persuasion, decision-making, and, as a part of a vision, will explore how to measure the relevant costs and benefits for human 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.

ILRR 667 Diversity and Inclusion in Organizations
Spring. 4 credits. Prerequisites: ILRR 260/560 or equivalent and permission of instructor. Q. Roberson.

Designed to explore diversity management and practices for inclusion in business organizations. The primary goals of the course are to increase students' knowledge of strategic and tactical uses of HR practices and policies to effectively manage organizational diversity issues. 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 enhance bottom-line outcomes. Successful projects for students in developing sensitivity to differences among people and to the importance of promoting fair treatment among all employees.

ILRR 668 Staffing Organizations
Spring. 3 credits. Prerequisites: ILRR 260/560 and one course in statistics or permission of instructor. C. Collins.

Seminar providing an overview of the processes by which the organization staffs positions with both internal and external applicants. Because staffing is one of the primary human resource activities, the course is critical for human resource professionals to understand how to staff 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, contexts and measurement of staffing effectiveness, job/competency analysis, human resource planning, recruitment and job choice, and internal and external selection practices.

ILRR 669 Managing Compensation
Spring. 4 credits. Limited to 50 students. Prerequisites: ILRR 260/560 or equivalent, one course in statistics, and permission of instructor. G. Milkovich.

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.

ILRR 690 Comparative Human Resource Management
Fall. 3 credits. Prerequisites: ILRR 260/560 or permission of instructor. L. Nishii.

Surveys human resource practices in two key regions of the world: Western Europe and the Pacific Rim. The focus is on HR issues related to managerial, professional and managerial workforce, such as selection and staffing, development, and appraisal and reward systems. Special attention is given to current changes and trends in the human resource management area (e.g., privatization of Europe, transformation of Japanese firms). Implications for multinationals operating in these countries are also discussed.

ILRR 692 Training the Displaced and Disadvantaged
Spring. 3 credits. Prerequisite: permission of instructor. J. Bishop.

Examines public and private efforts to lower unemployment and underemployment of displaced and disadvantaged workers. The seminar examines the scope of the problem, its causes, and why specific programs have worked and others have not. Topics covered include training for displaced workers, rehabilitation of the disabled, job-search training, tax credits for hiring, vocational training, literacy instruction, EEO, public service employment, assisting new businesses, and industrial policy. The seminar also investigates how the structure of the economy influences the ability of targeted training and job creation to achieve sustained reductions in unemployment and draws lessons from the experience of other societies.

ILRR 693 Training and Development in Organizations
Spring. 3 credits. Prerequisites: ILRR 260/560 or equivalent, one course in statistics or permission of instructor. B. Bell.

The purpose of this course is to acquaint students with aspects of learning in organizations. We begin with the 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.

ILRR 694 Competing in Services
Fall, spring. 4 credits. Prerequisite: HR 560 or equivalent and consent of instructor. B. Batt.

Examines alternative service management strategies and outcomes, with particular focus on customer relationship management. Priority is given to analyzing the relationship between business strategy, service delivery, 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.

ILRR 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 progress is changing the nature of work and what this implies for reform of education and training; why United States productivity has increased so little in the past two decades; how education and training can contribute to growth and competitiveness; why educational achievement has declined; and how the responsibility for education and training should be apportioned among individuals, firms, private nonprofit organizations, and government.

ILRR 696 Knowledge Management
Fall. 3 credits. Open to seniors and graduate students. S. Smell.

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 individual (e.g., competitive challenges, core competencies) as well as the employees (e.g., psychological contracts, employment relationships). Ultimately, the goal is to integrate these views to develop a framework to the organization and the individual maximize value. Also explores the processes that 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 East Asia (with special emphasis on math and science education) and of the effects of these institutions on productivity, growth, and equality of opportunity. The institutions studied include primary and secondary education, apprenticeship, employer training, and higher education. Data on the consequences of policies are presented and an effort made to understand how human resource policies and institutions have contributed to the rapid growth and low levels of inequality in Europe and East Asia. An important focus of the course is understanding the causes of the low levels of achievement of American high school students relative to their counterparts abroad.

ILRHR 699 Advanced Desktop Applications
Spring. 1 credit. Letter grade only. Prerequisite: ILRHR 266 or significant experience (2-4 years) using office applications. C. Hornighouse. 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 find most useful and relevant in the job market. Examples of areas include working with tables, columns, or sections in Word, pivot tables in Excel: taking a PowerPoint presentation “on the road;” and using join tables to create relationships in Access.

ILRHR 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. research seminar examining the evolution of the literature on the organization of work, group effectiveness, teams, and social capital, including recent critical and international perspectives. It reviews alternative theories and evidence from industrial engineering, I/O psychology, social psychology, organization studies, sociology, economics, and industrial relations. Outcomes for firms and employees are debated.

ILRHR 765 International Compensation
Spring. 4 credits. G. Milkovich. 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 from sociology, economics, psychology, and other disciplines. Four operative terms are seminar, comparative, compensation, and organization. Students should come to each session prepared to be active players in discussions. The focus is comparative, including research, theory, and practices of specific enterprises in different countries. Compensation includes all forms of pay including cash, benefits, allowances, and so on. Primary focus is at the organization level of analysis.

ILRHR 769 Topics in International Compensation Theory and Research
Spring. 4 credits. Prerequisite: ILRHR 669. G. Milkovich. Examines recent developments in theory, research, and practice related to compensation. Discussion emphasizes the relevance of theory and research to compensation decision making. Students examine compensation and reward-related theories and research from supporting disciplines such as economics, psychology, sociology, and organizational behavior and evaluate their relevance to employee managerial, executive, and international compensation.

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 798 Internship
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 799 Directed Studies
For description, see the section on 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. The workshop is designed to provide 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 Human Resource Studies Program 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 providing 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 Strategic HRM, 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. 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


ILRIC 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, antiwar, and campus coalitions for domestic reform and global justice.

ILRIC 337 Special Topics
Fall. 3 or 4 credits. 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.

ILRIC 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 both 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.

ILRIC 499 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRIC 533 Politics of the Global North
Fall. 4 credits. Graduate students only. L. Turner.
See description for ILRIC 333. Graduate students also submit an analytical term paper at the end of the semester.

ILRIC 537 Special Topics
Fall or spring. 3 or 4 credits. Not offered 2003–2004. 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.

ILRIC 631 Comparative Labor Movements in Latin America
Fall. 3 credits. G. Fields. Examines the historical development of labor movements in Latin America, their role in national political and economic development, and the impact of economic liberalization, authoritarianism, and redemocratization on contemporary labor relations in the region. Countries examined will include, but are not limited to, Mexico, Brazil, Argentina, Chile, Peru, and Guatemala.

ILRIC 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, and the "Europeanization" of labor.

ILRIC 633 Labor, Industry, and Politics in Germany
Fall. 4 credits. Open to seniors with permission of instructor and graduate students. Not offered 2003–2004. 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 work 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.

ILRIC 635 Labor Markets and Income Distribution in Developing Countries
Spring. 4 credits. Prerequisite: ILRLE 240/540 or ECON 313 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; employment, unemployment, wages, and labor markets; and an introduction to public economics and development policy.

ILRIC 636 Comparative History of Women and Work (also WOMNS 636)
Spring. 4 credits. Permission of instructor. I. DeVault.
Explores the similarities and differences between different cultures' assumptions about the work of women as well as women's experiences in varying work circumstances throughout history. Beginning with theoretical pieces and overviews of the history of women and work, most of the course consists of in-depth examinations of specific work situations or occupations across time and geography. Comparative examples are taken from the United States, Europe, and the Third World.

ILRIC 637 Labor Relations in Asia
A comparative survey of the industrial relations systems of selected Asian nations such as Japan, South Korea, Thailand, Malaysia, Singapore, Hong Kong, China, and several others. The emphasis is on economic development strategies and industrial relations policies in these countries. Industrial relations practices, the extent of union organization, and labor force demographics of these countries is examined. The primary objective is to provide students with an introduction to industrial relations systems in Asia. The countries chosen are representative, but not exhaustive.

ILRIC 638 Labor, Free Trade, and Economic Integration in the Americas
Fall. 3 credits. Limited. Open to seniors and graduate students, juniors by permission. M. Cook.
Analyzes the contemporary movements toward free trade and regional economic integration in the Western Hemisphere. Special attention is paid to labor's role and to transnational movements in the region.
Examines the origins and implications of the North American Free Trade Agreement (NAFTA) and looks at integration schemes in South America (Mercosur), Central America, and the Caribbean and at hemisphere-wide initiatives. A research paper is required.

ILRIC 639 Building a "Social Europe": Regional Integration in the Global Economy (also GOVT 736)
Spring. 4 credits. Seminar designed for graduate students and seniors with permission. Limited. L. Turner.
Central questions addressed include: what have the European Union and its member nations done to develop and reform the social dimension in the 1990s and beyond? How are the major actors—labor, government, and business—positioned to influence social policy and industrial relations reform, and what strategies are they pursuing? How do EMU and enlargement affect the efforts of European societies to defend the social dimension of their market economies? What are the prospects for "Social Europe" in an increasingly deregulated global economy?

ILRIC 730 Research Seminar on Labor Markets and Economic Development
Fall and spring. 3 credits. Prerequisite: open to M.S. and Ph.D. students only. G. Fields.
Research seminar for students writing theses or dissertations on aspects of labor markets and economic development. Addresses research questions, methodologies, and contributions in the areas of employment and unemployment, income and earnings, educational and human resource development, welfare economics, and economic growth. Presentations and written papers are required.

ILRIC 731 Industrial Relations in Latin America
Faced with the competitive pressures brought on by globalization, employers and governments throughout the region are transforming practices 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. Reading knowledge of Spanish or Portuguese recommended but not required.

ILRIC 737 Special Topics: Labor, Democracy, and Globalization in the South
Spring. 4 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. The course will draw from theoretical/methodological debates and literatures in political science, sociology, political economy, and law. The seminar will be organized around an exploration of theoretical topics and common themes, with empirical examples drawn from several regions, industrial sectors, and countries, including South Africa, South Korea, Brazil, and Chile. Students will be expected to participate extensively in the seminar: they will rotate responsibility for presenting weekly readings and heading discussion, and they will write and present a major research paper.

ILRIC 739 The Political Economy of Mexico
Spring. 3 credits. M. Cook.
For course description, see ILRIC 339. Graduate students attend ILRIC 339 lectures, meet with the professor, and write a research paper.
ILRRC 150 Freshman Colloquium
Fall 1 credit. Open only to ILR freshmen. S-U only. Staff.
This course is offered to acquaint new freshman students with some of the issues and disciplines in the field of industrial and labor relations and to establish acquaintanceship among members of the ILR faculty and small, randomly assigned groups of students. The course includes a plant visit and several meetings early in the semester designed to introduce issues encountered in studying the employment relationship.

ILRHR 260. Limited to 30 ILR students.

ILRHR 260. Limited to 30 ILR students.

ILRHR 456 International Human Resource Management
Spring. Staff.
For description, see the section Human Resource Management.

ILRHR 466 Comparative Human Resource Management
Fall. Staff.
For description, see the section Human Resource Management.

ILRHR 469 Immigration and the American Labor Force
Fall. Briggs.
For description, see the section Human Resource Studies.

ILRHR 698 International Human Resource Policies and Institutions
Spring. J. Bishop.
For description, see the section Human Resource Studies.

ILRLE 140 Development of Economic Institutions
Fall. 3 credits. Prerequisite for non-ILR students: permission of instructor. G. Boyer.
Examines the historical roots of the economic system currently dominant in Western Europe and the United States. The course focuses on the process of European economic growth prior to 1914, the effect of industrialization on labor in Great Britain, and the historical evolution of economic thought from Adam Smith to J. M. Keynes.

ILRLE 240 Economics of Wages and Employment
Fall and spring. 3 credits. Prerequisites: ECON 101–102, ECON 313, or permission of instructor.
Applies the theory and elementary tools of economics to the characteristics and problems of the labor market. Considers both the demand (employer) and supply (employee) sides of the market to gain a deeper understanding of the effects of various government programs and private decisions.

[ILRHR 465 The Globalization of Services
Fall. R. Batt.
For description, see the section Human Resource Studies.

ILRHR 466 Comparative Human Resource Management
Fall. Staff.
For description, see the section Human Resource Studies.

ILRHR 469 Immigration and the American Labor Force
Fall. V. Briggs.
For description, see the section Human Resource Studies.

ILRHR 698 International Human Resource Policies and Institutions
Spring. J. Bishop.
For description, see the section Human Resource Studies.

ILRLE 446 The Evolution of Social Policy in Britain and America
Spring. G. Boyer.
For description, see the section Labor Economics.

ILRLE 446 Economy History of British Labor (also ECON 459)
Spring. G. Boyer.
For description, see the section Labor Economics.

ILRLE 448 Topics in Twentieth-Century Economic History: The Economics of Depression and the Rise of the Managed Economy
Fall. G. Boyer.
For description, see the section Labor Economics.

ILRLE 642 Economic Analysis of the Welfare State
Fall. 4 credits. R. Hutchens.
For description, see the section Labor Economics.
targeted at the labor market. Topics covered include employment demand, basic compensation determination, education and training, benefits and the structure of compensation, labor-force participation and its relation to household production, occupational choice, migration, labor-market discrimination, and the effects of unions.

ILRLE 340 Economic Security (also ECON 451)
Spring. 3 credits. Prerequisites: ILRLE 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 economic security measures are also considered.

ILRLE 440 Compensation, Incentives, and Productivity (also ECON 431)
Spring. 3 credits. J. DeVaro
See ILRLE 404 for description. Designed for ILR majors with calculus.

ILRLE 441 Income Distribution (also ECON 455)
Fall. 4 credits. Prerequisite: ILR 240 or ECON 341. R. Huchens.
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 PAM 370 may not receive credit for 441.

ILRLE 442 The Economics of Employee Benefits (also ECON 456)
Fall. 4 credits. Prerequisites: ILR 240 or equivalent. F. Blau.
An in-depth treatment of the economics and financial management and administration of all employee benefits: health care, insurance, retirement income, family-care benefits, executive incentive plans, and other compensation provided as a service or contingent financial package to employees. Detailed international comparisons of health care and retirement systems are included.

ILRLE 443 Personnel Economics for Managers (also ECON 443)
Fall. 4 credits. Prerequisites: ILR 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: team work; and internal labor markets. The course focuses on labor-related business problems using the analytic tools of economic theory, and should appeal to students contemplating careers in general business, consulting, and human resource management as well as in economics. Some assignments are case studies requiring teamwork.

ILRLE 444 The Evolution of Social Policy in Britain and America
Spring. 4 credits. Prerequisite: ILRLE 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.

ILRLE 445 Women in the Economy (also ECON 457 also FGSS 446)
Fall. 4 credits. Prerequisite: ILRLE 240 or equivalent.
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; and the consequences of women's employment for the family.

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 various aspects 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 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 314. G. Boyer.
Topics covered include: the causes of the Great Depression in the United States, the economics of the New Deal; the causes of high unemployment in interwar Great Britain; the rise of Keynesian economics and the development of demand management policies in Great Britain and the United States after 1945.

ILRLE 495 Honors Program
Fall and spring (year-long course). 3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 497-498 Internship
Fall and spring. 3 and 6 credits.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 540 Labor Economics
Fall. 3 credits. Prerequisites: ECON 101-102 or ECON 103 or equivalent.
A course in labor market economics for prospective managers in the corporate, union, and governmental sectors. 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, attract, and retain talent; pay and productivity; hiring and training investments, and promotions 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 institutional 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)
Fall. 4 credits. R. Huchens.
Uses the tools of public economics to analyze modern welfare states. Although examples are drawn from several countries, the course focuses on the U.S., 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 in general, and labor market analysis in particular, can be usefully applied to analyze resource allocation decisions at universities. Among the topics covered are financial aid, tuition, admissions policies, endowment policies, faculty salary determination, the tenure system, mandatory retirement policies, merit pay, affirmative action, comparable worth, collective bargaining, resource allocation across and within departments, undergraduate versus graduate education, research costs, libraries, athletics, and "socially responsible" policies. Lectures and discussions of 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 741 Applied Econometrics
Fall. 5 credits. S-U or letter. G. Jakubson.
Considers methods for the analysis of longitudinal data, that is, data in which a set of individual units 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 (fixed, random, mixed effects models, etc.), factor analysis, measurements error models, and general moment structure methods.

ILRLE 742 Applied Econometrics II
Spring. 4 credits. Letter or S/U grades. J. Butler.
Covers statistical methods for models in which the dependent variable is not continuous. Covers: models for dichotomous response (including probit and logit); polytomateous 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 microeconomics. G. Jakubson.
Covers topics not covered in ILRLE 741–742, including further development of duration analysis, panel data methods for nonlinear models, quantile regression and related techniques, and an introduction to nonparametric and semiparametric methods. Additional topics as suggested by their use in applied areas of social science. Covers not only the statistical issues but also the links between behavioral theories in the social sciences and the specification of the statistical model. Also develops a general framework for the techniques covered in the ILRLE 741–742–743 sequence.

ILRLE 744 Seminar in Labor Economics I (also ECON 641)
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 642)
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 643)
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 Higher Education
Spring. 4 credits. R. Ehrenberg. A survey of the econometric research on a wide variety of higher education issues. Examples of the topics addressed include public and private funding, financial aid and tuition policies, faculty labor markets, and Ph.D. production. While the emphasis is on the American educational system, research from other countries may also be discussed. 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 Benefits
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 approaches to the economic problems of developing nations. Topics to be covered include: some old and new directions in development economics thinking; the welfare economics of poverty and inequality; empirical evidence on who benefits from economic development; labor market models; project analysis with application to the economics of education; and development policy.

ILRLE 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 on Collective Bargaining, Labor Law, and Labor History.

ILRLE 799 Directed Studies
For description, see the section on 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 stratification, politics, 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; 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 end up doing most of the work while others get a free ride? This course explores these questions from an interdisciplinary perspective, drawing on sociobiology, economics, and social psychology. Alternative theories of group solidarity are applied to a series of case studies such as: urban gangs, spiritual communes, the civil rights movement, pro-life activists, athletic teams, work groups, and college fraternities.

ILROB 322 Service Learning (also SOC 323)
Fall. 4 credits. M. Lounsbury. 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 the service to gain further understanding of course content, and develop a richer understanding 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 explored 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 sociology. W. Sonnenstuhl. Recent developments in the concept of culture as it has evolved in sociology and anthropology,
applies 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, or their change in the cultural forms that carry these cultural messages, rituals, symbols, myths, sagas, 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. See 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 exploration of current practical applications of OB theory in organizations. Using a range of contemporary resources, students sit through practitioner articles and research, view videos, meet with managers, consultants, 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 effectively carry out several 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, applying quality management tools, etc.

ILROB 422 Organizations and Deviance
Fall. 3 credits. Enrollment limited to 60. W. Sonnenstuhl.

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-Contraagate, 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 on the sources of power and control exercised by professional groups in contemporary society. A number of issues are examined in this context including: the role of professions in society, processes through which an occupational group becomes defined as a profession, sources of control that professional associations have over their members, relations between professionals and nonprofessionals in organizations, and the relationship between unionization and professionalization of occupations.

ILROB 429 Organizational 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 those changes affect individuals and organizations, and the distortions that occur as individuals and organizations attempt to adjust to a new unstable order. Issues to be examined include power, corruption, dealmaking, 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, and group dynamics. 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 organizational 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 (yearlong course). 3 credits each 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 or 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.

Surveys 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, group formation, 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 621 Work Histories: Patterns and Processes
Spring. 2 credits. 7 weeks. Permission required. P. Tolbert.

Individuals usually view their work history as the result of a series of decisions and job choices they have made. Few people recognize, however, the extent to which such decisions and choices are influenced by a combination of personnel structures in organizations, organizational conventions, and common social norms that shape family relations. This course will examine research on how organizations, occupations, and family influence work histories. Special attention will be given to problems of defining and measuring key dimensions of work history and other issues in empirically investigating the determinants of work history patterns.

ILROB 622 Sociology of Markets (also SOC 622)
Fall, spring. 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 reconfigured by the entrance of new social movements, 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, social institutions in the United States have undergone a dramatic transformation. Standard solutions to social problems offered by public agencies and nonprofit organizations are increasingly being reconfigured by the entrance of new social enterprises that focus on self-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 world, 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 students contextual and 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
Spring. 3 credits. P. Tolbert. An examination of theories and research findings from the behavioral sciences that are relevant to leadership and the influence process in groups and organizations. Personality, situational factors, group processes, interpersonal perception as well as the motivation to both lead and follow are discussed. The implications for leadership training, organization development, and action research are explored.

ILROB 627 Leadership in Organizations
Spring. 3 credits. Open to graduate students and seniors with permission. T. Hamner. An examination of theories and research studies of leadership and power processes in industrial societies playing in allocating income, status, and other resources to individuals. A variety of theoretical explanations of social inequality are examined, and the social policy implications of each are considered.

ILROB 628 Organizational Behavior
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 students contextual and theoretical approaches to conflict and bargaining (e.g., rational choice, cognitive, social exchange) and places the power perspective in this context.

ILROB 629 The Social Psychology of Behavior and Experience in Organizations
Fall. 3 credits. Prerequisite: ILROB 170 and 171 or ILROB 520. Staff. Considers theories that seek to explain behavior at the individual, group, and organizational level. Work motivation, leadership, and the member composition and dynamics of groups are discussed. Harmony, conflict, and other aspects of the relationships among groups in the organization are evaluated.

ILROB 670 Methods of Observation and Analysis of Behavior
Fall or spring. 4 credits. Permission of instructor required. Staff. Focuses on qualitative methods and emphasizes learning by doing. 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 data analysis. This technique is the basis of such qualitative computer programs as Ethnograph and Nudist. Students conduct their own research projects. Students who wish to use qualitative methods either for a senior honors thesis, master's thesis, or doctoral dissertation are encouraged to take this course. 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. 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 723 Behavioral Research Theory, Strategy, and Methods I
Fall. 4 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll. Staff. Materials studied in ILROB 723 and 724 include: theoretical, conceptual, and ethical concerns; survey research and attitude-scaling procedures; laboratory research methods; participant observation and interview methods; use of documents and qualitative data analysis. Provides students with important philosophical background for doing research and exposes them to a well-balanced, interdisciplinary set of quantitative and qualitative research tools.

ILROB 724 Research Practicum on Work, Family, and Careers
Spring. 2 credits. S-U only. 7 weeks. P. Tolbert. Will focus on research involving work and family relationships. Course work will include participating in a speakers' program, reviewing published research, and conducting empirical analyses of extant data on work and family.

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 examines published research papers in both 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. Staff. An advanced seminar that explores 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 areas of organizational theory. Emphasis is placed on exploring the relevance of tradition in related disciplines (anthropology, linguistics, philosophy, sociology, etc.) that may enrich our understanding of organizational life.

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. Lounsbury. 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-scale 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 students understand the behavioral implications of new manufacturing initiatives. Case studies are used to study the introduction of a variety of innovations in contemporary manufacturing firms, 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 relationships, 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/Manufacturing Option degree program.
ILRST 778 Solidarity in Groups (also SOC)
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.

ILRST 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.

ILRST 798 Internship
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRST 799 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRST 920 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. Bunge, T. DiCiccio, P. Velleman, M. Wells

ILRST 210 Statistical Reasoning I
Fall, spring, and summer 2003-2004. 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 in 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 2003-2004. 3 credits. Prerequisite: ILRST 210 or suitable introductory statistics course. J. Angellotti, T. DiCiccio, D. Fink.
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. D. Fink.
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. 3 credits. J. Bunge.
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 499 Directed Studies
For description, see the section Collective Bargaining, Labor Law, and Labor History.

ILRST 510 Statistical Methods for the Social Sciences I
Fall, spring, and summer. 3 credits. J. Angellotti, M. Wells.
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 511 Statistical Methods for the Social Sciences II
Fall, spring, and summer. 3 credits. Prerequisite: ILRST 510 or equivalent introductory statistics course. J. Angellotti, 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
Spring. 4 credits. Offered only for the New York City M.P.S. Program. Staff.
Students learn basic skills for conducting qualitative and survey research. Students work through an introductory review course at home on their own time. After passing an exam, they attend a two-week immersion course in Ithaca taught by the on-campus faculty in July. Topics include: an introduction to surveys and discrete analysis, basic regression, and integration of qualitative and quantitative research methods.

ILRST 614 Structural Equations with Latent Variables
Fall. 3 credits. Prerequisites: ILRST 210, 211 or ILRST 510, 511, or equivalent. M. Wells.
Provides a comprehensive introduction to the general structural equation system, commonly known as the "LISREL model." One purpose of the course is to demonstrate the generality of this model. Rather than treating path analysis, recursive and nonrecursive models, classical econometrics, and confirmatory factor analysis as distinct and unique, 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 715 Likelihood Inference
Fall. 3 credits. Prerequisites: graduate courses equivalent to OR&IE 670 and OR&IE 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

Statewide

The following courses are open to participants in the Extension Division's statewide credit programs in labor studies and management studies. Extension offices are based in Buffalo, Albany, Rochester, Ithaca, New York City, and Long Island. These courses are not open to undergraduate or graduate students matriculated in the Ithaca ILR programs. Courses and course credits earned in Extension Division certificate programs are not automatically accepted as transfer credits or as a basis of admission to the resident ILR undergraduate and graduate programs in Ithaca. Student applications for course transfer are evaluated by the ILR school on an individual basis.

204 Managing Conflict
Fall or spring. 3 credits. Staff.
Provides students with opportunities to apply conflict resolution theory to specific situations, based on real-life problems that require resolution. Students will examine situations, analyze the facts and perceptions driving the actors, and develop strategies for effective communication, negotiation, and mediation techniques to reduce or eliminate the conflict.

205 Oral Skills for Conflict Management
Fall or spring. 3 credits. Staff.
Emphasizes development of oral communications skills required to successfully manage conflict both as a party to a dispute and as a third party who is charged with helping to resolve a dispute. The course presents simulations to help the participants practice their skills.

206 The Nature of Conflict
Fall or spring. 3 credits. Staff.
Provides students with the conceptual foundation to engage in further study of conflict management and conflict resolution. Having taken the course, the students will be able to: identify and describe types of conflict; identify the various sources of conflict; apply a conceptual model of conflict to interpersonal, organizational, and international conflict situations; and develop conflict resolution techniques in terms of social psychological aspects using a "person perception" or "attribution" theoretical orientation; and identify their personal response styles to conflict.

209 Leadership in Unions
Fall or spring. 3 credits. Staff.
What role does leadership play in the vitality of the labor movement? Is there a crisis of leadership in contemporary unions? Does the political context of a democratic membership organization affect the quality of leadership? Will changing workforce demographics create a demand for increased leadership opportunities by women and minorities in their unions? This course examines theories of leadership including a comparison of leadership styles and skills in the context of changing needs of the labor movement. The dynamic relationship of leaders and followers is examined in regard to emerging internal union organizing strategies which aim to increase membership and to activate current members.

212 Labor, Technology and the Changing Workplace
Fall or spring. 3 credits. Staff.
Technological changes are having a profound impact on both work and society. But what do these changes mean for workers and their unions? Is resisting technological change equivalent to obstructing progress? What can we do to influence how work is shaped and performed? These and other questions are the central theme of this course. The course is divided into three sections: Skills, Technology, and the Labor Process; Industrial Change and Worker Responses; Four Historical Case Studies; Unions, Technology, and the Future of Work.

240 Union Organizing
Fall or spring. 3 credits. Staff.
Students learn in 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 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 importantly 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 labor. Students examine issues and laws such as Equal Employment Opportunity, Employee Retirement Income Security Act, Federal Wage and Hour Laws, Occupational Safety and Health Act, unemployment law, 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.
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 contract bargaining impasse. The course considers the impact of traffic bargaining outcomes on workers, unions, employers, and the public.

252 Contract Administration
Fall or spring. 3 credits. Staff.
Focuses on the role of the steward in administering the union contract in the workplace. Students examine 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 with consideration 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 institutions and leaders, and the evolution of union political activities and collective bargaining. Special attention is paid to the involvement of women and minority workers with unions.

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 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
Abowd, John M., Ph.D., U. of Chicago.
Edmund Ezra Day Prof. of Industrial and Labor Relations, Labor Economics
Angelotti, 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
Bishop, John H., Ph.D., U. of Michigan. Assoc. Prof., Human Resource Studies
Blau, Francine D., Ph.D., Harvard U. Francis Perkins Prof. of Industrial and Labor Relations, Labor Economics
Boudreau, John W., Ph.D., Purdue U. Prof., Human Resource Studies
Boyer, George R., Ph.D., U. of Wisconsin. Prof., Labor Economics
Briggs, Vernon M., Jr., Ph.D., Michigan State U. Prof., Human Resource Studies
Bunge, John A., Ph.D., Ohio State U. Assoc. Prof., Social Statistics
Collins, Christopher, Ph.D., U. of Maryland. Asst. Prof., Human Resource Studies
Compa, Lance, J.D., Yale Law School. Sr. Lecturer, Collective Bargaining, Labor Law, and Labor History
Cook, Maria L., Ph.D., Univ. of Calif., Berkeley. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
DeVore, Jed, Ph.D., Stanford U. Asst. Prof., Labor Economics
DiCiccio, Thomas J., Ph.D., U. of Waterloo. Assoc. Prof., Social Statistics
Dyer, Lee D., Ph.D., U. of Wisconsin. Prof., Human Resource Studies
Ehrenberg, Ronald, Ph.D., Northwestern U. Irving M. Ives Professor of Industrial and Labor Relations and Economics, Labor Economics
Fields, Gary S., Ph.D., U. of Michigan. Prof., Labor Economics, and International and Comparative Labor
Gross, James A., Ph.D., U. of Wisconsin Prof., Collective Bargaining, Labor Law, and Labor History
Haas, Martine, Ph.D., Harvard Business School. Asst. Prof., Organizational Behavior
Hammert, Tove H., Ph.D., U. of Maryland. Prof., Organizational Behavior
Horngren, Christina, B.S., Ithaca College. Lecturer, Human Resource Studies
Hurd, Richard W., Ph.D., Vanderbilt U. Prof., Extension and Public Service
Hutchens, Robert M., Ph.D., U. of Wisconsin. Prof., Labor Economics
Jakubson, George H., Ph.D., U. of Wisconsin. Assoc. Prof., Labor Economics
Katz, Harry C., Ph.D., U. of California at Berkeley. Jack Sheinkman Prof. in Collective Bargaining, Labor Law, and Labor History
Kuruvilla, Sarosh C., Ph.D., U. of Iowa. Prof., Collective Bargaining, Labor Law, and Labor History
Lawler, Edward J., Ph.D., U. of Wisconsin at Madison. Prof., Organizational Behavior
Lipsky, David E., Ph.D., Massachusetts Inst. of Technology. Prof., Collective Bargaining, Labor Law, and Labor History
Lounsbury, Michael, Ph.D., Northwestern U. Asst. Prof., Organizational Behavior
Roberson, Quintetia, Ph.D., U. of Maryland. Asst. Prof., Human Resource Studies
Salvatore, Nicholas, Ph.D., U. of California at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History
Seeler, Ronald L., Ph.D., U. of Illinois. Assoc. Prof., Extension
Smith, Robert S., Ph.D., Stanford U. Prof., Labor Economics
Snell, Scott, Ph.D., Michigan State U. Prof., Human Resource Studies
Sonnenstahl, William J., Ph.D., New York U. Assoc. Prof., Extension and Organizational Behavior
Stone, Katherine J.D., Harvard U. Anne Evans Estabrook Prof. in Dispute Resolution, Collective Bargaining, Labor Law and Labor History
Toibert, Pamela S., Ph.D., U. of California. Prof., Organizational Behavior
Velleman, Paul F., Ph.D., Princeton U. Assoc. Prof., Social Statistics
Wells, Martin T., Ph.D., U. of California at Santa Barbara. Prof., Social Statistics
Wright, Patrick M., Ph.D., Michigan State U. Prof., Human Resource Studies

ADMINISTRATION

Robert J. Swieringa, dean
L. Joseph Thomas, associate dean for academic affairs
Michael J. Hostetler, associate dean for executive education
Cathy S. Dove, associate dean for MBA Program and operations
Richard A. Shafer, associate dean for corporate relations
Thomas B. Hambury, director of EMBA Program
Rosaly H. Hines, executive director of development and alumni development
Natalie M. Grinblatt, director of admissions
Karin S. Ash, director of career services
Rhonda H. Velazquez, director of student activities and special events
Sherry L. Canger, assistant to the dean
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 follow 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 many classes. Since matriculated MBA students require certain courses for graduation, non-Johnson School students are not allowed to pre-enroll. During the first week of classes, registration of non-Johnson School students occurs on a space-available basis.

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 evaluation 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 MBA 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 an 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 to 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 find a business that can attract venture investors. Tutorial sessions with instructors apply lessons to the team business plan. Students learn how high-technology ideas are converted into world-class businesses in venture-backed start-up companies and in new business development in existing companies. Slides take the student from idea to initial public offering. Grading is based on a final exam focusing on the video lectures, a written business plan, and its final presentation to a judging panel. Designed for M.Eng. and M.B.A. 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 553.

NCC 554 Management and Organizations
Fall. 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, entrepreneurship, and e-business. 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.

NBA 502 Managerial Cost Accounting
3.0 credits.

NBA 506 Financial Statement Analysis
1.5 credits.

NBA 549 Managerial Finance—Practicum
1.5 credits.

NBA 558 Corporate Financial Policy
1.5 credits.

NBA 565 Corporate Governance
1.5 credits.

NBA 656 Valuation Principles
1.5 credits.

NCC 508 Managing Operations
2.5 credits.

NCC 509 Strategy
2.5 credits.

IBI—Investment Banking Immersion
This course is specifically designed for those students planning to pursue careers in investment banking. The course is inappropriate for students interested in following a finance career in non-financial industry or non-finance careers (including consulting).

This course is designed to meld the practical and the theoretical aspects of the field. We will be expecting a great deal of interaction and discussion between students, the participating faculty, and visiting practitioners. While the course is designed to make its students more attractive as candidates for employment in the investment banking profession, and we expect that some of the participating firms will be using their visits to identify candidates for summer internships, obtaining relevant summer internships remains the responsibility of the students. Prerequisite: NCC 506.

NBA 500 Intermediate Accounting
3.0 credits.

NBA 506 Financial Statement Analysis
1.5 credits.

NBA 511 Financial Modeling
1.5 credits.

NBA 556 Investment Banking—Practicum
1.5 credits.

NBA 558 Corporate Financial Policy
1.5 credits.

NBA 656 Valuation Principles
1.5 credits.

NCC 508 Managing Operations
2.5 credits.

NCC 509 Strategy
2.5 credits.

RS&T—Research, Sales, and Trading Immersion
This course is specifically designed for students planning to pursue careers in research (both buy-side and sell-side), sales, and trading, either at Wall Street firms (sell-side) or at buy-side firms such as mutual funds. The course will meld the practical and theoretical aspects of the field. A great deal of interaction and discussion is expected between students, the participating faculty, and visiting practitioners. While the course is designed to make its students more attractive as candidates for employment in the investment management profession, and we expect that some of the participating firms will use their visits to identify candidates for summer internships, obtaining relevant summer internships remains the responsibility of the students.

NBA 500 Intermediate Accounting
3 credits.

NBA 506 Financial Statement Analysis
1.5 credits.

NBA 529 Securities Analysis
1.5 credits.

NBA 583 Research, Sales, and Trading Practicum
1.5 credits.

NBA 656 Valuation Principles
1.5 credits.

NBA 673 Introduction to Derivatives I
1.5 credits.

NCC 508 Managing Operations
2.5 credits.

NCC 509 Strategy
2.5 credits.

SBM—Immersion in Brand Management
This is a full-time program for the semester; students will not be able to take other courses concurrently. The course objective is to begin developing students to think and act like brand managers, some of the best trained and most upwardly mobile professionals in industry. It 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
3.0 credits.

NBA 620 Marketing Research
3.0 credits.

NBA 624 Brand Management—Practicum
4.0 credits.

NCC 508 Managing Operations
2.5 credits.

NCC 509 Strategy
2.5 credits.

SIM—Semester in Manufacturing
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 class 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.
NBA 502 Cost Accounting
3 credits.

NBA 650 Semester in Manufacturing Practicum
7 credits.

NCC 508 Managing Operations
2.5 credits.

NCC 509 Strategy
2.5 credits.

E&PE—Entrepreneurship and Private Equities Immersion

This is a comprehensive course that integrates the technical, strategic, and economic aspects of entrepreneurship and is the student's full course load for the semester. David J. BenDaniel, the Don and Margi Berens Professor of Entrepreneurship at the Johnson School, will lead the faculty team for this immersion.

NBA 502 Managerial Cost Accounting
3 credits.

NBA 531 Venture Start-up
1 credit.

NBA 559 Venture Capital Industry
5 credits.

NBA 564 Entrepreneurship and Private Equity
3 credits.

NBA 653 Strategic Alliances
1 credit.

NBA 656 Valuation Principles
1.5 credits.

NCC 508 Managing Operations
2.5 credits.

NCC 509 Strategy
2.5 credits.

NCC COMMON CORE COURSES

NCC 500 Financial Accounting
Fall. 2.5 credits. Johnson School core course. Enrollment limited. R. Libby.
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.

NCC 501 Statistics for Management
Fall. 2.5 credits. Johnson School core course. Enrollment limited. J. McClain.
An introduction to decision making under conditions of uncertainty. Topics include descriptive statistics, probability theory, classical statistics, statistical decision theory, and simple and multiple regression analysis. Applications in finance, marketing, and operations management are discussed.

NCC 502 Microeconomics for Management
Fall. 2.5 credits. Johnson School core course. Enrollment limited. R. Hilton. Microeconomic theory is introduced and applied to problems faced by managers. Specific topics covered include supply and demand, consumer behavior, pricing when a firm has market power, and the role of contracts. The class employs a lecture format and emphasizes problem solving. Grading is based on a midterm and a final exam.

NCC 503 Marketing Management
Fall. 2.5 credits. Johnson School core course. Enrollment limited. D. Stayman, E. Eisenstein.
The course is designed to convey the key concepts of marketing and how they fit into the larger context of management strategy and decisions. Both the practical "how" and the fundamental "why" of marketing activities are presented in the light of contributions from behavioral science, economics, and statistics. The goals are to provide sufficient understanding for those who will need only to interact with the marketing function, as well as communication concepts and developing processes that can provide the foundation for further course work and future experience in marketing. The course makes extensive use of case materials.

NCC 504 Managing and Leading in Organizations
Fall. 2.5 credits. Johnson School core course. Enrollment limited. D. Sally, K. O'Connor.
If you think about it, stories are central to how we know and remember events, people, and facts, and to how we communicate knowledge and history. Most of the jobs you aspire to involve a particular form of storytelling—the CEO's vision, the analyst's report, the planner's strategy, the salesperson's pitch, the consultant's analysis, and the manager's brand. What distinguishes these as business stories is that they are often analytical (based on a set of objective facts and statistics) and reflect a deep understanding of the complex interactions of individuals and organizations. This course has two goals: (1) to make you appreciate the complexity of the issues that often arise in organizations, and (2) to develop and refine your analytical storytelling abilities. To achieve these goals, the course will be taught by the case-study method. Cases are an efficient way to expand your experience base with respect to such issues as motivation, power, leadership, ethics, structure, design, and more. We hope to teach you how to make good inferences about what will and won't work in particular situations, and how to learn from your own experiences and those of others.

NCC 506 Managerial Finance
Fall. 2.5 credits. Johnson School core course. Enrollment limited. R. Michaels.
The course is designed to introduce students to the basic concepts of finance. In particular, we address the issue of what type of investment should firms and individuals take on, and how these investments should be financed. Understanding these concepts is essential to financial managers and professional investors, and has important applications to many aspects of financial decisions all of us have to make on a daily basis (e.g., is getting a MBA a good investment?). These issues involve capital budgeting decisions, stock and bond valuation, how to assess and account for risk through the capital asset pricing model (CAPM), option pricing, capital structure and cost of capital. The course is grade only, based on examinations, quizzes, group case reports, homework, and class participation.

NCC 508 Managing Operations
Spring. 2.5 credits. Johnson School core course. Enrollment limited. Prerequisite: NCC 501 or permission of instructor. R. Zhang, L. Robinson.
This course focuses on managing processes: actions that convert inputs into outputs. Almost any business function can be modeled as a network of processes. The first part of the course examines processes, both individually and as part of a larger system; we see that good process design reflects both the volume and the variety of the product. A common course thread is the deleterious effect of variability (in demand, supply, quality, or capacity) in complex systems. Queuing theory and simulation are particularly helpful for analyzing process capabilities. The second part of the course analyzes how goods and services are produced. After describing the strategic role of operations, we examine forecasting systems, inventory management, and just-in-time and logistic management. Constrained optimization models provide information about managing with constraints. The final part of the course examines process improvement through quality and productivity management and corporate learning.

NCC 509 Strategy
Spring. 2.5 credits. Johnson School core course. Enrollment limited. V. Kadiatyali, J. Johnson.
Among the critical tasks facing any senior manager are the creation, implementation, and evaluation of a business unit's strategy. This course seeks to provide the management student with the tools and frameworks essential to carrying out these tasks. Many of these tools and frameworks are based on recent advances in game theory, industrial organization, and organization theory, although the course also draws from the older business policy tradition. Students who successfully complete this course will be able to analyze industries, identify areas of strategy advantage and disadvantage, and devise strategies that exploit advantages and remedy disadvantages.

NBA MANAGEMENT ELECTIVE COURSES

NBA 500 Intermediate Accounting
Spring. 3 credits. Prerequisite: NCC 500 or the equivalent. M. Nelson.
The course is based on the essential concepts and terminologies of financial accounting introduced in the accounting core course. Students learn to evaluate financial statements through the use of case studies drawn from actual corporate financial reports.

NBA 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, accumulating costs for product costing, activity-based costing, standard costs, the analysis of cost variances, cost estimation and prediction, cost-volume-profit 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, confronting competition in an industry dominated by lean enterprises, re-engineering, process value analysis, identification of nonvalue-added activities and costs, target costing, Kaizen costing, 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 500 (or concurrent enrollment), or permission of the instructor. S. Bhongraj, 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, a finance internship experience, or permission of the instructor. S. Bhongraj. 
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. The course will be a group term project, but no final exam.

Note: Students who have completed the three-credit version of NBA 506 cannot enroll in this course.

**NBA 511 Financial Modeling**
Fall, spring. 1.5 credits. Prerequisites: NBA 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 Computer Lab, and active student participation is emphasized.

**NBA 512 Applied Portfolio Management**
Fall, spring. 3 credits. Restricted. C. Lee. 
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.

**Economics**

**NBA 524 Macroeconomics and International Trade**
Fall. 3 credits. Prerequisite: NCC 502 or equivalent or permission of the instructor. I. Azis. 
The course applies basic macroeconomic theory to such problems as inflation, unemployment, economic growth, and productivity and examines how those problems interact with international trade and finance. Students learn to be informed observers of national and international economic policies and discerning users of economic analyses and forecasts. A lecture/discussion format is used as the method of instruction.

**NBA 527 Applied Price Theory**
Spring. 4 credits. R. Frank. 
This course emphasizes 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 and 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. F. Keller. 
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, business decisions can benefit from considering the impacts of social and ecological capital. This so-called "triple bottom line" of sustainable business is now recognized 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 produced 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 521 Investing in Distressed Corporations**
Fall. 1 credit. J. Rubin, R. Symington. 
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 "bottoms-up" approach, the curriculum first seeks to develop the building blocks of this field: research, valuation, legal issues, and strategies such as target capital structure location, control/passive strategies, value creation 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. Lounsbury. 
Social entrepreneurship involves blending nonprofit and for-profit logics 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 produced 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. P. Sear. 
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 Ryan's book Smartups. The lectures contain analyses of various styles of entrepreneurship, ways of determining the viability of technical businesses and hints for negotiation with venture capitalists and sources, among other important topics.
NBA 535 Private Equity
Spring. 0.5 credit. H. Bierman.
This course will meet four times during the semester. The focus will be the transformation of a public corporation to private equity to increase value. The advantages and disadvantages of private equity will be discussed, but the focus will be on financial models. The cases 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. 1.5 credits. F. Beste.
This course consists of a series of cases that focus on the venture capital investment process and the 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 structures, 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 perspectives are that of the entrepreneur and the techniques and skills employed in managing growing enterprises. Presentations 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) due diligence investment: concentration in fewer, 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 Alternatives
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, federal securities laws, the Securities and Exchange Commission review process, undertaking arrangements, and selection of a trading forum (i.e., NYSE, NASDAQ, or AMEX). Regarding deal structures, the course is choosing an appropriate transaction 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 aspects of the acquisition, such as caps/collars, letters of intent, successor liability, continuity of employees, and noncompetition 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 is 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 going to public and present 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. Suwinski.
A wide variety of strategic alliances are being used today as companies try to leverage their resources for competitive advantage. This course gives an overview of the spectrum of alliances, examining the strategic rationale and pros and cons of each major type of alliance. The primary focus is on joint ventures as a specific form of strategic alliance, where the success rate is less than 50 percent. The course develops a set of principles that have contributed to success for Corning Incorporated. The course is taught from the perspective of the general manager of a major business unit.

NBA 678 Special 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 arranged 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, VCs and (3) the 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 key issues that an emerging high-growth business must consider and address, including (1) choosing type of business entity, (2) protecting confidential information and inventions, (3) sources of capital (in both bull and bear market environments), (4) understanding capitalization structures (common stock, preferred stock, warrants, etc.), (5) use of stock options as employee compensation, (6) fundamental fair 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.

NBA 529 Securities Analysis
Spring. 1.5 credits. C. Lee.
This half-semester course is an introduction to security analysis, equity research, and the mechanics of trading in security markets. A central mission is to integrate financial analysis and valuation skills acquired in earlier courses to the presentation of equity research reports. A secondary objective is to familiarize students with the intricacies of market architecture and design and how these issues affect trading costs. Other topics will include portfolio risk management (using BARRA software), stock selection (using Parker Center tools), short selling, and institutional sales.

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 building a 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, and the use of leverage 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. Lu.
This course deals with several important issues pertaining to investments in securities markets. 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 analysis. Finally, the course deals with frictions to trading imposed by the institutional structure of securities markets. The goal of this course is to train students in the latest tools and techniques in portfolio theory and familiarize them.
with the latest developments in securities market research and applications. This is a highly quantitative course involving extensive analysis of security market data using regression analysis and other statistical tools. Grades are based on computer labs, 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 question of market efficiency and the interaction between government policies and financial markets is analyzed. 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 is discussed. 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 analytical 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. Macey.
This course explores a series of selected topics that involve 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 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. Prerequisite: NCC 506 or the equivalent. Recommended: NBA 540. Course is limited to second-year MBA’s and Twin Cities MBA (TCMB) 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, MBO’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. International finance is different in two basic respects. First, the existence of multiple currencies adds risk to investment and financing decisions. Second, when corporations and portfolio investors cross international borders, both problems and opportunities arise. We focus on these issues and highlight how finance theory can be extended to address them. Starting with the basic principles of international finance, students apply these principles to a variety of problems. The course helps students understand the ideas and research results of international finance and adapt what they learn to the practical problems in the increasingly globalized business world beyond the classroom. The first part of the class outlines three basic themes: exchange rate volatility, barriers to international capital flows, and the value of international diversification. The second part of the class presents a variety of problems, explanations, and examples from the three basic themes. These range from corporate finance applications of capital budgeting to portfolio management strategies. Spreadsheet assignments and a term project requiring data analysis, research skills, and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

NBA 555 Fixed Income Securities and Interest Rate Options
Fall. 3 credits. Prerequisites: NCC 506 (Finance core), NCC 501 (Quantitative Methods) and NBA 550. R. Grinstein.
This course is designed to study the pricing, hedging, and risk management of fixed income securities and interest rate derivatives. Topics to be studied include: the term structure of interest rates, interest rate swaps (caps, floors, collars), the risk structure of interest rates, credit risk spreads, and corporate bond valuation. The method of instruction is lectures and discussion, 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 of corporations. 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 creditors or 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 556 Corporate Governance
Spring. 1.5 credits. Prerequisite: NCC 506 and NBA 550, or permission of instructor. Y. Grinstein.
This course deals with the ways in which different investors assure themselves of getting a return on their investments. How do investors get managers to return some of the profits to them? How do they make sure that managers do not invest their money in bad projects?

These questions are extremely relevant for almost any organization, from start-ups to Forbes 500 companies. 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 the ways in which venture capitalists monitor projects. The role of stage financing in mitigating VC losses and its effect on project valuation will be explored. We will then examine different forms or mechanisms in more established firms. In particular, we will discuss the board of directors, mergers and acquisition market, institutional investors, compensation contracts, debt contracts, and bankruptcy proceedings. Relevant theory will accompany the cases. Topics covered will 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 IBI Immersion or permission and signature of professor H. Swaminathan.
The advanced valuation course builds on the valuation principles course. It applies discounted cash flow valuation (DCF) and valuation by multiples to more sophisticated 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. The course focuses 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, natural resource investments, land development (real estate), 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 Valuation Principles
Spring. 1.5 credits. J. Sunder.
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) valuation. The definitions of cash flow and discount rate depend on whether we want to value the entire firm or value only equity. We first discuss how to compute free cash flows based on historical income statements and balance sheets. We then discuss the concept of value drivers and economic value added (economic profits or residual income). Next, we cover operating risk and financial risk, the relation between financial leverage and cost of capital, the leveraging and unleveraging of equity, capital asset pricing modeling, computing cost of equity, cost of debt, cost of preferred stock, weighted average cost of capital, divisional cost of capital, etc. We apply these concepts to computing cost of equity. 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.  
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 526 Consulting Technologies  
Fall. 1.5 credits. J. Russo.  
This course presents two or more complex technologies that consultants might use to aid clients who confront important and complex business challenges. The objective of the course is for students to achieve sufficient skill to use these technologies with little or no expert assistance. For this reason, the primary work products in the course are team reports of applications. The specific technologies change from year to year. Examples are scenario-based planning and decision analysis.

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 settings today and into 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 top 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 introduces the basic tenets of law, as they apply to businesses and their operations. Topics include personal property, contracts, agency, real property, and landlord-tenant concerns. 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 560 Business Law I (also AEM 320)  
Fall. 3 credits. Limited to juniors, seniors, and graduate students. D. Grossman.  
The course introduces the basic tenets of law as they apply to businesses and their operations. Topics include personal property, contracts, agency, real property, and landlord-tenant concerns. 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 peer feedback; writing assignments every week. Students receive instructor and peer feedback. Priority given to MBA students. Open to other graduate students and employees if room is available.

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, and have the opportunity to review in tutorials the videotapes of most of their presentations. Priority given to MBA students. Open to other graduate students and employees if room is available.

NBA 569 Management Consulting  
Fall, spring. 3 credits. A. McAdams.  
The course is case-study oriented and focuses on strategic consulting. It has 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. 1.5 credits. MBA students only. R. Peterson, 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 sessions. Staff from RPW and Johnson School faculty provide training. The first two days focus on self-awareness and employ several experiential exercises and self-assessment instruments including the Campbell Leadership Inventory (CLI), Myers-Briggs Type Indicator (MBTI), the Fundamental Interpersonal Relations Orientation-Behavior (FIRO-B), the Kirtton Adaptation/Innovation inventory (KAI), and the Ambiguity Preference Scale (APS). Class members are also trained in giving and receiving feedback from team member(s) and faculty. Mid-week activities include various leadership and team challenges, including a business simulation. Attendance is required each day of the course 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. Smidt.  
This 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 and the instructor's evaluation of team's performance (at their own convenience). The course is NBA 649 Cornell Management Simulation.

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 and role in environmental protection. Another focus is the analysis of the operational significance of the concepts of sustainability, ecoefficiency, and market-based environmental policies. Seminar speakers from financial firms, consultant, forest products, construction, 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 discussion of issues in environmental management, and will also feature four management practices in 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 projects. Students will form consulting teams focused on specific strategic, process improvement, or operational problems in companies. A faculty consultant resident (CIR) will be involved, closely engaged in the teams' work. The teams will meet with the faculty advisors 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, large, 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 577 The Political, Legal, and Regulatory Environment of Business
Spring 3 credits R. Schuler. The political climate, laws, regulations, and government arrangements for infrastructure have a profound effect on the nature, operation, and profitability of business. Many of the most important decisions that top management makes are driven by political, legal, and regulatory considerations. The seminar will introduce students to the political environment in the United States, examine how that environment interacts with the division of its company in response to an antitrust suit filed by the U.S. government. Environmental and waste-management concerns are leading to new laws and regulations that affect many aspects of business, creating opportunities as well as posing problems. The course begins with a discussion of the political and economic foundations of business regulation. Students examine different areas of application, including economic regulation, environmental regulation, antitrust, and product liability. Guest speakers include leading scholars from throughout the university and business and government leaders.

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 examining the elements of a consulting engagement, including selling the engagement, scoping the project, contracting with the client, forming the consulting team, creating consultant/client work teams, defining deliverables, developing a work plan, conducting analysis, creating a communication and change plan, managing the project, overcoming resistance and barriers, developing recommendations, presenting the deliverables/implementation plan, and developing potential follow-on work.

The course 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. Swiwnski. A well-defined strategy is essential for business success—the class 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 580 Non-Profit Management
Spring 1.5 credits. I. Azis. This course will address topics on nonprofit management, including corporate responsibility, board development and responsibility, fund-raising and social marketing, measuring success, corporate-NPO/NGO partnerships, and nonprofit accounting and law.

International Management

NBA 524 Macroeconomics and International Trade
Spring, 3 credits. I. Azis. This course applies basic macroeconomic theories 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 policies and discerning users of economic analyses and forecasts.

NBA 536 Economics of Japanese Business and Government
Spring 1.5 credits. H. Morita. This course introduces several distinctive features of Japanese labor market and management practices, customer-supplier relationships, the financial and corporate governance system, and government-business relationships. We analyze interconnections among these features by developing theoretical frameworks and conducting case studies.

NBA 548 International Political Risk Management
Spring 1.5 credits. E. Iatikova. While political risks 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 integration, 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 flirtations with reform and its implications in China are just a few examples of the changing world environment of business. Topics include developments in western and eastern Europe, the former Soviet Union, the Pacific Rim, Central and South America, 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, including France, Germany, the United Kingdom, and Italy—for lessons the United States might learn and use. Students investigate the impact in each of those countries of government policies on the global competitiveness of the countries' 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 Strategies
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, and the use of resources to gain competitive advantage, and strategies to confront competitors, both domestic and multinational.

NBA 585 International Management
Spring. 1.5 credits. A. Un.
This class focuses on the challenges associated with managing operations of companies whose activities cross national boundaries. Understanding how to manage in multinational corporations is extremely important because, collectively, multinationals account for more than 40 percent of the world’s manufacturing output and 25 percent of world trade. While not all multinationals are large, most large companies in the world are multinational. In these firms, successful managers have overseas work experience and know how to manage multinational organizations.

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 process in which business people, investment bankers, and lawyers work together to structure transactions across national borders. The reading will cover the basic business and legal issues most frequently encountered in international mergers and acquisitions. Class discussion will occasionally refer to the reading but will generally cover other issues.

NBA 590 Business in Transition Economies
Fall. 1.5 credits. E. Iankova.
This half-semester course will explore business development in the transition economies of central and eastern Europe and Russia. The legacies of corporate life under the Soviet model, as well as the political, economic, and legal environment of business in transition economies will be discussed. The course will then focus on the emergence and consolidation of new business organizations and strategy in the course of privatization. It will also examine foreign investments and foreign investors’ strategies in the region, with special emphasis on business lobbying and business strategies for political risk mediation. Issues of corporate governance and control, entrepreneurship, and management strategy and structure will be discussed. To understand better the pressures for change in transition economies, students will become involved in problem-solving using case discussions of organizations and ventures operating in different sectors of the transition economies. Focus areas include agriculture, manufacturing, pharmaceuticals, and the high-tech industries.

NBA 592 Experience in International Management
Spring. 1.5 credits. J. Katz.
The objective of this course is to combine classroom sessions and international experience with an increased awareness of business environments outside the United States. Participation in a faculty-approved study trip is required to complete this course (fee charged). On trips, students visit local businesses, subsidiaries of foreign multinationals, government officials, local business school students, and others. Students must also attend two pre-trip meetings (1 1/4 hours each) and two Saturday meetings during spring semester (2 1/2 hours each). Those meetings are usually used to present information on international business conditions, industrial structures, management styles, and also to develop cross-cultural skills. A final paper, integrating the material learned in the classroom with their experiences, will be required.

NBA 593 International Entrepreneurship
Spring. 1.5 credits. M. Goldman.
Venture capital firms, corporate venture funds, and "angels" have increased their funding in high-growth start-up activities outside of their countries of origin. This course provides an overview of the diffusion of entrepreneurship institutions outside of the U.S. via a variety of structural forms of start-up finance (i.e., family backing, intrapreneurship). It also focuses on the process of selecting, financing, managing, and exiting venture capital deals abroad. The course is designed to provide practical insights through the participation of guest speakers involved in various stages of international entrepreneurship activities (e.g., European corporate funds in the U.S., venture capital firms in Europe, U.S.-based venture capital and "angel" initiatives investing abroad).

NBA 595 Economics of Financial Crises
Spring. 1.5 credits. I. Azis.
The main purpose of this course is to familiarize students with the analysis of the causes, nature, and consequences of financial crises, and equip them with analytical tools to better understand the economics of financial instability and alternative strategies for dealing with them. The first part of the course concentrates on financial instability/crisis by way of explaining the empirical episodes of the crisis in various emerging market countries, and elucidating the relevant theoretical concepts in each of the cases. The second part is devoted to discussions of post-crisis episodes, emphasizing the different paths of recovery and patterns of policy responses. The latter includes financial and monetary policies and the unsettled relationship between interest rates and exchange rates.

NBA 599 Business and European Enlargement
Fall. 1.5 credits. E. Iankova.
This half-semester course will explore the impact of the ongoing process of eastern European enlargement on business development in the region. Basic concepts of European integration will be discussed, including the foundations, institutions, and common policy of the Union and business lobbying at the European level. The course will further outline the role of business in European integration, with special emphasis on processes of enlargement. It will also examine the process of development of multinational corporations with operations in Europe, and one of individual companies in some of the applicant countries from central and eastern Europe. The conditionality of European accession will be discussed from the business perspective, with special emphasis on environmental protection, work conditions, and the free movement of labor in an enlarged Europe. To understand better the pressures for change in the new Europe, as well as the challenges from the EU, students will become involved in problem-solving through case discussions.

NBA 625 International Marketing
Fall. 1.5 credits. J. Katz.
This course is designed to train students to take a domestic product and successfully expand it into international markets. Market selection, international market research, and international marketing strategies are discussed. The term project (submitted in three parts throughout the term) requires students to choose a product and develop a plan for taking it abroad. Because each class includes cases, class preparation is essential. Grading is based on the term project, a final, and class participation. Core marketing provides a useful background but is not a prerequisite.

Management Information Systems

NBA 518 Introduction to Data Management Systems
Spring. 1.5 credits. J. Gehrenk.
The course introduces modern data management systems and their use in the business context. The focus is on the capabilities of modern database systems and their role in the enterprise instead of going into technical detail. Concepts covered include data models and modeling, query languages, transactions, database tuning, application servers, service-oriented and three-tier architectures, capacity
planning, and data mining. Students will perform several hands-on exercises involving a commercial database system.

NBA 600 The Strategic Role of Information Technology
Spring. 3 credits. D. Greenberg.

Beyond the hype surrounding the rise and fall of the dot-com era, information technology has had a wide-ranging impact on business activities. For instance, search costs and transaction costs have plummeted, while concurrent pricing and organizing commercial transactions have emerged. Such changes are affecting how firms are managed as well as how they interact with their customers, employees, and business partners. This course explores how firms can use information technology to create business value and explores strategies that can help ensure they capture part of that value. We will examine small and large companies in a variety of industries, including financial services, travel, retail, software, and manufacturing. Prior knowledge of information technology is not presumed; relevant technologies will be covered in class or in assigned readings. The course format is a combination of lectures and cases.

NBA 601 Electronic Commerce
Spring. 3 credits. Letter/S-U optional grading. L. Orman.

Electronic commerce is the use of information technology in conducting economic transactions and managing businesses over computer networks. It is a phenomenon that has captured the public for its wide-ranging implications for businesses, markets, public institutions, and the general public. Electronic commerce involves a wide variety of cooperating technologies such as 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 new technologies and new combinations of existing technologies to support management. On occasion, it radically altered business practices and the role of management.

The students in this course learn to conduct economic transactions and manage businesses on the Internet. Technological and managerial issues are covered through computer exercises on the Internet, and case studies and examples of businesses on the Internet.

NBA 608 The Business of Biotechnology: Taxonomy and Analysis
Spring. 1.5 credits. B. Ganem.

Breakthrough scientific discoveries in biotechnology will continue to drive medical advances in the new millennium. As it now enters the post-genomic era, the field of biotechnology comprises some 1,400 U.S. companies having $13 billion in worldwide sales and $10 billion in research expenditures. This broad spectrum of biotech businesses presents numerous challenges to professional securities analysts attempting to track progress and map future growth in this sector. This course presents practical concepts from the behavioral sciences that can serve as guides to managerial action. Lectures, cases, and exercises are used to acquaint students with new perspectives on decision making, critical thinking, problem solving, and group processes. Taken together, the course materials offer a trouble-shooter's guide to the uncertainty, complexity, and conflict in the business world.

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 dramatically 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 communications. Advances in computer technology emphasizing the fundamentals behind the increases in processing power, video and computer graphics capabilities, and network transmission will be presented. The latter half of the course covers the effect of these scientific advances on many discipline-specific areas including photography, the film industry, the entertainment and animation industry, broadcasting, publishing, as well as the computer industry itself. Sessions are devoted to the social and legal issues rising from the rapid advances in electronic communication. In attempting to predict the disruptive changes of the future, it is best to understand the technologies themselves. 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 issues, and ethics. 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 barriers 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 also 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, cases, and exercises are used to acquaint students with new perspectives on decision making, critical thinking, problem solving, and group processes. Taken together, the course materials 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 interdependent parties. The purpose of this course is to understand the theory and processes of negotiation as it is practiced in a variety of settings. This course is designed to complement the technical and diagnostic skills learned in other courses. 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 behavior to address questions such as what is the difference between leadership and management? how does a leader establish trust and commitment to an organization? and how do leaders transform organizations? The course consists primarily of case studies of leaders, but also includes teamwork and group activities. Course grade is based on class participation, group case analyses, and 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 perspectives found in the classic texts 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 for 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 (and career) 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 these concepts and principles to analyze cases. In our discussions, we will seek to understand 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 an opportunity to develop a personal values statement to help guide personal learning plans and align them with career aspirations. The course employs a web-based, follow-through support system to facilitate further leadership growth by prompting students regularly to assess and document their progress. 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 analytical skills to develop optimal solutions to problems, a broad array of negotiation skills is needed in order for these solutions to be accepted and implemented. The course is largely experiential, providing students an opportunity to develop their skills by participating in negotiations and integrating their experiences with the principles presented in the assigned readings and course discussions. Students who have taken NBA 666 cannot take this class.

**Marketing**

**NBA 620 Marketing Research**

Fall. 3 credits. Prerequisites: NCC 501 and NCC 503, or the equivalent. S. Gupta.

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 marketing design, qualitative research measurement, data collection, and analysis. The emphasis is on evaluating research methods and on interpretation and use of results rather than on mathematical derivations. Students are also exposed to the practical side of marketing research through case studies, problem sets, and projects.

**NBA 621 Marketing Communications**

Fall. 1.5 credits. Prerequisite: NCC 503 (marketing core). D. Stayman.

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 of the issues involved in advertising planning and decision making. They also learn how recent social-science findings and theory can facilitate advertising management.

**NBA 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 create new shifts 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 (handled primarily by the respondents and data analysis), and self-chosen product category. The method of instruction consists of a combination of lectures and discussion of cases and articles. Performance for the course is largely based on exams and the group project.

**NBA 626 Consumer Behavior**

Fall. 3 credits. S. Chatterjee.

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 on-line industry, business models for the Internet, advertising and promotions on the Internet, marketing research on the Internet, loyalty programs for Internet marketing, and disintermediation or channel conflict resulting from Internet distribution. The course is comprised of industry speakers from Cendant, CSC, Netcentives, H-P, 1st USA, Catalina marketing, Bausch and Lomb, and others. Course requirements include written-up assignments on a subset of speakers, and a report and presentation on an Internet marketing issue of the student's choice. NBA 638 is restricted 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 decisions. Unlike marketing courses that focus on conceptual material, this course will provide skills to translate conceptual understanding into specific operational plans—a skill in increasing demand in organizations today. 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 learn 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 506, OR/IE 410, or permission of the instructor. D. Stayman.

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 concept of modeling, and creating objective presentations 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 500-502 Directed Reading and Research
Fall, spring, 1, 2, or 3 credits. Staff.
Students undertake special-interest 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 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 concept of modeling, and creating objective presentations 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.

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 replicate the results of one of the papers, requiring the participant to write the necessary code and briefly discuss their findings.

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 507 Doctoral Seminar: Affect and Cognition
Fall. 3 credits. Prerequisites: courses in statistics and experimental design. A. Isen.
The course examines research on some of the ways affect influences such thought processes as memory, decision making (including risk taking), and problem solving (including creative problem solving). Applied topics relevant to management concerns (for example, organizational behavior and consumer behavior) as well as other theoretical and applied topics (among them medical decision making, social interaction, self-concept, and cognitive and affective development) are considered, depending on student interests.

NRE 518 Marketing Models
Spring. 3 credits. Y. Park.
This course is a study of model-based research in the marketing literature. The goal of the course is to promote an understanding of the cultural assumptions we bring to 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 concept of modeling, and creating objective presentations 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.

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 reviews selected topics 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. Michaeley.
This course covers the foundations 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

NMI AND NRE RESEARCH AND ADVANCED STUDIES

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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
BenDaniel, 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. Noyes Professor of Business Administration
Bloomfield, Robert J., Ph.D., U. of Michigan. Assoc. Prof., Accounting
D'Souza, Julia, Ph.D., Northwestern U. Assoc. Prof., Accounting
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
Hass, Jerome E., Ph.D., Carnegie-Mellon U. Prof., Finance and Business Strategy
Hilton, Ronald W., Ph.D., Ohio State U. Prof., Accounting
Hribar, S. Paul, Ph.D., U. of Iowa. Asst. Prof., Accounting
Huttonlocher, Daniel P., Ph.D., Massachusetts Inst. of Technology. John P. and Rilla Neufsey Professor. Computing and Information Systems and Business
Ilsen, Alice M., Ph.D., Stanford U. S. C. Johnson Prof., Marketing
Jarrow, Robert A., Ph.D., Massachusetts Inst. of Technology. Richard A. and Susan E. Lynch Professor of Investment Management, Prof., Finance and Economics
Johnson, Justin, Ph.D., M.I.T. Asst. Prof., Economics
Kadiyali, Winnda, Ph.D., Northwestern U. Assoc. Prof., Marketing and Economics
Lee, Charles M. C., 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, Elisabeth, A., Ph.D., U. of Chicago. Assoc. Prof., Management and Organizations
McAdams, Alan K., Ph.D., Stanford U. Prof., Managerial Economics
McClain, John O., Ph.D., Yale U. Prof., Operations Management
Michael, Roni, Ph.D., New York U. Prof., Finance
Nelson, Mark W., Ph.D., Ohio State U. Prof., Accounting
O'Connor, Kathleen, Ph.D., U. of Illinois. Assoc. Prof., Management and Organizations
O'Hara, Maureen, Ph.D., Northwestern U. Robert W. Purcell 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
Smidt, Seymour, Ph.D., U. of Chicago. Nicholas H. Noyes Professor of Economics and Finance, Director, Leadership Skills Program
Stayman, Douglas M., Ph.D., U. of California at Berkeley. Assoc. Prof., Marketing
Sun, Jayanthi, Ph.D., New York U. Asst. Prof., Finance
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. Asst. 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
Weinstein, David, Ph.D., New York U. Asst. Prof., Finance
Zhang, Rachel, Ph.D., Northwestern U. Asst. Prof., Operations Management
Zhang, Xiaoyan, Ph.D., Columbia U. Asst. Prof., Finance

Lecturers
Katz, Jan, Ph.D., Massachusetts Inst. of Technology. Sr. Lec., International Business and Marketing
Mink, Barbara E., M.A., Cornell U. Sr. Lec., Management Communications
Pike, Alan S., M.A., Cornell U. Sr. Lec., 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
Sears, Peter A., J.D., Harvard U. Visiting Lecturer, Vice President, Business Investments, Smith Kline Beecham Corporation
ADMINISTRATION

John A. Siliciano, interim dean and professor of law
Gary J. Simson, associate dean for academic affairs and professor of law
Claire M. Germain, law librarian and professor of law
Harry B. Ash, associate dean for external relations
Richard D. Geiger, associate dean and dean of admissions and financial aid
Anne Lukingbeal, associate dean and dean of students
Karen V. Comstock, assistant dean for career services
Charles D. Cranston, assistant dean for graduate legal studies
John R. DeRosa, assistant dean for student services
Richard F. Robinson, assistant dean for administration and finance
Nan A. Colvin, registrar

LAW SCHOOL

The primary function of the Law School is to prepare attorneys for both public and private practice where they will render the highest quality of ethical and professional service to their clients and further legal progress and reform. The curriculum is designed to prepare students for admission to the bar in all American states and territories.

Ordinarily, a student who is admitted to the Law School must have a baccalaureate degree from an approved college or university. The course of study leading to the degree of Doctor of Law (J.D.) covers three academic years. Students may be admitted to a program of study leading to the degree of Doctor of Law “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. degree in international and comparative law.

There are 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 Universite de Paris I (Pantheon-Sorbonne), L’Institut d’Etudes Politiques de Paris, and Humboldt University, as well as a special opportunity for highly qualified undergraduates in the College of Arts and Sciences to register in the Law School during their senior year.

Each year the graduate program of the Cornell Law School admits a limited number of students, generally all from abroad. The LL.M.

degree (Master of Laws, Legum Magister) and the J.S.D. degree (Doctor of the Science of Law, Jurisprudentiae Scientiae Doctor) are conferred. A small number of law graduates may also be admitted as special students, to pursue advanced legal studies without seeking a degree.

For further information, refer to the Law School catalog, which may be obtained from the Office of the Registrar, Myron Taylor Hall.

FIRST YEAR COURSES

LAW 500 Civil Procedure
Full year. 6 credits. S-U option unavailable.
K. M. Clermont, B. J. Holden-Smith, F. F. Rossi.
An introduction to civil litigation from the 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.
S. L. Johnson, T. W. Morrison, G. J. Simson.
A study of basic principles of American constitutional law, including judicial review, some structural aspects of the Constitution as developed in particular light of the passage of the Civil War amendments, and certain of its rights provisions.

LAW 504 Contracts
Fall. 6 credits. S-U option unavailable.
R. A. Hillman, R. S. Sumner, R. H. Sumner.
An introduction to the nature, functions, and processes of exchange, contract, and contract law. The course focuses on the predominant rules and principles governing contract and related obligation, including the substantive reasons underlying the rules and principles.

LAW 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
Fall. 4 credits. S-U option unavailable.
E. M. McKee, A. J. Moorey.
Lawyering is a full-year course designed to introduce 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. For example, students prepare preliminary memoranda for their "boss," pointing out the strengths and weaknesses of their client’s case, and attempting to develop winning arguments. 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. Students determine and investigate the essential facts to support their client’s case by interviewing or deposing various witnesses. 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
Spring. 4 credits. S-U option unavailable.
A. Riles, E. L. Sherwin.
An introduction to the law of protection of ownership, including the beginnings of property, estates in land, concurrent ownership, landlord/tenant relations, and public and private regulation of land use.

LAW 515 Torts
Fall. 4 credits. S-U option unavailable.
An introduction to the principles of civil liability in the tort field: intentional wrongs, negligence, and strict liability. Attention is also given to the processes by which tort disputes are handled in our legal system.

GRADUATE COURSES

LAW 605 Advanced Legal Research—U. S. Legal Research for LL.M. Students
Fall. 1 credit. Graduate program grading—H, S, U. Limited to graduate students. P. G. Court.
This course will introduce LL.M. students to basic legal research in U.S. materials that will be valuable to them in their course work at Cornell and in practice. The focus will be on understanding and finding primary legal sources, including statutory codes, session laws, administrative regulations, and court decisions, as well as explanatory materials, such as law reviews and treatises. To a large extent, instruction will use online materials that are most likely to be available to the students in their future careers. There will be short introductory lectures, as well as hands-on computer lab and Reading Room sessions. The textbook will be Basic Legal Research: Tools and Strategies, 2d ed., 2003. Students will complete five assigned exercises using the resources learned in class, and there is no final exam. The final grade will be based on the five assigned exercises (20% each).

LAW 622 Contracts in a Global Society
This course is designed for foreign-trained lawyers who are familiar with basic contact
law in their own country. It surveys the Anglo-American common law of contracts and related civil obligations. The pedagogic approach focuses on the case method and is Socratically based, similar to the traditional first-year course in Contracts. Graduate students who wish to study contract law would generally be expected to take this one-semester course. They are free to enroll instead in the first-year Contracts course, but if they do so, they must take that course for the full year.

**LAW 676 Principles of American Legal Writing**
Fall, spring. 2 credits. Graduate program grading—H, S, U. Limited to graduate students. Limited enrollment. This course provides foreign-trained lawyers with an introduction to the essential principles of legal writing in the United States and an opportunity to practice some of the forms of writing common to American legal practice. Students will prepare such documents as client letters, memoranda, pleadings, and discovery demands in the context of representing a hypothetical client.

**LAW 799 Thesis**
Fall, spring. 5 credits. Graduate program grading—H, S, U, J.D./LL.M. program. S-U option unavailable. Limited to graduate students and students completing the joint J.D./LL.M. program. Arrangements for a master's thesis are made by the student directly with a faculty member. A faculty member may require the student to submit a detailed outline of the proposed thesis, as well as a summary of previous writing on the subject or other appropriate information. The work is completed during the academic year under the supervision of a law faculty member.

**LAW 800 Graduate Research**
Fall, spring. Limited to J.S.D. students.

**UPPERCLASS COURSES**

**[LAW Accounting for Lawyers**
2 credits. Not offered 2003–2004.]

**LAW 602 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, procedural modes of administrative policymaking, judicial review of agency action; and the oversight and control relationships between agencies and Congress or the President. The course provides a working familiarity with the fundamentals of administrative procedure, as well as a larger inquiry into the role of agencies in our constitutional system—and the effect of legal doctrine on shaping that role.

**LAW 604 Advanced Legal Research in Business Law**
Fall. 1 credit. S-U option available. Prerequisite: Legal Methods or Lawyering. J. M. Callihan. This course will introduce 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 will learn about specialized resources including financial reports, SEC filing, company financials, industry, and current industry and market research, and economic and financial data. The focus will be on research strategy and evaluation of resources. The course will include short lectures, hands-on computer lab sessions introducing students to commercial and free databases, and some instruction by a business librarian on database searching. There will be selected readings in lieu of a required textbook, and five assignments using the resources learned in class. There is no final exam, and the final grade will be based on the five assigned exercises (20% each).

**[LAW Advanced Torts: Privacy, Relational, and Economic Interests**
3 credits. Not offered 2003–2004.]

**LAW 609 Anatomy of a Deal: Entrepreneurial and Corporate Finance**
Spring. 2 credits. Recommended pre- or co-requisite: Corporations. S-U option available. K. K. Azzarelli. Topics will include an introduction to capital structure and corporate finance during the various stages of a company's growth. While reviewing basic corporate law concepts such as the interests and rights of debt and equity holders and basic financial accounting concepts, the course will focus on the interests and rights of preferred equity and debt holders. The remainder of the course will examine the anatomy of a deal and will include a review of the business and legal issues that arise, discussion of the principal players involved, and a close look at the agreements employed.

**LAW 610 Antitrust Law**
Spring. 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 U.S. protect competitive markets and limit the exercise of monopoly power. Topics include: price fixing, boycotts, and market allocation agreements among competitors; agreements between suppliers and customers; joint ventures; monopolization; and mergers.

**LAW 611 Arbitration Law and Practice**
Spring. 2 credits. S-U option unavailable. J. I. Gross. 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 employees, 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 will explore the doctrines governing arbitration, including arbitrability, arbitral due process, and judicial review of arbitration awards. In addition, this course will provide an introduction to the practice of arbitration, including drafting claims, engaging in discovery, conducting pre-hearing conferences and hearings, and filing post-hearing submissions.

**[LAW Banking Law and Regulation**
3 credits. Not offered 2003–2004.]

**[LAW Bioterrorism and Public Health Law**
2 credits. Not offered 2003–2004.]

**LAW 616 Comparative Law: The Civil Law Tradition**
Fall. 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 Africa and Asia). The course will therefore provide a broad overview of "civil law" 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 Comparative Public Law**

**LAW 619 Conflict of Laws**
Spring. 3 credits. S-U option available. G. J. Simson. This course focuses primarily on the "choice-of-law" methods used by courts in the United States to decide the applicable law in cases that, in their parties or events, involve more than one state or country. The course examines in detail the nature, logic, and constitutionality of such methods. In addition, the course devotes substantial attention to recognition and enforcement of judgments and, in particular, to the obligations imposed by the Constitution's Full Faith and Credit Clause to respect the judgments of other states' courts.

**LAW 620 Constitutional Law II: The First Amendment**

**LAW 623 Copyright**
Fall. 3 credits. S-U option unavailable. P. W. Martin. 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 interest (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, it touches on issues of trademark and right-of-publicity law as they overlap or complement copyright.

**LAW 624 Corporate and White Collar Crime**

Fall. 3 credits. S-U option available. S. P. Garvey.

White collar crime is one of the fastest growing areas of specialization in the legal profession today. The collapse of the savings and loan industry, corruption in the health care industry, and most recently the Enron scandal have contributed to a dramatic increase in federal white collar crime prosecutions over the past twenty years. This course examines some of the principal statutes used to prosecute corporate and white collar crime. Theories of liability we will consider include traditional white collar offenses like mail and wire fraud, insider trading, false statements, perjury, and obstruction of justice. They also include more recent entries into the field such as RICO, money laundering, and laws enacted to combat government contract fraud. In addition the course provides an introductory look at the workings of the Federal Sentencing Guidelines.

**LAW 625 Corporations**

Fall, spring. 4 credits. S-U option available. Limited enrollment. A. Chander, S. F. Diamond.

An introduction to the business corporation laws affecting the rights and roles of corporate boards of directors, senior executive officers, and shareholders, with an emphasis on large, publicly traded firms. Shareholders' economic interests are examined from the perspective of limited liability and dividend standards, expectations of liquidity or transferability of shares, and the use of debt capital as a mode of financing corporate activity. Shareholders' limited participation rights in corporate decision making are examined from the perspective of state and federal rules governing shareholder voting and the disclosure of information and the notion of managerial expertise (e.g., as evidenced by judicial application of the "business judgment rule"). The course also considers directors' and officers' fiduciary obligations to shareholders, examining the operation of these duties in a variety of settings and transactions. Issues relating to the role of business corporations within society are also addressed. No previous business knowledge is assumed.

**LAW 626 Criminal Procedure**

Fall. 3 credits. S-U option available. J. H. Blume.

This course surveys the law of criminal procedure, with emphasis on the constitutional constraints that regulate 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 Current Topics at the Crossroads of Law and Finance**


**LAW 629 Debtor-Creditor Law**

Spring. 4 credits. S-U option unavailable. T. Eisenberg.

In part, a study of Article 9 of the Uniform Commercial Code, which governs the procedures for achieving the status of a secured creditor in personal property and the rights one obtains by becoming a secured creditor. Also, selected topics in the law of bankruptcy. An overview of the various bankruptcy chapters and a detailed study of the bankruptcy provisions of most general applicability. The relationship between the rights of the 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 conveyances.

**LAW 630 Directed Reading**

Fall, spring. 1 or 2 credits. Must be taken S-U. Arrange directly with instructor. See page 18 of the Law School Catalog and 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 632 Education Law**

Fall. 3 credits. S-U option available. M. Heise.

This course focuses on selected legal issues that arise in the private and public education context, with emphasis on the elementary and secondary school setting. Topics considered include the legal and policy dimensions of the rights of students, parents, educators, and the state with respect to such issues as access to control over, and regulation of the education setting and institutions. Issues germane to equal education opportunity, school finance, and school governance and regulation receive particular attention.

**LAW 633 Employment Law**

Spring. 3 credits. S-U option available. S. J. Schwab.

Survey of major statutory schemes and common law doctrines that affect the employee-employer relationship in the private sector, other than laws regulating union formation and collective bargaining, which are covered in Labor Law. Topics covered include unjust dismissal, drug testing, free speech, privacy, and antidiscrimination laws, as well as wage and hours laws, employee benefit regulation, and safety and health regulation.

**LAW 636 Environmental Law**


The course surveys the major environmental laws, with a primary focus on federal statutes. Emphasis will be placed on the various sources of liability to both individuals and corporations from common law, statutory provisions, administrative regulation and enforcement policy. Corporate successor liability through mergers and acquisitions will be included. Discussing the increasing importance of determining a full range of due diligence review for environmental conditions in such transactions. Special attention is paid to the economic, social, and political obstacles to efficient regulation of the environment.

**LAW 638 Estate Planning**

Fall. 2 credits. S-U option available. Limited enrollment. T. Eisenberg.

Related topics in the law of property in estate planning and at death, for substantial and moderate estates. Emphasis will be placed on the various statutory, administrative, and common law doctrines that affect the distribution of an estate in such transactions. Special attention is paid to the economic, social, and political obstacles to efficient regulation of the environment.

**LAW 640 Evidence**

Fall, spring. 3 credits. Limited enrollment. S-U option unavailable in fall only. F. F. Rossi, N. E. Roth.

The course focuses on the Federal Rules of Evidence, with some attention to how they diverge from the common law.

**LAW 641 The Evolving Law of Patents**

Fall. 2 credits. S-U option available. Limited enrollment. Y. M. Cripps.

The course will provide a general introduction to patent law, including an analysis of the meaning given by the Patent Office and the courts to novelty, non-obviousness, and utility. Biotechnology, which is at the leading edge of recent developments in patent law, will be a focal point of the course, frequently serving as a case study to illustrate many of the points of general principle. As is inevitable in any discussion of intellectual property law, international perspectives will be important. The course will involve presentation and discussion of papers in class in lieu of a final exam. Each student will write a 10-15 page paper that will be presented in class as well as orally. Brief written critiques of the other students' papers.

**LAW 642 Family Law**

Fall. 3 credits. S-U option available. M. L. A. Fineman.

Broadly understood, family law is the study of state-imposed rules regulating intimacy and intimate 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 all 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 children's custody, support, property distribution, and spousal maintenance. Other topics considered include definitions, policy, 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**

Spring. 4 credits. Availability of S-U option to be announced first day of class. Prerequisite: Constitutional Law and second semester of Civil Procedure; students without such background should consult with the instructor. C. R. Farina.

This course examines the various constitutional and judge-made doctrines that control access to the federal courts to vindicate federal rights. It is particularly valuable for those planning a career in public interest or the public sector, anyone else expecting to litigate extensively in federal court, and students who have or hope to obtain a judicial clerkship. Topics covered include: case or controversy limitations, including standing; constitutional and statutory limits on jurisdiction; causes of action for constitutional and statutory rights, including 42

relations and government benefit eligibility) will be considered.

**LAW 644 Federal Judges**

Spring. 3 credits. Limited enrollment. J. A. Blumkin.

This course provides a general introduction to the role of the federal judiciary, including an analysis of the meaning given by the Federal Judicial Council and the courts to the role of the judiciary. The course will involve presentation and discussion of papers in class in lieu of a final exam. Each student will write a 10-15 page paper that will be presented in class as well as orally. Brief written critiques of the other students' papers.

**LAW 645 Federal Taxation**

Spring. 3 credits. S-U option unavailable. J. A. Blumkin.

This course provides an introduction to the federal income tax system, including its legal and economic underpinnings, legislative framework, and enforcement mechanisms. The course will cover the basic principles of income taxation, including the definition of income, the determination of the tax liability of individuals and corporations, and the administration of the tax system. Special attention will be paid to the role of the federal tax system in promoting economic growth and social welfare, and to the challenges faced by policymakers in designing and implementing a just and efficient tax system.
LAW 644 Federal Income Taxation
Fall, spring, 4 credits. S-U option available. Limited enrollment. R. A. Green, E. A. Zelinsky.
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 649 The IPO Process and Deal Structure Alternatives
Fall, spring, 3 credits. S-U option available. Prerequisite: Corporations. Limited enrollment. Z. Z. 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, due diligence, 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 transaction 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/collars, letters of intent, successor liability, continuity of employees, and noncompetition agreements and reacting to hostile bids.

LAW 650 Intellectual Property in Cyberspace
Fall. 3 credits. S-U option available. M. Sunden.
Intellectual property law is being adapted rapidly to the new demands of a digital world and is quickly expanding in cyberspace. But many scholars warn that the expansion of intellectual property rights in cyberspace is giving property owners greater rights than they ever had with respect to control and profit from information. Worse still, many fear the expansion of intellectual property in cyberspace threatens an ever shrinking public domain, or intellectual commons, from which artists and inventors may borrow old ideas to build new ones. This class will critically consider the role of intellectual property laws (including copyright, trademark, and patent) emerging to meet the competition of Internet and digital technologies that enhance human abilities to access, copy, store, manipulate, and transmit vast amounts of information. We will question whether it is appropriate to map existing legal concepts onto problems arising in cyberspace; whether it is necessary to go back to the first principles of intellectual property law to maintain a balance between private control and public access; and whether new laws are upsetting the balance between freedom and control. There are no course prerequisites. Students will be required to complete a take-home examination at the end of the course.

LAW 651 International Commercial Arbitration
Fall, spring. 3 credits. S-U option available. J. J. Barcello 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 selection of an arbitrator, enforcement of agreements to arbitrate, challenging arbitrators, procedure and choice of law in arbitration proceedings, and enforcement of international arbitral awards. The course gives 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 on 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 655 International Human Rights
Spring. 3 credits. S-U option available. Recommended prerequisite: Public International Law. D. Wippman.
This course explores the development and effectiveness of international legal rules governing the conduct of a state toward people within its jurisdiction. Topics include the substance and principles of human rights and their philosophic basis; the mechanisms for the protection of human rights, such as the United Nations, international human rights treaty bodies, and domestic courts; and current issues such as the doctrine of humanitarian intervention, transitional justice, and human rights during armed conflicts.

LAW 657 International Organizations and International Human Rights Institutions
Fall. 3 credits. S-U option unavailable. M. B. Nolte.
The course provides a comprehensive legal analysis of problems concerning membership, the structure of the United Nations organs and a variety of other international organizations. It considers their functions and acts taking into account the United Nations Charter and texts establishing these organizations. 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 and the International Criminal Court. It also examines 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 and the Inter-American Court of Human Rights. Relevant decisions of these courts and of municipal courts are studied as well as basic documents.

LAW 658 International Taxation
Spring. 3 credits. S-U option available. Prerequisite: Federal Income Taxation. E. A. Zelinsky.
This course will explore the U.S. tax treatment of U.S. citizens and corporations which invest and earn income abroad and the U.S. tax treatment of aliens and foreign corporations which invest and work in the United States. The course will emphasize both the current statutory framework and the alternatives available in an increasingly globalized economy.

LAW 659 Labor Law
Fall. 3 credits. S-U option available. K. V. W. Stone.
A study of the law regulating employee collective action and labor unions. Topics include union formation, strikes and other economic weapons, antitrust law and enforcement of collective agreements, the duty of fair representation, the application of antitrust law to union activity, and the relationship between federal labor law and local laws regulating the employment contract. The course also explores how recent changes in the employment relationship effect forms of employee representation.

LAW 660 Land-Use Planning
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 national 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 promulgate 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 necessary partners: ministries of justice, nongovernmental organizations, bar associations, or others? Issues will be illustrated by case studies drawn from Eastern Europe, Asia, Latin America, and Africa. Social change topics will range from women's rights, gender
and the family, to democracy-building and environmental protection. Course requirements are two short “think pieces” (2–3 pages), and a final analytical paper of 10–15 pages on a student-selected topic.

**LAW 663 Law for High Growth Companies**
Spring. 3 credits. S-U only for fall 2003. Prerequisite: for fall 2003, students can enroll in LAW 663 only if they are simultaneously participating in the Entrepreneurial Legal Services program. Z. J. Shulman.

An in-depth analysis of key issues that an emerging high growth business must consider and address, including: (i) choosing type of business entity, (ii) protecting confidential information and inventions, (iii) sources of capital (in both bull and bear market environments), (iv) understanding capitalization structures (common stock, preferred stock, warrants, etc.), (v) use of stock options as employee incentives, (vi) fundraising, and (vii) initial public offerings. The course will focus on the foreign lawyer role and conduct.

**LAW 665 Law of Branding and Advertising: Trademarks, Trade Dress, and Unfair Competition**
Spring. 2 credits. S-U option available. N. D. St. Landau.

Fundamental trademark, trade dress, and false advertising laws are examined in the context of assisting clients to execute branding and marketing strategies. Special focus is given to branding as it relates to: "consumer products companies," the impact of the Internet on business and trademarks, and the internet on branding and competition. This course examines the basics of this rapidly changing body of law.

**LAW 666 Lawyers and Clients**
Spring. 3 credits. S-U option unavailable. D. A. Kysar.

A survey and critique of (1) the law governing the practice of law and the legal profession's norms concerning the lawyer-client relationship; (2) the social functions of lawyers; (3) the modes and patterns in which legal services are or are not made available to the public; and (4) ethical theory relating to lawyer role and conduct.

**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 a commercial 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 investments to developing countries; guarantees to investors and investment codes; bilateral treaties; nationalization; joint ventures; transfer of technology; arbitration; investment insurance; unification of trade law; and the settlement of investment disputes.

**LAW 669 Legal Profession**
Fall. 3 credits. S-U option unavailable. S. A. Bernstein.

An overview of the practice of law, including attention to legal ethics and the sociology of the profession. Lawyers in private practice occupy center stage here, but the course also studies judges, prosecutors, in-house lawyers, and (very briefly) law professors in their professional roles. Similarly, disciplinary law as practiced by the Model Rules of Professional Conduct occupies center stage here, but we also consider responses to, or remedies for, lawyer misfeasance that criminal law, tort law, disqualification case law, civil procedure rules, and federal agencies have created. To consider some of what a lawyer's day-to-day work feels like, the course features occasional collaborative talks and a 'docket' with internal deadlines.

**LAW 670 Products Liability**
Fall. 3 credits. S-U option available. A. Bernstein.

An introduction to the legal framework governing the manufacture, sale, and distribution of products, with a focus on the common law of torts. The course will examine the legal framework relevant to a variety of problems drawn from or closely approaching actual litigation. The course will focus on the public international law principles and rules governing the investment of plan assets.

**LAW 672 Mergers and Acquisitions**
Fall. 3 credits. S-U option available. R. I. Balotti.

This course examines the principal business issues arising upon the formation, operation, and sale of publicly held companies (including hostile takeovers). Among the topics to be explored in the course are the Code and ERISA rules governing the investment of plan assets.

**LAW 673 Negotiation and Mediation:**
Spring. 2 credits. S-U option available. R. I. Balotti.

Negotiation and mediation exercises, and simulated mediations. This course will inquire into the theories and processes and will teach interviewing and counseling, negotiation and mediation as skill sets. A variety of approaches will be used to analyze issues and develop skill sets, including lecture/discussion, video tapes, negotiation exercises, and simulated mediations.

**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 676 Pension, Profit Sharing and Fringe Benefits Plans**
Spring. 3 credits. S-U option available. E. A. Zelinsky.

This course will examine the legal framework governing pension, profit sharing and fringe benefit plans. Much of that framework is contained in the Internal Revenue Code provisions governing qualified pension and profit sharing plans and the unique provisions of the Employee Income Retirement Security Act of 1974 (ERISA). Among the topics to be explored in the course are the Code and ERISA rules governing the investment of plan assets.

**LAW 68 Public International Law**
Fall. 3 credits. S-U option available. A. Henderson, Jr.

Applications of products-liability doctrine and theory to a variety of problems drawn from or closely approximating actual litigation. An overview of the relevant case law, statutes, and administrative regulations, including the new Restatement Third of Torts: Products Liability.

**LAW 681 Securities Regulation**
Fall. 3 credits. S-U option available. S. F. Diamond.

Capital formation is critical to the economic health of the U.S. and other nations. American capital markets have historically been the strongest in the world, but they have been under significant stress recently as a result of market declines and corporate failures. This course will examine the U.S. federal regulatory scheme for capital formation through the sale of equity and debt securities, focusing on the Securities Act of 1933. The course also focuses on financial and other disclosure requirements, and regulation of insider trading, under the Securities Exchange Act of 1934. Federal regulation of securities markets and broker-dealers, and regulation of accountants and lawyers who practice before the SEC, are also discussed. Federal regulatory requirements are explored in the context of the practical realities of structuring capital formation transactions, and advising public companies and other market participants in the post-Enron environment. Case law and regulatory developments will be considered through the use of hypothetical real-world fact situations.

**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, family, 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 online.

LAW 684 Sports Law
Spring. 2 credits. S-U option available. Recommended prerequisites: Antitrust Law and the Law of Labor
The course traces the development of sports law in the United States. Particular attention is given to the relationship of sports with antitrust and labor law. Contemporary issues involving urban planning, collective bargaining, amateur athletics, agents, criminal law, 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 page 18 of the Law School Catalog and 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 page 18 of the Law School Catalog and 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 and as mentors to first-year law students. With training and guidance from the Lawyering faculty, the Honors Fellows work closely and one-on-one with the students on the various writing 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 the 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 Fellows hold workshops on basic law school skills and, during the spring semester, under the direction of the Deans of Students, a small group of Fellows may tutor first-year law students.

LAW 689 Taxation of Corporations and Shareholders
Fall. 3 credits. S-U option available. Prerequisite: Federal Income Taxation. R. A. Green
This course examines the federal income taxation of corporate transactions, including incorporations, dividends, redemptions, liquidations, and reorganizations.

LAW 692 Trial Advocacy
Spring. 4 credits. S-U option available. Pre- or co-requisite: Evidence. Limited enrollment. G. G. Galbreath
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: voir dire, 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 does 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. 3 credits. S-U option available. E. L. Sherwin
The course surveys the basic law of the administration of property, including wills and intestate succession, and the law of trusts. Among the recurring themes of the course are the 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. Barcelo III
The law of the World Trade Organization (WTO), including international trade theory, the basic WTO rules and principles limiting national trade, the WTO dispute settlement process. A study of national (U.S.) fair and unfair trade law within the WTO framework (safeguard, antidumping, subsidies and countervailing duty remedies). Consideration will also be given to non-trade values within the WTO system (environment, labor rights, and human rights).

LAW 699 Taxation of Corporations and Shareholders
Spring. 3 credits. Limited enrollment. B. J. Holden-Smith
This seminar explores the development and effectiveness of the mechanisms of domestic court and administrative bodies 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 will be required to undertake a research project on a specific case and make a presentation on the case to the class.

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 court and administrative bodies 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 will be required to undertake a research project on a specific case and make a presentation on the case to the class.

LAW 701 African Americans and the Supreme Court

LAW 707 American Legal Theory
Fall. 3 credits. S-U option unavailable. Limited enrollment. R. S. Summers
The fall 2003 topic for this seminar is the appropriate form of basic types of legal phenomena such as criteria of valid law (for both publicly and privately made law), institutions such as legislatures and courts, statutory 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 lacks appropriate form in many important ways and a heavy price is paid for this. However, appropriate legal form and its distinctive underlying rationales (general legal values) profoundly affect the overall content of law and its practice by lawyers in the American as well as other legal systems. Such formality and its rationales have as much or more of a claim to primacy as the essence of law than do problem-specific policies that also inform the law's content; there is about equal emphasis on practical skills and theory.

LAW 708 Appellate Advocacy
Fall. 3 credits. S-U option unavailable. Limited enrollment. J. B. Atlas
This seminar will examine the law and skills that are integral to representing a client on appeal. The seminar will be 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 exploration include motion practice, leave applications, and the role of law clerks in the decision-making process. Students will read and analyze the record of a criminal proceeding, assess and research potential appellate issues, and prepare a brief (including a re-write) for either the prosecution or defense. Each student will also orally argue the case in a moot-court session.

LAW 709 Biblical Law
Fall. 3 credits. S-U option available. Limited enrollment. C. M. Carmichael
Analysis of law and narrative in the Bible from the perspective of ancient law and legal history. Topics include the nature of the law codes (e.g., hypothetical formulation versus statutory law), legal issues in the narratives (e.g., law of adultery and women's rights), law and morality (e.g., the Ten Commandments), law and religion (e.g., institutions guaranteed by the law but condemned by religious authority), the transformation of extralegal relations into legal ones (e.g., with the introduction of money), legal interpretation in antiquity (e.g., the Scrolls on the Mount), and 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 710 Business Law Workshop**  
Fall. 3 credits. S-U option unavailable.  
Prerequisite: Corporations or (for graduate students) an equivalent course elsewhere.  
Each week a different guest will present a business law topic to conduct the class. The guest will be practicing lawyers, former practicing lawyers and a judge. The problem will cover a wide variety of topics involving business law. Students will prepare, in teams of two persons each, a five-page paper on each week's topic and will be expected to discuss the topic in class. Each paper will be graded and the final grade, will be the average of the 12 papers.

**LAW 711 Children at the Intersection of Law and Psychology**  
Spring. 3 credits. S-U option available.  
This seminar, cross-listed 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 will concentrate on how courts, particularly family and domestic courts, use psychological and developmental information to reach decisions about children and families. Topics will 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 as the students may select.

**LAW 712 Comparative Civil Procedure**  
Fall. 3 credits. S-U option available.  
Limited enrollment: R. C. Goldstock.  
This seminar will concentrate on the primary structural similarities and differences between common law and civil law procedural systems, as well as within each procedural family, both in terms of first instance proceedings and the appellate process. Current cases will involve the “different procedural systems, particularly that of the proposed ALI/Unidroit Principles and Rules of Transnational Civil Procedure, will be examined in this regard. The seminar will also be concerned with comparative aspects of current attempts to reform the processes of civil procedure, such as the use of American “managerial” judges and English case allocation. In addition, it will deal with the comparative aspects of some specific procedural mechanisms, such as notice vs. fact pleading, discovery processes, class and other forms of representative actions, etc.

All seminar participants will be expected to prepare the reading assignments and participate actively in all discussions of the seminar. Each participant will also prepare a paper on a topic of his or her choice. The participants will be presented with a wide range of topics for this purpose, but they may also suggest topics on their own. Each paper will be followed by an oral presentation on his or her topic, which will be based on a preliminary draft of the paper, which will be circulated to all participants prior to the presentation. The grade for the seminar will be based primarily on the final draft of the paper, but it may be altered upwards or downwards by one or two steps of a gradation based on the oral presentation and performance in the seminar discussions.

**LAW 714 Comparative Constitutional Law**  
Fall. 3 credits. S-U option available.  
This seminar examines the rapidly changing face of Central European constitutional law. The seminar will begin by examining national constitutional/governmental structures, federalism regimes, mechanisms for judicial and administrative review of executive and legislative action, and modes of civil rights protection. The seminar will then analyze the increasingly important role played by transnational European legal institutions (especially the European Court of Justice and the European Court of Human Rights) in these areas. Finally, the seminar will address the complex relationship between the national constitutional orders and the European Union’s ongoing constitutional convention.

**LAW Constitutional Law and Political Theory**  

**LAW Consumerism**  

**LAW 716 Corruption Control**  
Spring. 3 credits. S-U option available.  
Limited enrollment: R. C. Goldstock.  
This seminar analyzes the types of corruption that exist in both the public and private sectors, the means by which a variety of criminal and non-traditional remedies may be used to reduce the frequency and impact of corrupt activities, and the constitutional and statutory problems implicated by such approaches.

**LAW Empirical Studies of Leading Civil Rights Issues**  

**LAW 720 The End of History? Comparative Corporate Governance in the Post-Cold War Era**  
Spring. 3 credits. S-U option available.  
Limited enrollment: S. F. Diamond.  
This seminar will explore the provocative proposition that corporate law has reached "the end of history" as suggested in a widely read article by Hansmann and Kraakman. The seminar will examine the classical tenets of the Anglo-American model of corporate governance, the alternative models found in Europe, Japan, and the new challenges facing the structure of the modern corporation and the surrounding financial markets. In addition to a review of the theoretical literature and leading scholarly efforts to advance this debate, we will examine several case studies, including the Vodafone/Mannesmann acquisition and the initial public offering of PetroChina, a major Chinese state-controlled oil company. Students will be expected to actively participate in weekly discussions and prepare a research paper on a topic related to the issues raised in the seminar.

**LAW Ethical Issues in Civil Litigation**  

**LAW 722 Ethical Issues in Criminal Practice**  
Fall. 3 credits. S-U option unavailable.  
Satisfies the professional responsibility requirement. Limited enrollment. C. Grumbach.

Using simulated problems, we will explore the ethical duties of and practical quandaries faced by prosecutors and criminal defense attorneys. As some examples, we will 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; and the obligation to disclose exculpatory evidence; the duties and dilemmas of the 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 will examine these topics in the context of hypothetical and famous trials that involve coaching, "playing the race card," and blaming the victim, or arrests based upon racial profiling or planted evidence. The writing assignments will be in the form of persuasive trial memoranda prepared on behalf of or to prosecute simulated clients. Sample issues might involve attorneys who face such quandaries 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 will hold mock hearings based upon these simulated cases.

**LAW 723 Ethnoracial Identity in Anthropology, Language, and Law**  
Spring. 3 credits. S-U option available. Limited enrollment: V. Santiago-Irizarry.

This seminar will examine the role that both law and language, as mutually constitutive mediating systems, occupy in constructing ethnoracial identity in the United States. We will adopt an approach to the law from a critical anthropolinguistic perspective. We will study the role and significance of sociocultural 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, and the creation and maintenance of differential power relations. Course material will draw on anthropological, linguistic, and critical race theory as well as ethnographic and legal material to guide and document our analyses.

**LAW 724 European Social Law**  
Spring. 3 credits. S-U option available. Limited enrollment: B. Caruso.

This seminar will focus on the process of political and social integration in the European Union. Topics will include EU social policy regarding antidiscrimination, immigration, and employment; the role of social and cultural values in the institutional structure of the new European Constitution; and the implications of European federalism for social regulation. Discussions will make comparisons between the EU and the United States experiences in the regulation of social policy.

**LAW 725 European Union Law**  
Spring. 3 credits. S-U option available. Limited enrollment: J. J. Barceló III.

The seminar studies the EU treaty, institutions, and lawmaking processes, the direct effect, supremacy, and reception of EU law in the member states; enlargement issues; the...
to assume that all or even most women have certain personality traits) and applies this perspective to the first-year curriculum. We revisit the seven courses seriatim, spending two classes on most of them. Each student will be an 'expert' in one first-year course, co-leading discussions twice during the term, and will also write a substantial research paper on an approved topic relating to feminism or gender and law. Students are encouraged to investigate potential topics before the semester begins.

LAW 728 First Amendment Theory
Spring. 3 credits. S-U option available. Limited enrollment. S. W. Yale-Loehr.
An examination of competing theories about the scope and justification of freedom of speech, freedom of press, and freedom of religion. The seminar will consider free speech theories focused on liberty, formal equality, self-government, public morality, dissent, and anti-domination; the relationship of various conceptions of democracy to freedom of press; and various conceptions regarding the optimal relationship between church and state. Among the more specific topics at issue in some of the readings are commercial speech, pornography, flag burning, subsidies of the arts, campaign finance, the structure of the mass media, government involvement with religious symbols, and vouchers to religious schools.

LAW 731 Immigration and Refugee Law
Fall. 3 credits. F-U option unavailable. Prerequisite: Constitutional Law. Limited enrollment. S. W. Yale-Loehr.
This course explores the evolving relationship between U.S. immigration policy and our national purposes. Immigration plays a central role in contemporary American life--significantly affecting our foreign relations, human rights posture, ethnic group relations, labor market conditions, welfare programs, public services, and domestic politics. It also raises in a acute form some of the most basic problems that our legal system must address, including the rights of insular minorities, the concepts of nationhood and sovereignty, fair treatment of competing claimants for scarce resources, the mass administrative justice, and pervasive discrimination. In approaching these questions, the course draws on diverse historical, judicial, administrative, and policy materials. 732

LAW 732 Immorality
Fall. 3 credits. S-U option available. Limited enrollment. S. P. Garvey.
Why do people act immorally? What is the moral psychology of wrongdoing? Are there different forms of immorality or wrongdoing? These are the basic questions this seminar addresses. We will survey six different forms of immorality: preferential wickedness, perverse wickedness, moral weakness, moral negligence, amorality, and moral indifference. We examine in particular how each of these different forms of wrongdoing is reflected in criminal wrongdoing, and we will question whether the criminal law should punish each of these different forms of wrongdoing in the same way, as it now does, or whether different forms of wrongdoing warrant different kinds of responses.

LAW 736 International Intellectual Property
Fall. 3 credits. S-U option available. Limited enrollment. M. Sunder.
From conflicts over access to AIDS drugs, copyright piracy, pharmaceutical patents on indigenous knowledge, and technology sharing between developed and developing countries, intellectual property has become a hot-button issue of global importance. This seminar will critically examine the conflicts and study the international legal regimes addressing them. Specifically, the seminar will consider: the underlying theories of international intellectual property protection; the multilateral and national frameworks for international intellectual property protection; whether intellectual resources are the...
"common heritage of mankind" or the proper subject of global property regimes; what kind of property regimes enable a fair and equitable distribution of wealth and resources between the developed and developing world; the cultural impacts of intellectual property forms, including protection for cultural resources, such as folklore and indigenous knowledge; authorship as a cultural value; and government takings of intellectual property, including compulsory licensing. Each student will prepare and present a substantial paper (approximately 30 pages in length) on an international intellectual property topic of the student's choice. Students will also be required to write two critiques (about 3 pages a piece) of two other students' papers, and to co-lead discussion of the critiqued papers. The seminar is best suited for students who have already taken at least one course in some area of intellectual property. Students who have not taken a previous course in intellectual property may apply for admission to the seminar, but students who have taken a previous course will get priority in admission.

[LAW Introduction to French Law 3 credits. Not available to students with significant knowledge of civil law system. Limited enrollment. Not offered 2003-2004.]

LAW 737 Introduction to Islamic Law Spring. 3 credits. S-U option available. Limited enrollment. D. S. Powers.

This seminar is designed to introduce law students to the terminology, principles, and concepts of Islamic law. In Part One, we will examine the historical formation of Islamic law and the development of its principles of jurisprudence. In Part Two, we will analyze court cases that took place in Morocco and Spain in the period between 1300 and 1500, with special attention to judicial procedure, personal status law, property law, and penal law. In Part Three, we will examine the modern transformation of Islamic law by focusing on the example of Egypt, addressing issues such as codification, legal reform, and constitutional law. Seminar discussions will be based largely on primary sources in English translation.

LAW 738 Juvenile Advocacy Fall. 3 credits. S-U option available. Limited enrollment. This seminar is the first half of a full-year offering that has as its second half the Juvenile Advocacy Motion and Appellate Clinic. Students admitted to the fall seminar are automatically admitted to the spring clinic and are required to take the spring clinic as well. C. Grumbach.

This seminar will be run as a simulated law office and class meetings will be run as weekly law office training sessions with students teaching their colleagues by way of oral presentation of interest to them that arise from simulated cases. Such topics might include: the role of the lawyer ("law guardian") in representing juveniles; the ethical, strategic, and treatment issues that arise when the client's expressed interest and "best interest" conflict; the application of criminal rights and defenses to delinquency proceedings; the disparate treatment of juveniles and adults on such matters as preventive detention of juveniles, the sufficiency of accusatory instruments, and interrogations and searches of juveniles suspected of criminal conduct or detained as truants or runaways; the disparate treatment of juveniles based on race; the use of PINS proceedings to control female teenagers; and the relationship between parental abuse, neglect, and emotional deprivation, and PINS and juvenile delinquency behavior. Based upon simulated case files, students will choose clients to represent and file various motions and legal memoranda before a designated judge. In this manner, students handle their persuasive writing skills and practice writing for a specific audience, learn to evaluate pleadings, and learn how to develop litigation theories and strategies and formulate a litigation plan. Students also develop their speaking skills through regular class presentations.

[LAW Labor and Social Policy 3 credits. Prerequisite: prior or concurrent course in labor law and permission of the instructor. Limited enrollment. Not offered 2003-2004.]

LAW 741 Law and Higher Education Spring. 3 credits. S-U option unavailable. Prerequisite: Constitutional Law or Administrative Law. Limited enrollment. J. J. Mingle.

Higher education is a complex, idiosyncratic institution. Universities and colleges have a unique mission—teaching, research, and public service—and a uniquely challenging task of accommodating the various constituencies and organizations, both internal (governing boards, faculty, students, alumni) and external (legislatures, courts, regulatory agencies) that influence how they are managed and how policies are shaped. This seminar explores the dynamic tensions, high expectations, and complex legal-policy issues universities and colleges face in fulfilling their mission.


LAW 744 Law and Social Movements in East Asia Spring. 3 credits. S-U option unavailable. A. Riles.

This seminar aims to rethink the anthropological understanding of law and of social movements, respectively, by considering how legal scholars, advocates, government officials, and activists conceive of the relationship between knowledge and politics. We will focus attention on a comparison of feminist theory and legal theory on the one hand, and gender and sexuality-focused social movements and bureaucratic and judicial action on the other. Readings will focus primarily, but not exclusively, on examples from East Asia.

One objective of the seminar is to experiment with a variety of possibilities and approaches anthropologists might wish to deploy in the ethnography of law and social movements. Towards this end, four weeks of the seminar will be devoted to engaging with the work of four anthropologists working on these questions from radically differing perspectives. These four anthropologists will come to Cornell to participate in our class discussions during the week in which we discuss their work.

The seminar will coincide with a conference on feminist and legal theory in East Asia


This seminar will examine violence against women from both theoretical and practical perspectives. The seminar begins with a general introduction to various feminist theories, including among them: equality feminism, difference feminism, dominance feminism, anti-essentialism feminism, and postmodernism. We will examine these feminist theories to provide us with frameworks for analyzing concrete manifestations of violence against women in society, including: domestic violence, rape, sexual harassment, pornography, and prostitution. The seminar will seek to apply theories to practice and use the issues that arise in legal practice to further cultivate and refine the theories. By focusing upon both theory and practice, students will collectively work toward developing legal strategies for contending with violence against women. This seminar encourages students to critique existing frameworks and assume the role of social movement lawyers. Students will write a substantial research paper focusing upon a substantive problem related to violence against women.


LAW 756 Legal Aspects of Commercial Real Estate Development Fall. 3 credits. S-U option unavailable. Limited enrollment. J. E. Blyth.

Through the use of several written memoranda and one oral presentation, this seminar addresses considerations basic to commercial real estate development. It focuses on purchase agreements, options, rights of refusal, and 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 real estate financing, and alternatives to conventional financing (such as tax-exempt financing, mezzanine financing, and synthetic leases).


LAW 760 Organized-Crime Control Fall. 3 credits. S-U option available. Limited enrollment. E. J. Bricker.

This seminar will explore the challenges organized crime poses to society and to traditional law enforcement techniques. Students will undertake a simulated investigation using physical and electronic surveillance, the analysis of documentary evidence, and the examination of recalcitrant witnesses before the grand jury. The RICO statute will be explored in detail as well as a variety of non-criminal remedies including forfeiture and court-imposed assets.
[LAW Pretrial Practice, Litigation Strategies, and Remedies in Commercial Litigation]

[LAW Problems in Advanced Torts]

[LAW Risk Regulation]

[LAW Separation of Powers]
3 credits. Prerequisite: Constitutional Law and Administrative Law. Students without such background should consult with the instructor. Limited enrollment. Not offered 2003–2004.

[LAW Sexuality, Gender, and Law]

[LAW Social and Cognitive Psychology for Lawyers]

[LAW State and Local Taxation]
Fall. 3 credits. Limited enrollment. E. A. Zelinsky.
This seminar will explore the legal issues surrounding the major features of state and local tax systems, in particular, property taxes, sales taxes, and individual and corporate income taxes. Particular emphasis will be placed on the state and federal constitutional rules governing these subnational taxes. This seminar will discuss, among other constitutional topics, the case pending in the N.Y. Court of Appeals, Zelinsky v. Tax Appeals Tribunal, which challenges the New York income tax treatment of certain nonresidents.

[LAW Street Law]

[LAW Topics in Criminal Law]

[LAW 777 Theories of Law, Theories of Film]
Spring. 3 credits. S-U option available. Limited enrollment. C. D. Bond.
This seminar examines cultural representations of systems of law and lawyers. As part of the course materials, students will view several, predominantly American, films that in some way deal with the law. Students will learn the language of film form and theory, which they will use to discuss how particular films construct narratives about the legal system.

TOPICS OF INQUIRY will include parallels between law and film as narrative systems, the role of interpretation in constituting legal and cultural meaning, and the manner in which cultural representations of law reflect cultural values, fantasies and myths, with particular attention given to narratives of race and gender. Students will read film theory and criticism and legal theory in an attempt to correlate theories of narrative across both disciplines.

[LAW 780 Asylum and Convention Against Torture Appellate Clinic]
Spring. 3 credits. Prerequisite: Criminal Procedure or criminal law experience preferred. Limited enrollment. J.H. Blume, S. L. Johnson.
Students will aid in the representation of a defendant charged with a capital crime. This clinic focuses on the actual trial of a capital case. Students will travel to the trial in shifts, and while there may assist in the rating of jurors, last-minute investigation, the preparation of exhibits, and assisted tasks relating to witnesses, as well as observing parts of the trial. Students will also be on call for help in researching and preparing motions for issues that arise during trial, and may be assigned to aid in the development of direct and cross-examinations, and opening and closing statements. Regardless of individual assignments, all students are kept informed as to events as they occur at trial, and are included in discussions of strategy as much as possible given the constraints of trial.

[LAW 781 Capital Trial Clinic I]
Fall. 4 credits. Limited enrollment. J.H. Blume, S. L. Johnson.
Students will aid in the representation of a defendant charged with a capital crime. This clinic focuses on preparing a capital case for trial. Students will be assigned both investigative and research tasks. Fact investigation and the development of a mitigation case will be taught. One or two trips to the scene of the offense (usually South Carolina) are typical, and expenses for those trips are reimbursed by the law school. Research projects that arise from the case will be assigned. Most years students will gain experience through the use of focus groups and/or learn the Colorado voir dire method. Regardless of individual assignments, all students are kept abreast of the developments in the case and included in discussions of strategy as they arise.

[LAW 782 Capital Trial Clinic II]
Spring. 4 credits. S-U option available. Prerequisite: permission of the instructor. (Capital Trial Clinic I is NOT a prerequisite.) Criminal Procedure or criminal law experience preferred. Limited enrollment. J.H. Blume, S. L. Johnson.
Students will aid in the representation of a defendant charged with a capital crime. This clinic focuses on the actual trial of a capital case. Students will travel to the trial in shifts, and while there may assist in the rating of jurors, last-minute investigation, the preparation of exhibits, and assisted tasks relating to witnesses, as well as observing parts of the trial. Students will also be on call for help in researching and preparing motions for issues that arise during trial, and may be assigned to aid in the development of direct and cross-examinations, and opening and closing statements. Regardless of individual assignments, all students are kept informed as to events as they occur at trial, and are included in discussions of strategy as much as possible given the constraints of trial.

[LAW 783 Full-Term Externship]
Fall. 12 credits. Must be taken S-U. Limited enrollment. G. G. Gablebreath, J. M. Miner. Occasionally students find that their educational and career goals would be best achieved by spending one semester working at a placement outside the law school. 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 non-profit 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. Students, in collaboration with the Associate Dean for Academic Affairs, will review the applications and decide 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 will prepare weekly journal entries for the faculty supervisor, engage in regular electronic communication with the instructor and other students in the course, host the instructor for a site visit, and complete a written evaluation of the placement and the placement experience for the law school's files.

[LAW 784 Government Benefits Clinic]
Spring. 6 credits. S-U option available. Limited enrollment. B. Strom.
This course has two classroom components: Government Benefits Class and Clinical Skills 1 or Clinical Skills 3. 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 live client clinical experience, in which those concepts can be applied in solving actual client problems. The substantive components provides an introduction to government benefits law by examining various social insurance and need-based benefit programs including Social Security, 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 benefit cases involving the Tompkins County Department of Social Services, the N.Y.S. Dept. of Labor and the Social Security Administration. The course also includes Clinical Skills 1 or Clinical Skills 3. Clinical Skills 1 class will address 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 and addresses such topics as alternative dispute resolution, formal discovery, and motion argument.

**LAW 785 Government Benefits Clinic/Neighborhood Legal Services Externship**

Spring. 6 credits. S-U option available. Limited enrollment. B. Strom.

This course is a combination of Government Benefits and Neighborhood Legal Services Externship and either Clinical Skills 1 or Clinical Skills 3. The course is the same as Government Benefits 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. Limited enrollment. G. G. Galbreath.

Students work with a trial court judge. Work involves courtroom observation, conferences with the judge, research and writing memoranda, and drafting decisions. The emphasis is on learning about judges, judicial decision-making process, and trial techniques. This is a weekly class meeting with readings and discussions of topics related to the externship experience. While the primary focus is the student's work at the placement, each student will also do class presentations, weekly journal entries, provide written work samples, and meet individually with the faculty member.

**LAW 788 Juvenile Advocacy Motion and Appellate Clinic**

Spring. 3 credits. S-U option available. Prerequisite: Juvenile Advocacy Motion and Appellate Seminar, fall 2003. Limited enrollment. C. Grunbach.

Students will write complex trial motions and/or appellate briefs on behalf of juveniles charged in juvenile delinquency (JD) and persons in need of supervision (PINS) proceedings. JD proceedings involve juveniles charged with criminal conduct and PINS proceedings involve juveniles charged with truancy, disobedience, or running away from home, and other behaviors labeled as "incorrigible, ungovernable or habitually disobedient." During the fall semester Juvenile Advocacy Seminar, students learn the substantive law underlying JD and PINS proceedings, the essential principles of appellate advocacy, and advanced persuasive writing techniques. During the spring semester, students will apply these skills to the real world by preparing complex trial motions (including legal memoranda) and/or appellate briefs on behalf of juvenile clients in Tompkins County and the vicinity. As part of this law guardian representation, students will communicate with and counsel their clients and, perhaps, interview lay or expert witnesses, prepare affidavits, digest transcripts, and appear in court to argue the motions or appeals. By the end of the year each student will have written multiple drafts of at least one motion and memorandum and/or appellate brief to be filed in court. The clinic will include weekly class discussions about the legal, ethical, strategic, and systematic issues that arise in the cases, simulations, and peer editing. In addition, the instructor will have regular one-on-one meetings with the students to discuss and critique written work.

**LAW 790 Law Guardian Externship**

Fall, spring. 4 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 (Person 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 will be several meetings with the instructor during the semester for discussion of issues arising from and related to the representation of children. Bi-weekly journals are also required.

**LAW 791 Neighborhood Legal Services Externship**

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 a legal services office, the Ithaca office of Neighborhood Legal Services (NLS). Along with case handling, this externship includes a classroom component, provided by Clinical Skills 1, 2 or 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 will meet periodically with the faculty supervisor for review of the placement experience.

**LAW 792 Legislative Externship**


**LAW 793 Public Interest Clinic I**


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, interrelate 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; do legal writing; negotiate and settle cases; and represent clients at administrative hearings.

This course is a combination of Government Benefits, the Neighborhood Legal Services Externship, and Appellate Seminar, fall 2003. Limited enrollment. Not offered 2003-2004.

**LAW 794 Public Interest Clinic 2**

Fall. 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. G. G. Galbreath, J. M. Miner, R. A. Sarachan, 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 case preparation, motion practice, and drafting. Students represent the clinic's clients in both federal and state courts.

**LAW 795 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. G. G. Galbreath, J. M. Miner, 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 discovery, and motion practice. Students represent the clinic's clients in both federal and state courts.

**LAW 797 Women and the Law Clinic**


This course has two classroom components: Women and the Law Clinic class and Clinical Skills 1 or Clinical Skills 3 class. Students will represent women clients who have legal matters primarily in the family law area (divorce, custody, support, domestic violence). The Women and the Law Clinic class will focus on such issues as the impact of substantive law on women, the impact of legal institutions on women, professional role development, feminist lawyering methods, and other topics related to the substantive law. Students will also participate in the lawyering skills classroom component, Clinical Skills 1 or Clinical Skills 3. Clinical Skills 1 will address 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.
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Effectiveness. Assigned readings consist mainly considering also constitutional limits on their administrative agencies in the legal process, presented not as a body of rules but as a set of techniques for resolving conflicts and dealing with social problems. 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 410 Limits on and Protection of Creative Expression—Copyright Law and Its Close Neighbors

Fall. 4 credits. 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 will be on-line. Copyright law has become increasingly important as the U.S. 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 Poll Prof.
Barcelo, John J. III, S.J.D., Harvard U. William Nelson Cromwell Professor of International and Comparative Law

Clermont, Kevin M., J.D., Harvard U. James and Mark Flanagan Professor of Law
Clymer, Steven D., J.D., Cornell U. Prof. Cripps, Yvonne M., Ph.D., U. of Cambridge. Visiting Prof.
Diamond, Stephen F., Ph.D., U. of California, Berkeley. Visiting Prof.
Eisenberg, Theodore, J.D. U. of Pennsylvania. Henry Allen Mark Professor of Law
Fineman, Martin S., J.D., U. of Chicago. Doreetha S. Clarke Professor of Feminist Jurisprudence
Germain, Claire M., M.L.L., U. of Denver. Edward Cornell Law Librarian and Professor of Law
Green, Robert A., J.D., Georgetown U. Prof. 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 P., Northwestern U. Prof. Henderson, James A., Jr., LL.M., Harvard U. Frank B. Igersoll Professor of Law
Hillman, Robert A., J.D., Cornell U. Edwin H. Woodruff Professor of Law
Holden-Smith, Barbara J., J.D., U. of Chicago. Prof.
Macey, Jonathan R., J.D., Yale U. J. DuPont White Professor of Law
Martin, Peter W., LL.B., Harvard U. Jane M. G. Foster Professor of Law
Morison, Trevor W., J.D., Columbia U. Asst. Prof.
Ndolo, Munu B., B. Phil., Trinity C. Prof. Nachlas, Jeffrey J., Ph.D., Stanford U. Prof.
Riles, Anne, Ph.D., U. of Cambridge. Prof.
Rossi, Faust F., J.D., Cornell U. Samuel S. Leibowitz Professor of Trial Techniques
Schwartz, Stewart J., Ph.D., U. of Michigan. Prof.
Sherwin, Emily L., J.D., Boston U. Prof. Shifrin, Steven H., J.D., Loyola U. of Los Angeles. Prof.
Siciliano, John A., J.D., Columbia U. Prof.
Simpson, Gary J., J.D., Yale U. Prof.
Stone, Katherine V. W., J.D., Harvard U. Prof. of Law and Anne Evans Estabrook Prof. of Dispute Resolution in the School of Industrial and Labor Relations
Summers, Robert S., LL.B., Harvard U. Professor of Political Economy
Wright, G. McRoberts Research Professor in Administration of the Law
Sunder, Madhavi, J.D., Stanford U. Visiting Assoc. Prof.
Taylor, Winnie F., LL.M., U. of Wisconsin. Prof.
Wippman, David, J.D., Yale U. Prof.
Zeilinsky, Edward A., J.D., Yale U. Visiting Prof.

Legal Aid Clinic

Cook, Nancy L., J.D., Georgetown U. Senior Lecturer
Galbreath, Glenn G., J.D., Case Western Reserve U. Senior Lecturer
Gemner, JoAnne M., J.D., U. of Connecticut. Senior Lecturer and Director
Garcia, Robert A., J.D., Indian U. Visiting Lecturer
Strom, Barry, J.D., Cornell U. Senior Lecturer

The Lawyering Program

Anderson, Paige S., J.D., Cornell U. Lecturer
Atlas, Joel, J.D., Boston U. Senior Lecturer

Bond, Cynthia D., J.D., Cornell U. Lecturer
Grunbach, Carol, J.D., Cornell U. Director of Lawyering Prog. and Senior Lecturer
Mckeel, Estelle M., J.D., Columbia U. Lecturer
Mooney, Andrea J., J.D., Cornell U. Lecturer

Academic Library Staff

Bynum, Charlotte L., J.D., Tulane U. Reference Librarian, international and foreign law librarian
Callahan, 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
Kreisler, Brandy, J.D., Texas Tech. Reference Librarian
Pajersek, Jean M., M.L.S., SUNY-Albany. Head of Technical Services

Members of Other Faculties Associated with the Law School

Carmichael, Calum, B. Litt., Oxford U. Prof. College of Arts and Sciences
Cheyfitz, Eric, Ph.D., John Hopkins. Prof. College of Arts and Sciences
Powers, David S., Ph.D. Princeton U. Prof. College of Arts and Sciences
Santiago-Ivizarry, Vilma, Ph.D., New York U. Assoc. Prof., College of Arts and Sciences
Wells, Martin T., Ph.D., U. of California. Prof. School of Industrial and Labor Relations

Adjunct Faculty Members

Azzarelli, Kim K., J.D., Cornell U. Adjunct Prof.
Bakos, Smulik, LL.B., Cornell U. Adjunct Prof.
Beresford, H. Richard, M.D., U. of Colorado. Adjunct Prof.
Blunkin, Joy A., J.D., Emory U. Adjunct Prof.
Blyth, John E., Dir, Goethe U. Adjunct Prof.
Briggs, W. Buckly, J.D., Georgetown U. Adjunct Prof.
Caruso, Bruno, Law Deg., U. of Catania, Adjunct Prof.
Goldstock, Ronald G. J.D., Harvard U. Adjunct Prof.
Goldstein, Stephen, J.D., U. of Pennsylvania. Adjunct Prof.
Greenberg, Marcia E., J.D., Northwestern U. Adjunct Prof.
Gross, Jill L., J.D., Harvard U. Adjunct Prof.
Meyer, Judith P., J.D., Cornell U. Adjunct Prof. Mingle, James J., J.D., U. of Virginia. Adjunct Prof.
Roth, Nelson E., J.D., U. of California, Davis. Adjunct Prof.
Shulman, Zachary, J.D., Cornell U. Adjunct Prof.
St. Landau, Norm D., J.D., Antioch C. Adjunct Prof.
Sussman, Erika, J.D., Cornell U. Adjunct Prof. Yale-Lehr, Stephen W., J.D., Cornell U. Adjunct Prof.
group discussions. The Learning Resource Center contains computers and printed and audiovisual resources that give students access to specialized software. 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 (NFA), 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 the College of Arts and Sciences. The Program of Study in Human Nutrition offers biology majors courses on the nature and biochemical function of essential and nonessential nutrients, nutrient requirements, the role of nutrients in gene expression, and the role of diet in both risk of chronic disease and treatment of existing disease states. Students in this program of study are encouraged to complete a diverse set of advanced courses. 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 coursework 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, NFA, and HBHS 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 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, 309–335 MVR. This office offers a wide range of advising materials to help students develop a program of study that matches students’ interests and needs.
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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 electives 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:

**Medical 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 communication; structured field experiences; 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 American Dietetic Association (ADA) accredited curriculum. Courses in foods, nutrition and disease, microbiology, management, statistics, and nutritional care are added to the courses required for the nutrition program.

**Exercise, Nutrition, and Health Promotion:** Students should complete a course in physiology and a course in anatomy after introductory biology. Students can complete the Exercise Science Concentration at Cornell 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 Gail Canterbury, dietetics program administrative assistant, 335 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 experiences than the classroom can offer, whether this involves laboratory work, library research, or field study. Any student interested in independent study should obtain the written approval 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, gives official recognition to students who have demonstrated excellence in their academic work and their capacity for independent study.

In addition to fulfilling the requirements for a major, students in the honors program take seminars in designing and evaluating research, complete an original piece of research (at least six credits of NS 499), and prepare an honors thesis. The honors project may be a laboratory or field research or deal with policy and program development. For more information, students should contact T. 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 rural sociology.

**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 701) 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 14855-4401; telephone (607) 255-4410; website: www.nutrition.cornell.edu/grad.html; e-mail: nutrition_gfr@cornell.edu.
The course focuses on the biological bases of adolescence. The course stresses critical lactation, infancy, and childhood through six to eight of the lectures. Competitive sport, childhood nutrition, food given to the role of vegetarianism in the growing interest in, and acceptance of, this and of more recent times, that have led to the historical and sociocultural roots, both ancient and of biological and behavioral responses to environmental stress. Human diversity is a s a p i e n s pathway of neutralization: detoxification, secretion, and DNA repair.

This introductory course surveys vegetarianism and discussed primarily includes the empirical evidence presented for easy comprehension of 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 transitions are offered. Internationally known guest speakers provide six to eight of the lectures.

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, assessment 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 critical needs of young children and adolescents.

The course considers the scientific evidence presented for easy comprehension of 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 transitions are offered. Internationally known guest speakers provide six to eight of the lectures.

COURSES

**NS 115 Nutrition, Health, and Society**
Fall. 3 credits. S-U grades optional. M W F 1:25 D. Lisk. 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. Staff. This course provides students enrolled in NS 115 individualized assistance in many skills including using computer 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, and helps students explore career opportunities through a variety of assignments. This is not an introductory nutrition course for nonmajors.

**NS 200 Vegetarian Nutrition: An Introduction**
Spring. 3 credits. S-U grades optional. Prerequisite: NS 115 advised but not essential. 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 of 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 transitions 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 sophomores. Prerequisite registration is required in room 309 MVR Hall. T R 1:25-2:40. P. Brannon, G. Garza. The course focuses on the biological bases of nutritional requirements in pregnancy, lactation, infancy, and childhood through adolescence. The course stresses critical

**NS 248 Social Science Perspectives on Food and Nutrition**
Fall. 3 credits. Prerequisite: NS 115. Letter grade only. T R 10:10-11:25, J. Sobal. Theories, concepts, and methods from the social sciences are used to examine food, eating, and nutrition. The 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 32 students. Laboratory preregistration during course preregistration required in 309 MVR Hall. Laboratory cost or apron required. Fall and spring T 1:25-4:25 or R 9:05-12:05. TBA. Staff. Emphasizes meal planning for healthy individuals using national nutrition standards; the development of food preparation and presentation skills; the application of sensory evaluation techniques; food science principles as they apply to cooking and ethnic and cultural influences on cuisine.

**NS 262 Nutrients and Cells**
Spring. 3 credits. Prerequisites: one semester of biology and chemistry. M W F 9:05. Not offered 2003–2004. N. Noy. The course focuses on the relationship of cells with the environment. Examples from three general areas are considered: (1) mechanisms of uptake of nutrients by bacterial and by mammalian cells; (2) intra-cellular outcomes of nutritional stimuli: effects on metabolism and gene expression, toxicity; and (3) pathways of neutralization: detoxification, secretion, and DNA repair.

**NS 275 Human Biology and Evolution**
Fall. 3 credits. S-U grades optional with permission of either instructor. M W F 10:10; disc. M. Lecs every W and F; occasional lectures on M. Offered alternate years. Next offered 2004–2005. K. A. R. Kennedy, 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 current evidence from fossil records 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, molecular vs. fossil evidence of human evolution, race, and racism are presented as examples of current issues in human biology.

**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 transferred from a previous major or institution. Students prepare a description of the study they want to undertake using a form available from the College Registrar's Office. The form, signed by both the instructor directing the study and the associate director for academic affairs, is filed at course registration or during the change-of-registration period.

**NS 306 Nutritional Problems of Developing Nations**
Spring. 3 credits. Prerequisites: NS 115. S-U grades optional. T R 10:10. Offered alternate years. Not offered 2004–2005. Staff. The course is designed for undergraduates interested in the nutritional problems of developing countries. Attention is given to the array of nutritional problems encountered, the causes of hunger and malnutrition, the epidemiology of the major nutritional problems afflicting poor nations, the functional consequences of these problems on individuals and societies, and the types of programs that can be implemented to improve health and nutrition.

**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. S-U grades optional. Offered alternate years. Not offered 2004–2005. T R 1:25–3:00. D. 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, 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. M W F 10:10, sec T 1:25. W. Arion, P. Sover. 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 fundamental concepts 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. Prerequisites: BIO BM 330 or 331, or NS 320, or equivalent. S-U grades optional. Lect M W F 10:10; disc. W 12:20 or R 8:00. C. McCormick. This course examines the biochemical and physiological bases of human nutritional
NS 302 Methods in Nutritional Sciences
Fall. 3 credits. Each section limited to 18 students. Prerequisites: NS 345, NS 331.

Laboratory preregistration during course registration. One evening prelin to be scheduled. Lec, M 12:20; lab M 1:25-4:25 or T R 10:10-1:10. M. N. Kazarnoff.

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 assay of nutrients, metabolite, and enzyme analysis in body fluids; methods for assessing individual food intake and nutritional status; and methods for assessing the composition of foods.

NS 341 Human Anatomy and Physiology
Spring. 4 credits. Letter grade only. Prerequisites: college biology; NS 115 recommended. Completion of laboratory permit forms. 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 nutrition 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 Foods-Laboratory
Spring. 3 credits. Prerequisite: college course in organic chemistry or biochemistry. S-U grades optional. T R 1:25-2:40. B. Parker, B. Lewis.

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 data bases are also discussed.

NS 346 Introduction to Physiochemical Aspects of Foods-Laboratory
Spring. 1 credit. Each section 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 12:00-3:20 or T R 9:05-12:05. B. Parker, B. Lewis.

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&S 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. Next offered 2004-2005. J. Haas, S. Robertson.

This course is concerned with the interrelationships of biological and psychological growth and development in humans, particularly 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 variation for current and subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological aspects is emphasized throughout the course.

NS 351 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 9:05-9:55. B. Strupp.

Serves as a critical evaluation of biological factors thought to influence behavior and/or cognitive functioning. Biological, psychological, and societal 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 378 Food, Nutrition, and Service Management
Fall. 3 credits. Prerequisites: NS 115, NS 247 or permission of instructor. T R 1:25-2:40. Not offered 2003-2004. Staff.

The course discusses how management principles and theories apply to food service operations and nutrition services. The systems concept of organization is utilized. Emphasis is placed on leadership development, decision making/problem solving as it relates to procurement, production, distribution, and quality assurance in food and nutrition services. Menu development projects demonstrate the interrelationships of nutrition, labor, equipment, food costs, and quality satisfaction. Marketing strategies and implementation are discussed. Teamwork and negotiating skills are emphasized.

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. Staff.

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 only. M 2:30. J. T. Brenna, C. Bisogni.

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 structure of scientific literature, preparation of research proposals, roles of scientific organizations, and funding sources. Students are required to attend and report on research seminars on campus.

NS 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 nutrition 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 course 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 a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

NS 403 Teaching Apprenticeship
Study that includes assisting faculty with instruction data bases.

NS 421 Nutrition and Exercise
Spring. 3 credits. Prerequisites: BIOAP 311 or NS 341 and NS 115 or NS 331. Limited to nutrition majors, others by permission of the instructor. S-U grades optional. Lec T R 11:15, sec T R or F 8:00-9:55. 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 critiques 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. Letter grades only. M 1:25, Sec W or F. 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 examine the evidence that diet plays a role in osteoporosis and hypertension and consider whether iron status affects the development of heart disease and inflammation. 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 are 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 441 (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 managing 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, PAM 201, PAM 303, RSOC 101, RSOC 200. M W F 11:15, disc TBA. K. Rasmussen, D. Pelletier.

Public health nutrition is the major professional career track for nutritionists outside of dietetics. It deals with efforts to improve the health and nutritional status of whole populations by working at the community, state, and national levels. This course helps prepare students to work in public health nutrition by describing methods used in the assessment of nutrition problems, the development of nutrition-related policies and the delivery of health, nutrition, and food-assistance programs.

**NS 451 Epidemiology and Health of Human Communities**  
Fall. 3 credits. Prerequisite: one semester of statistics (can be taken concurrently). M W F 1:25, E. Frongillo.

Examines through a series of case studies the role of epidemiological investigation in understanding, assessing, and improving the health and nutrition of human communities and populations. Students read and discuss scientific research and public policy literature on specific topics of current interest. Emphasis is on the conceptualization of epidemiology as an ecological science that studies the interdependence and interaction of humans with their social and physical environment. Intended for advanced undergraduates and graduate students with an 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 epidemiology 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 public policy literature. 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 interactions, 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, eg. BIOBM 330, BIOBM 331–332 or 333, BIOBM 432. M W 9:05, D. Manor.

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 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. M W F 9:05. D. Sahn.

This course focuses on the analysis of global hunger and malnutrition. Students analyze 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 Mamalian Developmental Defects (also BIOAP 475)**  
Spring. 3 credits. Prerequisites: BIOBM 330, 331–332 or 333 (may be taken concurrently). Lec M W 9:05, lab R 2:00. Offered alternate years, not offered 2004–2005. D. Noden, P. Stover.

Developmental defects are present in nearly 5% of humans. Drawing upon current research, this course explores the causes of birth defects, emphasizing the interplay between genetic and environmental factors in the regulation of developmental processes. Emphasis is on nutritional disruptions, 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: NS 378, BIOIM 290. White lab coat is required. Approximately $30.00 will be needed for special supplies/activities. Lec M W 9:05, lab T 2:45–6:45, E. Gier.

Students gain experience in facility design; equipment selection, use, and care; job analysis and evaluation; human resources planning; management of financial resources; menu and food production; computer-assisted management; employee training; and applied safety and sanitation standards. They develop other skills required to operate/manage a food service program. The application of quality management in food service operations and facility management is stressed. Laboratories are arranged through Cornell Dining. Completion of a lab experience/professional portfolio will be required.

**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 of NS 499, typically spread over two or more semesters. The student and the mentor determine the appropriate number of credits for each semester. Research activities may include reviewing the literature, writing a proposal, developing research methods, collecting data in the field or laboratory, analyzing data, and writing the honors thesis.
NS 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. Limited to graduate students recommended by their chair and approved by the instructor in charge. S-U grades optional. Division faculty. Emphasis is on independent advanced work. Experience in research laboratories in the division may be arranged.

[NS 601 Proteins and Amino Acids (also AN SC 601)]

NS 602 Lipids (also BIO AP 619)
Fall. 2 credits. T R 11:15. A. Bensadoun. Advanced course on the molecular aspects of lipid transport. Topics covered include plasma lipoproteins and biology of lipoprotein receptors, transcriptional regulation of cholesterol homeostasis, lipid transfer factors, lipolytic enzymes, and molecular aspects of atherosclerosis.

[NS 603 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also AN SC 603)]
Fall. 2 credits. Letter grade only. Prerequisites: biochemistry, physiology, and nutrition. T 2:00–4:00. Offered alternate years. Next offered 2004–2005. X. G. Lei. An advanced course that emphasizes metabolism, gene regulation, and genetic defects of 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.

NS 604 The Vitamins (also AN SC 604)
Fall. 2 credits. T R 10:10. Staff. Text-based discussion sessions on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

NS 605 Nutritional Biochemistry Colloquium
Fall and spring. 1 credit. S-U grades only. R 12:20. Nutritional biochemistry faculty. Nutritional biochemistry colloquium is a graduate seminar series that focuses on recent advances in biochemical nutrition. Weekly presentations are made by faculty, postdocs, and graduate students and are based on the primary literature. The presentations are followed by a discussion involving all participants.

NS 607 Nutrition as an Integrating Discipline: Concepts and Paradigms
Fall. 3 credits. Prerequisite: some prior coursework or experience in nutrition, or permission of the instructor. M W F 10:10. M. Kazarnoff, J. P. 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, economics, program planning and delivery, 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.

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. TBA. S. Bloom, R. Dietert. 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. K. Rasmussen. An advanced course on the role of nutrition during pregnancy and lactation. The feeding growth and development 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. Warley. 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)
Spring. 2 credits. Prerequisites: BIO BM 330 or equivalent. Letter grades only. T R 10:10. Offered alternate years. Not offered 2004–2005. J. Brady, B. Lewis. 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
Fall. 5 credits. Limited to didactic interns. M 1:25–3:25. S. Travis. This course provides students enrolled as didactic interns with supervised, in-depth experiences in a community nutrition program and fosters the integration of research, theory, and practice. Through placements in community programs, students gain experience in program administration and in assessing, designing, implementing, and evaluating food and nutrition programs for targeted populations through public organizations. In weekly seminars (and other seminars and observations as arranged) students integrate theory and practice, reflect upon their placement experience, learn about community nutrition research, and explore the many issues facing community food and nutrition practitioners.

NS 626 Special Topics in Food
Fall. 2 credits. TBA. B. Lewis. This course provides a discussion of current research on specific topics related to functional foods and nutraceuticals/phytochemicals.

NS 630 Anthropometric Assessment
Spring. 1 credit. Prerequisite: NS 331 or equivalent knowledge. Basic knowledge upon their placement experience, learn about community nutrition research, and explore the many issues facing community food and nutrition practitioners.

NS 637 Epidemiology of Nutrition
Spring. 3 credits. Limited to graduate students. Prerequisites: BTRY 601 and concurrent registration in BTRY 602 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 using nutritional information in decision making are presented. The course shows how the biochemistry and physiology of nutrition can be related to nutritional epidemiology and research strategies.
This course builds upon the perspectives developed in NS 650. It provides a framework and a social context of nutrition and food systems. It is rooted in the socio-political world. This course focuses on empirical methods for analyzing household survey data. Students examine a series of measurement and modeling issues 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: Applications to Nutrition, Health, and Poverty (also ECON 771)**

Spring. 3 credits. Prerequisites: intermediate microeconomics, intermediate statistics or econometrics (through multiple regression) and knowledge of dependent variable models, or permission of the instructor. M W TBA. D. Sahni.

The course focuses on empirical methods for the analysis of household survey data. Students examine a series of measurement and modeling issues 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 690 Trace Element and Isotopic Analysis (also CHEM 529)**

Spring. 3 credits. Primarily for graduate students and advanced undergraduates. Prerequisite: CHEM 288 or 390, 302 or CHEM 208 and MATH 112, or permission of instructor. S-U grades optional. T R 11:15. Offered alternate years. Not offered 2004-2005. J. T. Brenna.

Survey course in modern high precision isotope ratio mass spectrometry (IRMS) techniques and trace/surface methods of analysis. Topics include dual inlet and continuous flow IRMS, thermal ionization MS, inductively coupled plasma MS, atomic spectroscopy, ion and electron microscopes, X-ray and electron spectroscopies, and biological and solid state applications. The first five weeks of CHEM 629/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. 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 or spring. 1 credit. S-U grades only. Fall 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 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.

Bensadoun, Andre, Ph.D., Cornell U. Prof., Nutritional Sciences.

Bisogni, Carole, Ph.D., Cornell U. Prof.

Brannon, Patsy, Ph.D., Cornell U. Professor and Dean, College of Human Ecology
Joint Appointees
Bauman, Dale, Prof., Animal Science/Nutritional Sciences
Miller, Dennis, Prof., Food Science/Nutritional Sciences

Other Teaching Personnel
Swanson, Joy, Ph.D., Cornell U. Research Associate
You, Chasook, Ph.D., Cornell U. Teaching Support Specialist
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 Robert Sova, Aviation, 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, Armory, 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 limited 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 in the program is 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 the Advisor and the Director of the ROTC program, to students not formally enrolled in the program. Students must pass required physical and aptitude tests. 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 their 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 United States Army. 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.

**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.

**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 text books.

**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 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.

ROTC 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 III and Mil S IV) receives $350-400 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 the theories of social and organizational psychology and behavior as they apply to the military setting. Attention is given to leader types, the source and exercise of authority, and the impact of varying styles of leadership, resource management, motivation, and organizational effectiveness. The student is instructed in the concepts of integrity, ethics, and professionalism. Classes on historical events and strategy are also presented.

Sophomore Year (Mil S II)

MIL S 201 Individual Leadership Studies/Teamwork
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. Troop-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. Problems of the course offer experience in land navigation and orienteering.

MIL S 211 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 covers the history 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 twentieth 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 organization. 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 Sova.

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, army operations, the logistical support of the armed forces in the field, and the army training system. The course focuses on the dynamics of leadership in battle through the detailed analysis of a series of case studies. Just war theory, ethics, and professionalism are also addressed in a seminar fashion.

MIL S 402 Officership
Spring. 2 credits. Required. Lieutenant Colonel Sova.

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 1 Leadership Laboratory I
Fall. 0 credits. S-U. 0 credits. S-U.
MIL S 151 Spring. 0 credits. S-U.
MIL S 152

MIL S 1 cadets meet for two hours each week to learn a variety of military skills including rappelling, first aid, drill and ceremonies, weapons familiarization, and physical fitness training.

MIL S 2 Leadership Laboratory II
Fall. 0 credits. S-U. 0 credits. S-U.
MIL S 251 Spring. 0 credits. S-U.
MIL S 252

MIL S 2 cadets meet for two hours each week as members of the cadre organization to participate in practical leadership exercises. Types of practical activities include rifle marksmanship, orienteering, drill and
ceremonies, signal communications, physical fitness training, first aid, tactics, and field exercises.

**MIL S III Leadership Laboratory III**
- **Fall**: 0 credits.
- **Spring**: 0 credits.
- **Required**: S-U.
- **S-U**: MIL S 351
- **S-U**: MIL S 352

Cadets meet for two hours a week and occasional weekends to prepare for a five-week summer camp that follows their junior year. Emphasis is placed on the development of individual practical and leadership skills. Cadets rotate through leadership positions to practice applying decision-making skills in a myriad of situations.

**MIL S IV Leadership Laboratory IV**
- **Fall**: 0 credits.
- **Spring**: 0 credits.
- **Required**: S-U.
- **S-U**: MIL S 451
- **S-U**: MIL S 452

Senior cadets plan and operate the leadership laboratory programs for MIL S I–III cadets. The development of planning and supervisory skills is emphasized. Cadets have an opportunity to practice leadership skills developed during previous ROTC training and summer camp experiences. Includes two to three hours a week devoted to physical fitness.

**Professional Military Education (PME) Requirements**

In addition to the ROTC classes and leadership laboratories listed above, a number of courses are required as part of the contracted student’s academic program. These courses are offered by the university and round out the student’s professional education. The PME component of the ROTC program requires at least one college course in each of the following areas: communication skills, military history, and an introduction to computers. 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 J. Alley, United States Navy, Professor of Naval Science and Commanding Officer, Naval ROTC Unit

TBA, United States Marine Corps

Lieutenant S. Jordan, United States Navy

Lieutenant L. Seymour, United States Navy

Lieutenant J. Kashuba, 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–Marines 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:

- The first way is by applying to the national competition each year. This process entails filling out and submitting an appropriate application, being interviewed, having a physical examination; and applying to, and being accepted by, one of the colleges or universities throughout the country that offers an NROTC program.
- The second way is by enrolling in the College Program at Cornell and being recommended by the Professor of Naval Science for a scholarship after at least one semester in the program.
- The third way is by entering through the Two-Year Scholarship Program.

**College Program**

There are two College Programs available. Both lead to a commission in the Navy or Marine Corps Reserve.

Starting in the junior year, each of these programs provides textbooks for naval science courses, uniforms, and a subsistence allowance of $500–$350 a month.

The regular College Program is four years long. Academic requirements for students in this program are somewhat fewer than those for scholarship students, as noted in the curriculum section of this book.

The Two-Year College Program begins the summer before the junior year; students attend a required program, with pay, at the Naval Science Institute in Newport, R.I.

**Summer Training**

Each summer, students in the Scholarship Program spend approximately four to six weeks on a Navy ship, or participate in a naval activity that may take place anywhere in the world, for on-the-job training. College Program students attend one summer training session of the same duration between the junior and senior years.

**Active Duty Requirements**

Scholarship midshipmen commissioned in the Navy or Marine Corps Reserve serve on active duty for a minimum of four years. College program midshipmen commissioned in the Navy 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 selects 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 junior year, Marine-option midshipmen are taught Marine-oriented courses by a Marine Officer Instructor. For First Class summer training (after the junior year), Marine-option students travel to Quantico, 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 vehicle 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 one 90-minute professional development session each week. The session is held from 2:30 until 4:00 on Wednesday afternoons, and consists of both drill and professional information briefings. Students gain experience in actual leadership situations and learn the fundamentals of seamanship, military formations, commands, discipline, courtesies, and honors. During information briefings, special emphasis is given to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

**Naval Science Courses**

All Navy and Marine midshipmen take one naval science course each semester during their freshman and sophomore years. Navy-option students have slightly different curriculum requirements for their junior and senior years. Marine-option students have slightly different curriculum requirements for their junior and senior years.

**Freshman Year (Navy and Marines)**

NAV S 101 Fundamentals of Naval Science

Fall. No credit. S. Jordan, J. Kashuba.

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. S. Jordan.

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 sailing principles. Students sail small boats on Cayuga Lake. Focus is on U.S. Navy Class B inshore skipper certifications.

**Sophomore Year (Navy and Marines)**

NAV S 201 Organizational Behavior and Small Group Processes

Fall. 3 credits. J. Alley.

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. J. Kashuba.

An introduction to primary ship-systems and their interrelationships. Basic principles of thermodynamics, propulsion, mechanical operation, internal communications, electronics, ship structure, and other marine systems are covered.

**Junior Year (Navy)**

NAV S 301 Principles of Navigation (also ABEN 305)

Fall. 4 credits. L. Seymour.

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 observation, 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. L. Seymour.

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. S. Jordan.

The principles and theories used in the development of naval weapons systems are examined. Initially, extensive study is made of detection systems, especially radar and sonar, followed by discussions of ancillary systems for computing, stabilizing, tracking, and weapons control and delivery.

NAV S 402 Leadership and Ethics

Spring. 3 credits. J. Alley.

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. TBA.

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. TBA.

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 best prepared to meet the technological requirements of the modern Navy.

**Navy-Option College Program**

Navy-option College Program students must complete one year of college-level study in mathematics, physical science, and English as a prerequisite for commissioning. The mathematics course must be completed by the end of the junior year; the physical science course by the end of the senior year. In addition, one term of computer science is required. College Program students who
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 is open to all qualified freshmen. Sophomores may also enter a condensed version of the four-year program in coordination with the AFROTC staff.

Veterans of the U.S. armed forces and students entering Cornell from military schools may receive advanced standing, subject to approval by the Professor of Aerospace Studies.

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 1 credit Aerospace Studies course each semester. During the freshman year, the student examines an introduction to mission of the United States Air Force and the environment of the Air Force officer. In the sophomore year, the student studies the history and development of American air power. In both years, officership and professionalism in the United States Air Force are emphasized.

Students also spend two hours a week in a leadership laboratory. Leadership laboratories provide cadets with an opportunity to put into practice the skills they have learned in their aerospace studies classes. These laboratories focus on the development of officer qualities through such activities as drill and ceremonies, group leadership problems, confidence-building exercises, and guest lecturers. 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. Students who are accepted for 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 cross-town agreement.

**One-Year Program**

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, 334-953-2093, extension 2093. 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.

**Fees**

An initial uniform deposit of $50 is required on entry into AFROTC. Prior to commissioning, cadets may purchase uniforms with their deposit or return uniforms and receive their deposit back.

**Benefits**

All cadets in the advanced program (POC)—whether they are on scholarship or not—receive a $250 per-month, nontaxable subsistence allowance during the academic year. During the four- or five-week summer field training (see below), each cadet receives a pay allowance plus an allowance for travel to and from the field site. Textbooks and supplies required for Department of Aerospace Studies courses are provided.

All cadets are eligible to participate in AFROTC-sponsored field trips made to Air Force bases throughout the country as well as voluntary summer programs for professional development. Scholarship and 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 orientation; junior officer training; physical training; small arms training; a social- actions program; and supplemental training. The five-week training program includes sixty 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-Fall Parachute Training, the British Royal Air Force (RAF) 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 nonflyng 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-scientific category may be assigned to practice in their specialty in research and development, communications, electronics, aeronautics, aeronautics, 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.
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, offciership 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.
Continuation of AIR S 161.

Sophomore Year
AIR S 211 The Evolution of USAF Air and Space Power I Fall. 1 credit.
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.
Continuation of AIR S 211.

Junior Year
AIR S 331 Air Force Leadership Studies I Fall. 3 credits.
This course is a study of the leadership, quality management fundamentals, 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.
Continuation of AIR S 331.

Senior Year
AIR S 401 National Security Affairs/Preparation for Active Duty I Fall. 3 credits.
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, offciership, military justice, civilian control of the military, preparation for active duty, and current issues affecting military professionalism. Continued emphasis is given to refining communication skills. A mandatory leadership laboratory complements this course by providing advanced leadership experiences, giving students the opportunity to apply the leadership and management principles described in this course.

AIR S 402 National Security Affairs/Preparation for Active Duty II Spring. 3 credits.
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
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
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
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 Experiences
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
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. 
DEPARTMENT OF PHYSICAL EDUCATION AND ATHLETICS

ADMINISTRATION
Alan E. Gantert, director

COURSES
The courses and fees described in this catalog are subject to change or cancellation at any time by official action of Cornell University. For current fee information on physical education courses call 255-4286, for outdoor education courses, call 255-6183, or visit www.coe.cornell.edu.

Enrollment in any course is limited by the space available. Other restrictions are included in the course description. Most courses are coeducational. The specific time and place of class meetings, as well as information about fees, are available at the physical education course registration or may be found on "Bear Access," a package of software for accessing a variety of network services at Cornell. Course fees are billed through the Office of the Bursar.

Additional course offerings may be listed at registration, as the curriculum is frequently reviewed and changed. Drop deadlines for outdoor education courses are earlier than university deadlines, and often earlier than physical education deadlines. 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, AED, 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, spring, and summer (6 weeks). Fee charged.
Program includes classroom work, skill training in a pool, and open-water training in Cayuga Lake. P.A.D.I. open water certification awarded upon successful completion.

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.

Specialty Scuba Diving
Fall and spring. Fee charged.
Courses offered in the following specialty diving areas: navigation, search and recovery, night diving, deep diving, underwater photography, wreck, multi-level, boat, tropical fish identification and buoyancy control, and underwater naturalist.

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, spring, and summer (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 offered in the following strokes: front crawl, back crawl, elementary backstroke, breaststroke, inverted breaststroke, sidestroke, overarm sidestroke, trudgeron, and butterfly.

Swimming Conditioning
Fall and spring. Prerequisite: reasonable swimming ability.
Introduction to and practice of different swimming methods. Final objective: to swim 2,500 yards during class period. Primarily a 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 and summer. Fee charged.
Includes instruction in the waltz, swing, cha cha, calypso, tango, and others.

Belly Dancing I
Fall and spring. Fee charged.
Belly dancing is an exciting Middle Eastern folk art that can help in the development of flexibility, body awareness, and overall body tone. The class will begin with warm-ups and continue with basic movements and rhythms, then put them together in a dance to music of the Middle East.

Belly Dancing II
Spring. Fee charged.
Advanced belly dance movements and combinations that include putting basic and advanced movements to the Beladi, Masmoudi, 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.
No partners are needed. Beginners can expect to develop significant capacity for enjoyment of two forms of swing dance: jitterbug and street boogie. Partners will be rotated throughout the course. Effort will be made at registration to equalize male and female ratios.

Swing Dance I
Fall and spring. Fee charged.
A class for those who have taken the 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.

Equestrain Center located on Pine Tree Road
near East Hill Plaza. Detailed information will
be offered by the equitation staff at the
registration sign-up table. Basic—never ridden;
Intermediate I—completed basic with
knowledge of walk/trot/canter; Intermediate II—walk/trot/canter with control over two-
foot-high jumping course; Advanced—strong
jumping/dressage skills with experience
hunting/showing/eventing. Students must fill
out a release form to participate in any riding
class.

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 course. American
Red Cross certification is valid throughout the
United States and is accepted by many states
as a Certified First Responder equivalent.
Certification is valid for three years. This cer-
ification would be appropriate for camp med-
cal 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.

Fishing Courses
Fishing and Basic Flyfishing 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
fishing. 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 train-
ing equipment, rowing machines, treadmills,
stationary bicycles, and Nordic Traks,
and to teach them to design a personal fitness
program incorporating the equipment.

Cardio Rock
Fall and spring. Fee charged.
This class combines the best of the principles
of weight training and the 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 Aerobics Instructor 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,
body-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 major-
ity 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 interme-
 diate skaters. Fee charged.
Students provide their own skates or rent
them at Lynah Rink. Course will cover for-
ward 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, crossovers,
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.

Renewal Fencing
Fall and spring. Prerequisite: Fencing I 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 Kun 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 Kun 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.

Tai Chi Chuan, Introduction to, and Intermediate
Fall and spring. Fee charged. Introduction to Tai 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. 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. Fee charged. Non-credit course. Seven one-hour climbing sessions at the Lindseth Climbing Wall for Wellness Program members only.

Intermediate Rock Climbing
Fall, spring. Fee charged. Six indoor sessions at the Lindseth Climbing Wall that introduce and practice more advanced climbing techniques.

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 will 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.

Cascades Mountaineering AND Leadership
Spring. Fee charged. Includes summer break trip. Two indoor classes and a three-week mountaineering expedition in the North Cascades of Washington State. Participants will learn climbing and leadership skills for mountain travel.

Adirondack Ice Climbing
Spring. Fee charged. Basic top-rope ice-climbing instruction, including a weekend trip to the Adirondacks.

High Peaks Expedition
Fall. Fee charged. Includes winter break trip. Two indoor classes and a one-week expedition to the Adirondacks will introduce winter camping, winter travel, and ice-climbing skills.

Backpacking Courses

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. Fee charged. Learn the essentials of traveling and camping in the winter through local outings and weekend trips. Covers trip planning, equipment selection and use, clothing, snowshoe and sled travel, snow shelter
construction, cooking, minimum impact camping, cold weather injuries, and safety.

**Southwest Backpacking**
Spring. Prerequisite: some previous backpacking experience recommended. 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. Trip covers expedition planning, wilderness backpacking skills, natural history, minimum impact techniques, navigation, backcountry cooking, safety, and leadership skills.

**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.

**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 III water. Course covers strokes, braces, eddy turns, peels, outs, ferrying, river dynamics, self-rescue, and river safety. Culminates with a weekend river trip.

**Sea Kayaking in Georgian Bay, Canada**
Fall, spring, summer. 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, and camping and travel skills.

**1,000 Islands Sea Kayaking**
Fall. Fee charged. Includes fall-break trip. 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.

**Caving Courses**

**Caving**
Fall, spring. Fee charged. Learn about the basic safety, techniques, and equipment for caving, finishing with a weekend caving trip.

**Caving Seminar**
Fall, spring. Fee charged. Learn about the basic safety, techniques, and equipment for caving, finishing with a day-long caving trip.

**Hiking Courses**

**Day Hiking**
Fall, spring. Fee charged. Hike and explore Ithaca's spectacular gorges, state forests, and extensive trail systems. 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. Seven sessions covering 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.

**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, outs, and Eskimo rolls. Prerequisite: ability to swim with comfort in deep water without a flotation aid.

**Pool Paddling**
Fall, spring. Fee charged. 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 kayaking, canoeing, and sea kayaking, while covering strokes, leans, braces, effective boat-handling skills, kayak Eskimo rolls, and rescues. Pool games, slalom gate courses, and video taping will be used to hone an understanding of skills and refine techniques.

**Sea Kayaking in Georgian Bay, Canada**
Fall, spring, summer. Fee charged. Learn basic sea kayak 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.

**Wilderness First Responder**
Fall. Fee charged. Includes fall-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.

**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.

**Outing Leadership and Teambuilding Courses**

**Facilitating the Adventure Experience**
Spring. Fee charged. Offers 100 percent attendance, otherwise fee charged. This experiential class challenges participants to explore the concept of facilitation. Each class member has the opportunity to develop personal leadership style while gaining valuable interpersonal skills. Course time is balanced between indoor group initiatives and outdoor low and high elements at Cornell's Hoffman Challenge Course.

**First Aid Courses**

**Basic Wilderness Emergency Care**
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 CPR and Wilderness First Responder certifications. Taught by Wilderness Medical Associates.

**Skiing Courses**

**Cross-Country Skiing**
Spring. Fee charged. Three weekend days 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. Included are 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 relieve 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 eyeware required.

Squash, Introduction to
Fall, spring, and summer. Fee charged.
Classes for appropriate level of play. Equipment is furnished. Protective eyeware 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.
Advanced strokes and doubles play emphasized. Recommended for tournament players or those with previous team experience.

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.

Water Skiing
Fall only. Fee charged.
Introductory course for beginner 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.

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.

Rifle 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.

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. Prerequisite: basic skating ability. Fee charged.
Stick handling, passing, and shooting are stressed. Some scrimmaging. Students provide their own skates and sticks; all other equipment is furnished.

Ice Hockey, Intermediate
Fall and spring. Fee charged. Prerequisite: beginning hockey or previous participation in organized hockey.
This course is designed for the intermediate hockey player. Advanced techniques taught include positioning, power play, penalty killing, and offensive and defensive attack. Each session emphasizes game situations and scrimmaging. Skates and hockey sticks must be supplied by the participants.

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 ball handling, serves, defensive blocks, and position play are stressed. Classes will scrimmage.

Volleyball, Intermediate
Fall and spring.
Passing and blocking strategies; 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 relation between high-rep light weight lifting, low-rep heavy lifting, and the development of bulk, strength, and endurance.

**Independent Study**

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.
Summer Sessions provides a wide variety of educational opportunities beyond the degree-granting programs of the university. These programs serve virtually all age groups in a great variety of formats and time frames. 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.

SCHOOL ADMINISTRATION
Glenn C. Altschuler, dean
Charles W. Jermy, Jr., associate dean, and director, Cornell University Summer Session
Diane E. Sheridan, director, finance and administration

School Program Directors and Managers
Stuart M. Blumin, director, Cornell in Washington Program
Abby H. Eller, director, Cornell University Summer College
Christine Holmes, special programs manager
Ralph Janis, director, Cornell’s Adult University

School Support Services
Graham Dobson, manager, information technologies
Ann L. Morse, media manager
Cathy M. Pace, registrar

SPECIAL AND PROFESSIONAL PROGRAMS
Intensive learning experiences are presented year-round both for students and for professionals in many fields. Formats include for-credit courses of one to eight weeks and non-credit weekend and weeklong short courses. Programs can also be designed to respond to the needs and interests of corporations, professionals, and other groups. These programs take place on the Cornell campus, on site, at other locations worldwide, and via distance learning. For information, call 255-7259; e-mail cusp@cornell.edu; fax 255-9697; or visit www.sce.cornell.edu/sp/.

SUMMER COLLEGE PROGRAMS FOR HIGH SCHOOL STUDENTS
Talented high school sophomores, juniors, and seniors attend regular university courses through Cornell University Summer College and may earn college credit. They also explore academic and career options in non-credit seminars. Students live in residence halls, become familiar with campus life, and attend seminars describing the college admissions process. The program is designed to help ease the transition from high school to college. For information, call 255-6203; e-mail summer_college@cornell.edu; or visit www.summercollege.cornell.edu.

CORNELL’S ADULT UNIVERSITY
Cornell’s Adult University (CAU) offers week-long noncredit courses on campus for adults and families during the summer. During the fall, winter, and spring, there are weekend seminars, weeklong domestic programs, and international study tours. Developed and led by distinguished members of the Cornell faculty, all programs are inspired by the belief that learning never ends and that one of the roles of a great university is to provide a bridge between traditional formal education and informal, noncredit study. For information, write Cornell’s Adult University, 526B Thurston Avenue, Ithaca, NY 14850-2400; call 255-6200; e-mail cauinfo@cornell.edu; or visit www.cau.cornell.edu.

DISTANCE LEARNING
The School of Continuing Education and Summer Sessions offers a range of courses through distance learning. Instructional materials for these courses may be presented on the web, and/or through video tapes, assigned readings, e-mail sessions with course instructors, and CD-ROMs. Students interact with the instructor and other students by phone or e-mail. Courses may be taken from home or elsewhere. Assignments and examinations are completed within a scheduled session, just as in on-campus courses, but students have the option of beginning study prior to the start of the session. For information, visit www.sce.cornell.edu/dl/. For faculty members interested in developing credit or noncredit distance learning courses, the school offers a broad range of services, including determining technological needs, resolving copyright issues, creating a marketing plan, and fulfilling administrative duties related to the course. Services are tailored to individual needs and ongoing support is available. Visit www.sce.cornell.edu/dl/ to see what's possible.

CyberTower is an exciting online program that gives users access to many of Cornell’s best teachers at any time and from virtually anywhere. CyberTower features Study Rooms on a wide range of topics. Each room offers video-streamed lectures, links to specially selected web sites, informative reading lists, and a place to chat with faculty and other Cornellians and CyberTower subscribers. CyberTower also features monthly faculty Forums on a variety of timely topics. For more information, visit the web site at cybertower.cornell.edu.

Distance Learning Course Roster
ABEN 299 Sustainable Development DL
AM ST 202 Popular Culture in the United States. 1945 to the Present DL
AN SC 222 Canine Genetics DL
ASIAN 225 Literature, Politics, and Genocide in Cambodia DL
COMM 120 Contemporary Mass Communication DL
COMM 272 Principles of Public Relations and Advertising DL
COMM 376 Planning Communication Campaigns DL
ECON 101 Introductory Microeconomics DL
EDUC 548 Effective College Teaching DL
GOVT 161 Introduction to Political Philosophy DL
GOVT 314 Prisons: The Politics of Incarceration in America DL
ILRST 210 Statistical Reasoning DL
ILRST 510 Statistical Methods for the Social Sciences I DL

EXTRAMURAL STUDY
Cornell undergraduate or graduate students whose studies have been interrupted may find it appropriate to register their studies by taking classes on a part-time basis. Area residents and Cornell employees may take courses on a part-time basis by registering as extramural students. Those interested may enroll in almost any course offered in the fall and spring terms if they receive the instructor’s written approval. Another offering, the Visitor’s Program, allows adults to attend classes in many divisions of the university on a space-available basis at a reduced charge. In this program, no credit is given, and no record is kept of attendance or performance. Visitors are required to obtain written permission from the instructor. For information, write to Extramural Study, B20 Day Hall, Ithaca, NY 14853-2801; call 255-4987; e-mail cusce@cornell.edu; fax 255-9697; or visit www.sce.cornell.edu/exmu/.

WINTER SESSION
Cornell undergraduate and graduate students, as well as employees and area residents, can earn up to four 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-mail cusce@cornell.edu; fax 255-9697; or visit www.sce.cornell.edu/wint/.
255-9697; or visit www.sce.cornell.edu/ws/. If a course is offered through distance learning, the course title will be followed by DL.

Winter Session Course Roster
AM ST 202 Popular Culture in the United States, 1945 to the Present DL
ASARC 131 Swahili (off campus)
BIOE 264 Tropical Field Ornithology (off campus)
C&R 495.18 Introduction to Peace Science
COMM 263 Organizational Writing
COMM 272 Principles of Public Relations and Advertising DL
EAS 305 Field Study in Hawaii (off campus)
ECON 101 Introductory Microeconomics DL
ECON 102 Introductory Macroeconomics
ECON 307 Introduction to Peace Science
ENGL 280 Creative Writing
ENGL 288 Expository Writing
GOVT 161 Introduction to Political Philosophy DL
NES 259 Islam—In Theory and Practice
OR&IE 350 Financial and Managerial Accounting
RELST 259 Islam—In Theory and Practice
Practicing Medicine/Providing Health Care (off campus)

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
ASARC 131-132 Swahili
ASARC 205 African Cultures and Civilizations
ASARC 210 Major Works of Black World Writing

International Agriculture (off campus)
INTAG 494.1 Tropical Ecology in Panama
INTAG 494.2 Summer Session at Zamorano (Honduras)

Biological and Environmental Engineering
BEE 299 Sustainable Development

American Studies
AM ST 104 Introduction to American History
AM ST 124 Democracy and Its Discontents: Political Traditions in the United States
AM ST 202 Popular Culture in the United States, 1945 to the Present DL
AM ST 301 America’s Changing Faces: A New Generation of Political, Economic, and Cultural Leadership (off campus)
AM ST 341 Recent American History, 1960 to the Present

Animal Science
AN SC 222 Canine Genetics DL

Anthropology
ANTHR 100 Introduction to Anthropology
ANTHR 101-102 Introduction to Anthropology
ANTHR 280 Native Americans and the Environment
ANTHR 315 Art in the Modern World: Expressive Culture and Performance

Applied Economics and Management
AEM 210 Introductory Statistics
AEM 221 Financial Accounting
AEM 250 Environmental and Resource Economics
AEM 290 Business Law I
AEM 323 Managerial Accounting
AEM 494 Special Topics

Archaeology
ARKEO 100 Introduction to Archaeology
ARKEO 358 Archaeology in Honduras

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 141 Introductory Sculpture
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 241 Sculpture II
ART 261 Photography II
ART 283 Color Photography
ART 361 Photography III
ART 372 Special Topics in Studio Art (off campus)
ART 459 Independent Studio in Painting (off campus)

Asian Studies
ASIAN 225 Literature, Politics, and Genocide in Cambodia

Chinese
CHIN 160 Introductory Intensive Chinese (Mandarin) [FALCON]
CHIN 201-202 Intermediate Chinese [FALCON]

Japanese
JAPAN 160 Introductory Intensive Japanese

JAPAN 201-202 Intermediate Japanese Conversation
JAPAN 460 Teaching of Japanese as a Foreign Language
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<tr>
<th>Course Code</th>
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<td>BIOE 261</td>
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<td>BIOE 467</td>
<td>Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life</td>
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<td>BIOG 200</td>
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<td>BIOBM 441</td>
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<td>BIOBM 602</td>
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<td>BIOL 102</td>
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<td>BIOL 368</td>
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<td>BIOL 375</td>
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<td>BIOL 413</td>
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<td>BIOL 418</td>
<td>Tropical Marine Science</td>
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<td>Seaweeds, Plankton, and Sea Grass: The Ecology and Systematics of Marine Plants</td>
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<td>CHEM 357-358</td>
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<td>CLASS 236</td>
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<td>CLASS 268</td>
<td>A History of Rome from Republic to Principate</td>
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<td>CLASS 104</td>
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<td>EDUC 420</td>
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<td>EDUC 694</td>
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<td>EDUC 711</td>
<td>Contemporary Issues in Educational Psychology</td>
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</table>
EDUC 760 Practicum Seminar in Educational Administration
EDUC 800 Master's-Level Thesis Research
EDUC 900 Doctoral-Level Thesis Research

**Engineering Introductory Courses**
ENGRI 172 Computation, Information, and Intelligence

**Distribution Courses**
ENGRD 211 Computers and Programming
ENGRD 221 Thermodynamics

The Engineering Cooperative Education Program offers a number of other engineering courses. Contact that office for more information.

**English**
ENGL 131 Critical Reading and Writing
ENGL 132 The Personal Essay
ENGL 211 Fantasy and Horror
ENGL 227 Shakespeare
ENGL 280 Creative Writing
ENGL 288-289 Expository Writing
ENGL 495 Independent Study (off campus)

**English as a Second Language**
ENGLF 101-102 English as a Second Language
ENGLF 211 English as a Second Language
ENGLB 115 English for Later Bilinguals

**Entomology**
ENTOM 213 General Entomology

**Feminist, Gender, and Sexuality Studies**
FGSS 203 Work and Family
FGSS 285 Gender and Sexual Minorities

**Government**
GOVT 111 Introduction to American Government and Politics
GOVT 131 Introduction to Comparative Government and Politics
GOVT 161 Introduction to Political Philosophy DL
GOVT 181 Introduction to International Relations
GOVT 307 An Introduction to Public Policy (off campus)
GOVT 312 America's Changing Faces: A New Generation of Political, Economic, and Cultural Leadership (off campus)
GOVT 314 Prisons: The Politics of Incarceration in America DL
GOVT 315 Introduction to the American Legal System: Its Nature, Functions, and Institutions (off campus)
GOVT 332 Modern European Politics
GOVT 420 The Politics of Environmental Protection in America

**History**
HIST 124 Democracy and Its Discontents: Political Traditions in the United States
HIST 154 Introduction to American History
HIST 253 Introduction to Islamic Civilization
HIST 262 The Middle Ages: Introduction and Sampler
HIST 268 A History of Rome from Republic to Principate
HIST 287 Evolution
HIST 314 History of American Foreign Policy, 1912 to the Present (off campus)
HIST 340-341 Recent American History
HIST 371 World War II in Europe
HIST 416 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

**History of Art**
ART H 202 Survey of European Art: Renaissance to Modern

**Horticulture**
HORT 202 Organic Gardening

**Hotel Administration**
H ADM 165 Managerial Communication I
H ADM 210 The Management of Human Resources
H ADM 420/620 Principles of Real Estate

**Human Development**
HD 115 Human Development
HD 216 Human Development: Adolescence and Youth
HD 284 Gender and Sexual Minorities
HD 370 Adult Psychopathology

**Human Ecology**
HE 406 Fieldwork in Professional Practice: Summer in the City (off campus)

**Industrial and Labor Relations**
Collective Bargaining, Labor Law, and Labor History
ILRRC 100 Introduction to U.S. Labor History: Nineteenth Century
ILRRC 408 Strategic Corporate Research

**NCC 550 Financial Accounting**
NCC 556 Finance with International Perspective

**Management Elective Courses**
NBA 548 Political Risk
NBA 554 International Finance
NBA 584 International Corporate Strategy
NBA 586 International Management
NBA 666 Negotiations

**Marine Science**
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 Engineering**
M&AE 221 Thermodynamics

**Music**
MUSIC 105 Introduction to Music Theory
MUSIC 331 Sage Chapel Choir

**Nutritional Sciences**
NS 422 Exercise Physiology and Human Performance
NS 660 Special Topics: Analysis of Longitudinal Data

**Philosophy**
PHIL 101 Introduction to Philosophy
PHIL 145 Contemporary Moral Issues
PHIL 191 Introduction to Cognitive Science
PHIL 231 Introduction to Deductive Logic
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
PHYS 501 Contemporary Physics for Teachers
PHYS 502 Modern Mechanics for Teachers

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 200 Introduction to Social Psychology
PSYCH 325 Adult Psychopathology
PSYCH 350 Statistics and Research Design

Religious Studies
RELST 265 The Middle Ages: Introduction and Sampler

Romance Studies
French Language
FRROM 209 Intermediate Composition and Conversation I
Italian Language
ITALA 123 Continuing Italian
Quechua (off campus)
QUECH 131-132 Elementary Quechua
QUECH 133-134 Continuing Quechua

Spanish Language
SPANR 121 Elementary Spanish
SPANR 123 Continuing Spanish
Spanish Literature (off campus)
SPANL 364/664 Culture and Civilization of the Andean World
SPANL 365/665 Contemporary Sociopolitical Issues in the Andes

Sociology
SOC 101 Introduction to Sociology
SOC 203 Work and Family
SOC 206 International Development
SOC 324 Environment and Society

Textiles and Apparel
TXA 114 Introduction to Computer-Aided Design

Theatre, Film and Dance
Film Studies
FILM 383 Screenwriting
Dance
DANCE 210 Beginning Dance Composition

Theoretical and Applied Mechanics
T&AM 293-294 Engineering Mathematics

Writing
WRIT 134 An Introduction to Writing in the University

S&T 427 The Politics of Environmental Protection in America
S&T 447 Seminar in the History of Biology: Evolution, Ethics, and Meaning in Life

Russian
RUSSA 121-122 Russian Elementary Course

Science and Technology Studies
S&T 205 Ethical Issues in Health and Medicine
S&T 287 Evolution
S&T 324 Environment and Society
The College of Veterinary Medicine offers a professional program that requires four years of full-time academic and clinical study of the normal and abnormal structure and function of the animal body and the diagnosis, treatment, and prevention of animal disease. Graduates of the college receive the Doctor of Veterinary Medicine (D.V.M.) degree, which is recognized by licensing boards throughout the world. Graduates generally enter private practice or academia, or become engaged in one of the increasing number of other biomedical activities.

Admission requires a minimum of three years of college work, including specific prerequisite courses and experience.

Applications must be filed approximately one year before the proposed matriculation date. The competition for admission is keen, since there are many more qualified applicants than can be admitted.

Graduate programs in veterinary research and postdoctoral training in clinical specialties are open to Doctors of Veterinary Medicine and some highly qualified holders of baccalaureate degrees and lead to the degree of Master of Science or Doctor of Philosophy.

More detailed information is available electronically at the website of the College of Veterinary Medicine, http://www.vet.cornell.edu.

Note: 500- and 600-level courses are open only to veterinary students except by written permission from the instructor.

The College of Veterinary Medicine’s professional curriculum comprises courses (designated with the prefix “VTMED”) in two categories: foundation courses and distribution courses.

The Professional Curriculum

Foundation Courses

In foundation courses I, II, III, and IV (VTMED 510, 520, 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 better able to integrate material from the basic and clinical sciences and are encouraged to develop an understanding of the clinical reasoning process from the beginning of the curriculum. The tutorial-based educational format creates an atmosphere that requires students to be involved actively in their learning and allows them to develop skills in communication, information retrieval, and analysis.

Note: Courses listed in brackets [ ] are approved courses that are not offered during the 2003-2004 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 ultrastructural 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 V)

Fall. 1 credit. Limited to first-year veterinary students. Letter grades only. A fee is charged for the course guide.

J. W. Ludders.

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 3-4 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, this laboratory course teaches the skills of observation, auscultation, palpation, and percussion, and related basic diagnostic procedures. The body systems are examined sequentially and follow the order of study in Block I.

VTMED 520 Genetics and Development (Foundation Course VI)

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.

An appreciation of how gene expression and cell behavior contribute to normal animal development and health is crucial for our understanding of the pathogenesis of disease. Students gain an understanding of the cellular and molecular mechanisms that regulate development and maintain normal structure and function throughout the life of an animal. Emphasis is placed on defining and characterizing normal cellular behaviors 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. Tutorial sessions are complemented by lectures, laboratories, and class discussions.

VTMED 521 Neuroanatomy and Clinical Neurology

Spring. 3 credits. Limited to first-year veterinary students. Letter grades only. A. delaHunta.

Neuroanatomy and Clinical Neurology is a vertically integrated course that includes dissection of the central nervous system of the dog and horse, the anatomic basis for the diagnosis of diseases of the nervous system, and the differential diagnosis of those diseases. Clinical cases with pertinent lesions
are demonstrated with each system using videotapes of clinical patients to demonstrate the clinical signs produced by the various diseases. Pattern recognition of characteristic neurologic disorders is emphasized. Slides of gross and microscopic use to demonstrate the clinical and neuroanatomic relationships to and stress characteristic features of representative conditions. The goal of the course is to make the student competent in interpreting neurologic signs to make an accurate neuroanatomic diagnosis, establishing a reasonable differential diagnosis, and planning and interpreting ancillary procedures.

VTMED 527 Animals, Veterinarians, and Society: Part B (Foundation Course Vlb) This begins in the last part of fall semester and finishes at the end of winter session. 1 credit. 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 course consists of both lectures and laboratory sessions. Lectures partially complement materials learned in VTMED 520 (Block II—Genetics and Development), 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 and bovine husbandry skills and reviews the small-animal physical examination.

VTMED 530 Function and Dysfunction: Part I (Foundation Course IIIa) Spring. 9 credits. Limited to first-year veterinary students. Prerequisite: VTMED 520, Genetics and Development. Letter grades only. R. Rawson and staff. This course is designed to develop students' understanding of how an animal maintains itself as a functional organism, how this is achieved through the integration of different functional organ systems; how tissue structure relates to tissue function; how injury alters structure and leads to dysfunction, manifested as clinical signs; how organ function can be assessed; and how it 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 IIIb) 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 C1 (Foundation Course Vlcl) Spring. 1.5 credits. Limited to first-year veterinary students. Prerequisite: VTMED 427, Animals, Lectures partially complement material learned in VTMED 530 (Block III—Function and Dysfunction: Part I). The primary focus of this course is to introduce students to the interpersonal skills and techniques necessary for effective communication with clients. In addition, students will be introduced to career opportunities in veterinary medicine, the human-animal bond, animal death, and grief counseling. This course gives students the opportunities 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 538 Animals, Veterinarians, and Society: Part C2 (Foundation Course Vlcl2, continued) Fall. 0.5 credit. Limited to second-year veterinary students. Prerequisite: VTMED 537, Animals, Veterinarians, and Society: Part C1. Letter grades only. A fee is charged for the course guide. J. W. Ludders. This course complements and augments material learned in VTMED 538 (Block III—Function and Dysfunction: Part II) and is predominantly a laboratory course that provides a basic introduction to the clinical skills students will need when they enter clinics. There is a strong emphasis on the physical examination of the dog, horse, and cow. Clinical procedures include, but are not limited to: ear examination and treatment, injections, SQ fluid administration, diabetic monitoring, catheterization, naso- and orogastric tube placement, urinary catheterization, and IV catheterization.

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 role played by the external environment and human intervention in the epidemiology of infectious organisms.

VTMED 547 Animals, Veterinarians, and Society: Part D (Foundation Course VlId) Fall. 1.5 credit. Limited to second-year veterinary students. Prerequisite: VTMED 538, Animals, Veterinarians, and Society: Part C2. Letter grades only. A fee is charged for the course guide. J. W. Ludders. This course complements material learned in VTMED 540 (Block IV—Host, Agent, and Defense). The course emphasizes veterinary public health. Topics include animal bites, routes of disease transmission, rabies control programs, zoonotic diseases, and preventative health care programs including vaccination protocols in large and small animals.

VTMED 550 Animal Health and Disease: Part I (Foundation Course V) Spring. 10 credits. Limited to second-year veterinary students. Prerequisite: VTMED 540, Host, Agent, and Defense. Letter grades only. R. Hackett. This course integrates basic clinical sciences of medicine, surgery, anesthesiology, radiology, and theriogenology, which are themselves integrated subjects, with systems pathology and relevant aspects of applied pharmacology. The course is presented on a systems basis, moving from clinical signs of alteration in function, to pathophysiology of clinical signs, to strategies for diagnosis and treatment. Specific examples are used to establish a cognitive framework and to make sense of the most important diseases. This course provides a sound foundation for clinical rotations in Foundation Course VI. It builds on the strengths developed in earlier courses by an increased exposure to case examples in a more directed way, taking advantage of the diversity of skills and special knowledge of both faculty and students. A variety of educational techniques are used, including lecturers in which interaction is encouraged; laboratories, demonstrations, case discussions, and autotutorials.


VTMED 557 Animals, Veterinarians, and Society: Part E (Foundation Course VlEl) Spring. 1 credit. Limited to third-year veterinary medical students. This course continues in the fall semester as VTMED 558. Prerequisite: VTMED 547, Animals, Veterinarians, and Society: Part D. Letter grade only. A fee is charged for the course guide. J. W. Ludders. This course complements material learned in VTMED 550 (Block V—Animal Health and Disease). During the spring semester this course explores the topic of professional development, while during the fall semester it covers topics concerning governmental regulation of veterinary medicine. More specifically, topics during the spring semester include informed consent, utilizing the veterinary team, reducing workplace stress, and personal financial management. There is a laboratory component in which students spend a shift in the Intermediate Nursing Care (INC) unit in the Cornell University Hospital for Animals.

VTMED 558 Animals, Veterinarians, and Society: Part F (Foundation Course VlEl2) Fall. 1 credit. Limited to third-year veterinary students who have successfully completed Foundation Course VlEl1. Prerequisite: VTMED 557, Animals, Veterinarians, and Society: Part E1. Letter grade only. A fee is charged for the course guide. J. W. Ludders. 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
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label drug use (FDA), controlled substances (DEA), professional liability and malpractice insurance, professional and unprofessional conduct, hazardous materials in the workplace (OSHA), and environmental issues (EPA). Also included are sessions relating to the control and prevention of the spread of animal diseases by the roles of USDA and specifically APHIS in these regulatory functions. The laboratory component consists of two nights in the Equine and Farm Animal Hospital and a shift with the small-animal Intermediate Nursing Care (INC) team.

VTMED 560 Ambulatory and Production Medicine
Fall, winter, spring and summer. Credit variable (either one or two credits).
Required component of Clinical Rotations (Foundation Courses VI). Letter grades only. M. E. White and staff.
A total of 4 weeks of Ambulatory and Production Medicine are required. VTMED 565 is taken during the clinical rotations in the 3rd or 4th year. VTMED 560 is also generally taken 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. Hornbuckle 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 pet for primary medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of these patients. After review, students explain their plans to the clients and provide follow-up care and management of these patients.

VTMED 562 Surgery III
Fall, winter, spring and summer. 2 credits.
Required component of Clinical Rotations (Foundation Course VI). Letter grades only. H. J. Harvey and staff.
Basic principles of anesthesiology and surgery are emphasized in the clinical rotation. Under direct staff supervision, students anesthetize and perform surgical procedures on patients presented to the Companion Animal Hospital for neutering and minor elective procedures. Students are responsible for all aspects of patient care during their hospital stay and are expected to interact in client communications. Ordinarily, this course will precede Anesthesiology Service and Small-Animal Surgery Service (soft-tissue component).

VTMED 563 Small-Animal Medicine
Fall, spring, winter, and summer. 4 credits.
Required component of Clinical Rotations (Foundation Courses VI). Letter grades only. S. C. Barr, S. A. Center,

The Small-Animal Medicine Service is structured to provide supervised clinical experience in the practice of small-animal medicine. The course is conducted in the Companion Animal Hospital. Students interact directly with clients presenting their pets for primary 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 564 Small-Animal Surgery Service
Fall, winter, spring, and summer. 4 credits.
Required component of Clinical Rotations (Foundation Courses VI). Letter grades only. H. J. Harvey and small-animal surgery faculty.
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 therapy, 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 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 clinicians on farm and stable calls and learn the skills and procedures necessary for operation of a modern veterinary practice offering primary care to large-animal clients. Routine herd-health visits are conducted for cattle, horses, sheep, goats, and swine. Reproduction evaluations (including pregnancy and fertility examination), nutritional evaluation, and disease prevention are stressed. Herd-health programs also include vaccinations, parasite control, mastitis prevention, and routine procedures such as castration and dehorning. 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, and staff.
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, election and completion of appropriate ancillary tests, diagnosis, treatment, and patient care. Daily rounds and discussions are used to monitor patient progress and further educate students.

VTMED 567 Large-Animal Surgery Service
Fall, winter, spring, and summer. 4 credits.
Required component of Clinical Rotations (Foundation Course VI). Letter grades only. A. J. Nixon and staff.
This clinical rotation is structured to provide supervised clinical experience in the practice of large-animal surgery. Under the direction of faculty and house staff, students participate in the diagnosis, surgical treatment, and care of patients presented to the Equine and Farm Animal Hospital. Training through patient care is supplemented by formal rounds and didactic instruction.

VTMED 568 Anesthesiology Service
Fall, winter, spring, and summer. 3 credits.
Required component of Clinical Rotations (Foundation Course VI). Letter grades only. R. D. Gleed, J. W. Ludders, P. F. Moon, and staff.
This course is designed to provide 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 569 Dermatology Service
Fall, winter, spring, and summer. 2 credits.
Required component of Clinical Rotations (Foundation Course VI). Letter grades only. W. H. Miller and D. W. Scott.
During this clinical rotation, students participate in the diagnosis and management of skin disorders in small and large animals. Patients are examined by appointment and through consultation with other hospital services.

VTMED 570 Ophthalmology Service
Fall, winter, spring, and summer. 2 credits.
Required component of Clinical Rotations (Foundation Course VI). Letter grades only. R. C. Ris, T. Kern, and N. Irby.
This course combines clinical experience with beginning skills in diagnostic ophthalmology. Students learn how to apply the ophthalmic diagnostic tests. A competent ocular examination is the goal of this rotation. Confidence in using direct and indirect ophthalmoscopes, slit lamps, tonometers, gonioscopes, conjunctival cytology, and surgery comes with the practice provided by this rotation. Students are required to review the introductory orientation videotapes in the autotutorial center titled Ocular Examination I and II before the start of the rotation. This rotation provides surgical experience and consultations. A high percentage of the consultations are referral cases that usually challenge the service. Adequate routine case material is presented to prepare most students for practice.

VTMED 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 two-week rotation. Necropsies are performed under the guidance of pathology faculty and residents. Students prepare written reports of necropsies performed, review microscopic hematologic and cytologic 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. Students use radiographic, CT, ultrasonographic, and nuclear-medicine imaging techniques to evaluate animal patients under treatment in the hospital. Students obtain and interpret radiographic and ultrasonographic studies with guidance from radiology faculty and technical staff. Two 3-hour laboratory sessions are given to allow hands-on experience in patient positioning and radiographic technique. 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 current cases. The safe use of X-ray-producing equipment and radioisotopes is discussed.

**VTMED 573 Fourth-Year Seminar**  
Fall and spring. 1 credit. Required component of Clinical Rotations (Foundation Courses VI). First-, second-, and third-year 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 two years, many of the distribution courses are oriented to the basic sciences. During years three and four, students have additional distribution course offerings from which to choose. Some emphasize clinical sciences, and small 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 601 Anatomy of the Carnivore**  
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. A. J. Beuzideman.  
Carnivore anatomy is studied by detailed systematic and regional dissection of the cat, with comparison to the dog. Student dissection is supplemented with prosections, radiographs, palpation of live cats, and exercises focusing on surgical approaches. There are opportunities to dissect other carnivores, such as the ferret and the fox, depending on availability of specimens. The lectures augment the laboratory dissection and introduce the student to functional and morphological comparative features in the Order Carnivora. Students do an independent research project on the carnivore species of their choice and give an oral presentation on this to the class.

**VTMED 602 Anatomy of the Horse**  
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. Haussler.  
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. Most lectures emphasize structural-functional correlations that are unique or important in the horse. Microscopic anatomy is integrated into the course in selected areas to lay a foundation for the later study of pathology or when it reinforces concepts of structure and function that are difficult to understand by a study of the gross anatomy alone (i.e., hoof). Student dissection cadavers are supplemented by skeletal materials, radiographs, models, preserved predissected specimens, and fresh specimens when they are available.

**VTMED 603 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 relate structure to function and to provide a foundation in pathology. Student dissection material is supplemented by skeletal materials, radiographs, models, predissected specimens, and postmortem specimens. Students are required to complete an independent study project on a relevant subject of their choice. Assessment includes written and practical examination.

**VTMED 605 Comparative Anatomy: Pattern and Function**  
Spring. 3 credits. Prerequisite: VTMED 510, The Animal Body. First-, second-, third-, or fourth-year veterinary students; others by permission. Letter grades only. L. A. Mazer.  
The goal of this course is to study anatomical variability among amniote (mammals, birds, and reptiles) and anamniote (amphibian and fish) species. This is accomplished by relating the anatomy of major organ systems in each species to a common basic pattern and considering the differences in a functional perspective. Five major systems are explored (integumentary, locomotory, cardiorespiratory, digestive, and urogenital) in a variety of species as available.

**VTMED 606 Advanced Clinical Neurology**  
The objective of this course is to further the student’s experience and confidence in the diagnosis and understanding of clinical neurological disorders. It continues their correlation of anatomy, physiology, and pathology in the diagnosis of diseases of the nervous system and the understanding of their pathogenesis. Neurological disorders that are not covered in the foundation course are considered here. The course is entirely based on case examples that are presented on videotapes and slides.

**VTMED 607 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 609 Anatomy and Histology of Fish**  
Spring. 2 credits. Minimum enrollment 4; maximum enrollment 6. First-, second-, third-, and fourth-year veterinary students; others by permission of instructor. S-U grades optimal. 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 610 Veterinary Aspects of Avian Biology**  
Spring. 1 credit. Minimum enrollment 10; maximum enrollment 60. First-, second-, third-, and fourth-year veterinary students; others by permission. Letter grades only. Offered even-numbered years. G. V. Kollias.  
An introduction to avian biology for veterinary students. The course includes lectures and laboratories involving avian evolution.
anatomy, physiology, and ecology. Emphasis is on the development of a strong foundation in avian biology that will be applied in VT MED 616, Diseases of Birds and VT MED 625, Avian Medicine and Surgery.

**VT MED 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.

The course is sponsored by Cornell University, the University of Pennsylvania, and three marine-science institutions at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center for 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, embryology, pathology, and medicine of a variety of marine and freshwater species are discussed. Some emphasis is placed on systems of aquaculture. The specific diseases of a few selected species are presented as examples, 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.

**VT MED 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 may be obtained; otherwise, students must demonstrate an 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. Letter grades only.

R. B. Innes.

This course is sponsored by Cornell University, the University of Pennsylvania, and three marine-science institutions at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center for National Marine Fisheries Service. It is an advanced course in the comparative pathology of aquatic invertebrates and vertebrates commonly used as laboratory animals. The model 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.

**VT MED 615 Veterinary Medicine in Developing Nations**

Spring. 2 credits. Maximum enrollment 35. First-, second-, third-, and fourth-year veterinary students; others by permission of instructor. S-U grades only. Normally offered odd-numbered years, will be offered in 2004. K. A. Schat.

Veterinary medicine has an important role to play in developing nations in developing and providing economical sources of animal proteins for human consumption and protecting ecological resources. This seminar course provides the veterinary students with information on and insight into the multitude of complex issues facing U.S. veterinarians working in developing nations.

**VT MED 616 Diseases of Birds**


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.

**VT MED 617 Basic Nutrition for Veterinary Students**

Fall. 1 credit. Prerequisite: Block III (VT MED 531). S-U grades only.

F. A. Kallfelz, J. J. Waskshlag, K. J. Hurley.

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.

**VT MED 620 Foreign Infectious Diseases of Animals**


This course describes the etiology, pathogenesis, clinical signs, gross pathology, differential diagnosis, methods of spread, reservoir hosts, and control of foreign animal diseases that present serious economic threats to the United States. It is student-seminar presentations with each student responsible for presenting one seminar. The recent spread of FMD, West Nile virus and BSE emphasize 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.

**VT MED 621 Feline Infectious Diseases**


The course consists of two 50-minute lecture periods a week for eight weeks. The lecture component of the course is obtained 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 findings, diagnosis, pathologic findings, therapy prevention, and public health considerations are emphasized. Most lectures are presented from a clinician’s point of view (and therefore the material is oriented towards practical skills in managing clinical cases.)

**VT MED 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, ligaments, meniscus, capsule, and synovium. The interrelationships of synovium, synovial fluid, articular cartilage, joint lubrication, biomechanical considerations, and enervation are considered. Canine osteoarthritis is emphasized. The disease in animal models such as mice, guinea pigs, rabbits, and sheep is mentioned. Therapies, such as nonsteroidal anti-inflammatory drugs, glucocorticoids, and others may be discussed.

**VT MED 626 Epidemiology of Infectious Diseases**


H. Mohammed and staff.

This course introduces the epidemiologic methods used in infectious disease investigations. The importance of surveillance systems in detecting modern epidemics and in the development of effective disease prevention and control strategies are also discussed. An emphasis is placed on understanding the role of the agent, the host, the environment as they relate to disease causation. The course explores contemporary epidemiologic methods applicable to old diseases that remain real or potential problems, newly emerging infectious diseases, and nosocomial infections. Selected diseases are discussed to clarify the role of epidemiology in understanding the pathogenesis of infectious processes in individuals and groups of animals. Students have the opportunity to apply the methods learned to actual disease problems and write an epidemiologic report that might lead to a publication in a peer-reviewed scientific journal.

**VT MED 627 Diseases of Antiquity**


This is a study of 36 human and animal diseases that have had profound effects on the course of human history from the beginning of recorded time to the present. This course combines aspects of literature, medicine, and history and explores the interactions between demographics, commerce, imperialism, medical care, the environment, and disease. Prevailing superstitions and religious views are considered in context with each illness and simultaneously occurring world events.
VTMED 628 Clinical Pathology
Spring, 2 credits. Minimum enrollment 20; maximum enrollment 60. Second-, third-, and fourth-year veterinary students. Letter grades only. Staff.
This six-week course addresses a range of issues related to laboratory medicine and interpretation of laboratory results. General topic areas include hematology, clinical chemistry and immunology, and urinalysis. The primary mode of instruction is student-driven small-group (untutored) exploration of case materials followed by faculty-moderated large-group discussions. Selected lectures and laboratory sessions supplement and expand on issues generated by the case discussions. This course builds on concepts previously addressed in Blocks III and IV and also provides additional experiences in practical clinical pathology procedures and microscopy.

VTMED 630 Clinical Biostatistics for Journal Readers
Spring, 0.5 credit. Prerequisite: VTMED 551. Staff.
This course provides a student with the statistical methods commonly used in veterinary clinical articles and becomes 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. Staff.
This course provides a student with diagnostic parasitology methods using samples obtained from ongoing clinical cases. Students attend eight 1-hour sessions as they rotate through the ambulatory, community practice, and pathology rotations. In the Ambulatory Service (four sessions with students), diagnostics concentrates on the laboratory examination of the 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 endo- and ectoparasites. 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 Environment.

VTMED 632 Senior Seminar
Fall and spring, 1 credit. First-, second-, and third-year veterinary students. S-U grades only. Must be completed in two consecutive terms (either fall to spring or spring to fall). 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 633 Introduction to Nontraditional Companion and Laboratory Animals
Spring, 1 credit. First-, second-, and third-year veterinary students. Letter grades only. Staff.
This course is both laboratory- and lecture-based and deals with a wide variety of nontraditional species, other than dogs or cats, that might be brought into a small-animal practice. These can be either companion or laboratory animals and include rodents, lagomorphs, other small mammals, reptiles, amphibians, birds, fish, goats, sheep, potbellied pigs, primates, and llamas. Instruction in restraint and handling, breeding, husbandry, and general animal management information is provided for each species. This is followed, where possible, by laboratory sessions for observation, restraint, and physical examination.

VTMED 634 Introduction to the Professional Literature
Spring, 1 credit. Minimum enrollment 20. First-, second-, third-, and fourth-year veterinary students. Letter grades only. Staff.
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. Secondary emphasis is on developing skills in library and bibliographic search techniques, as well as exploring the use of veterinary-related on-line information.

VTMED 635 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 optional. 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 Veterinary Teaching Hospital for Animals. Students observe and assist with restraint, examination and routine treatment of pets, and communication with clients. Successful completion requires satisfactory participation during 10 half-days of clinical service.

VTMED 636 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. Kalb, M.D.
The first half of this course provides information on the requirements for and metabolic uses of the essential nutrients of large and small animals, and the formulation and evaluation of practical rations for species of veterinary interest. Concepts are applied to life stage nutritional needs, including growth, adult maintenance, gestation, lactation, aging, performance, and production. The second half covers clinically relevant diseases of nutritional deficiency and excess, including obesity, as well as the role of nutrition in the management of diseases of the various organ systems—e.g., renal, lower urinary tract, cardiac, G-I, hepatic, and musculoskeletal. Topics include the role of nutrition in managing cancer and hypersensitivity disorders and in critical care, including enteral and parenteral nutrition. The course also includes an introduction to nutrition for exotic and zoo animals.

VTMED 640 Veterinary Aspects of Captive Wildlife Management
Spring, 2 credits. Minimum enrollment 10; maximum enrollment 40. First-, second-, third-, and fourth-year veterinary students. Letter grades only. G. V. Kollai.
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) zoonotic and toxicological problems, (5) manual restraint and anesthesia, (6) preventive medicine, and (7) medical and legal ethics. In even-numbered years the course emphasizes non-North American wildlife species (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
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 explicit 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 choice, treatment, 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 acid-base disturbances in domestic animals. The course is divided into segments dealing with salt and water imbalances, potassium abnormalities, metabolic acidosis, metabolic alkalosis, and mixed acid-base disturbances.

VTMED 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 techniques, embryo culture and
manipulation, embryo transfer techniques, registration of offspring, import and export, and related topics in assisted reproductive technologies. Students are exposed to practical 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 3; maximum enrollment 21. Enrollment is done by lottery. Third- and fourth-year veterinary students. S-U grades only. J. B. Woodie (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**

Fall, spring, summer (given in fall). 1 credit. Enrollment not to exceed 20 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 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 the public and local wildlife rehabilitators. Student activities are directly supervised and assessed by faculty and residents on a daily basis. Successful completion of the course requires 60 hours of satisfactory supervised participation per semester in the clinic. Clinic times are appropriately scheduled throughout the semester. Students are required to submit two case summaries, or alternatives approved by the course leader, before the end of the semester and log of their clinical hours.

**VTMED 649 Introduction to Equine Practice**

Spring. 0.5 credit. Minimum 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 breeds and colors, 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**

First- and second-year veterinary students. S-U grades only. G. V. Kollias and staff.

This course 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 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 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 in the course are nitrates, cyanide, oxalates, photodynamic agents, alkaloids, and mycotoxins.

**VTMED 648 Clinical Management of Native Wildlife**

Fall, spring, summer (given in fall). 1 credit. Enrollment not to exceed 20 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 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 the public and local wildlife rehabilitators. Student activities are directly supervised and assessed by faculty and residents on a daily basis. Successful completion of the course requires 60 hours of satisfactory supervised participation per semester in the clinic. Clinic times are appropriately scheduled throughout the semester. Students are required to submit two case summaries, or alternatives approved by the course leader, before the end of the semester and log of their clinical hours.

**VTMED 650 Introduction to Equine Theriogenology**

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 intended for students anticipating equine practice after graduation. This course is offered during a one-week period over winter intersession.

**VTMED 651 Equine Theriogenology**

Spring. 1.5 credits. Minimum enrollment 10; maximum enrollment 110. First-, second-, third-, and fourth-year veterinary students. Letter grades only. G. Perkins.

The common medical problems of foals, calves, and lambs often centered around septicemia and infection. The course emphasizes basic understanding of principles of clinical and laboratory diagnosis. A case-based approach is utilized in this course.

**VTMED 652 Advanced Equine Lameness**


This course is designed to introduce third- and fourth-year veterinary students to the principles and practice of clinical avian medicine and surgery. The course is taught in a basic didactic lecture and discussion format with laboratories that reinforce concepts presented in the lectures. Live birds are utilized in some of the laboratories.

**VTMED 653 Disorders of Large-Animal Neonates**

Spring. 1 credit. Minimum enrollment 6; maximum enrollment 24. Third- and fourth-year veterinary students. Enrollment is done by lottery. S-U grades only. R. Hackett and staff.

This course is intended for students anticipating equine practice after graduation. This course is offered during a one-week period over winter intersession.
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 Service of the Department of Biomedical Sciences. Working with the attending pathologist, students examine tissue specimens histologically, propose diagnoses, and discuss their interpretations. Students may enroll in this course only through the Office of Student Records within the official add/drop period. All requests to enroll must be accompanied by the Supplemental Enrollment Form indicating Dr. McDonough's approval of the enrollment and the amount of credit to be awarded. Second-year students should not enroll for any term other than summer unless they have actually reserved a January or spring-break slot through Dr. McDonough.

VTMED 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. Fubini and staff
This course provides students with a special insight into the dairy industry by offering 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 666 Small-Animal Clinical Oncology
Spring. 1 credit. Third- and fourth-year veterinary students. Letter grades only. K. M. Rassnick
This course presents the common cancers affecting small animals. Emphasis is placed on biological behavior and patient management. Surgery, chemotherapy, and radiation therapy as important methods to treat cancers in small animals are discussed. Course format includes lectures. Attendance is required.

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 selected problems in small-animal medicine in 2-hour weekly seminars. The focus is on the medical problems associated with cases using historic, clinical, clinical pathologic, and pathologic findings to elucidate physiologic 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, ultrasonics), treatment plans, and prevention. The course expands knowledge gained in Foundation Course V and, under the instruction of a clinical faculty member, is aimed at facilitating the use of that knowledge into the practical skills of managing clinical cases.

VTMED 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. Staff
Course participants form a veterinary group practice that includes the specialties of each person's interest. Topics are presented and discussed in the staff meeting format of the practice. Topics include basic practice organizational principles, 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 relations and 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, concurrent enrollment in Sheep and Goat Medicine Lecture is required. Third- and fourth-year veterinary students. S-U grades only. M. C. Smith
This course discusses diagnosis, treatment, and prevention of medical and surgical problems of individual small ruminants and of sheep and goat herds. Basic information on breeds, behavior, nutritional requirements, and management systems is supplied. Economically important contagious or metabolic diseases are discussed in depth. The diagnostic evaluation and differential diagnoses for common clinical presentations such as skin disease, neurologic disease, lameness, and mastitis are considered. Herd monitoring of economically important parameters and periparturient diagnosis of abortions and neonatal losses are addressed. Breeding systems, pregnancy diagnosis methods, and correction of dystocias are discussed and demonstrated in optional laboratory sessions.

VTMED 670 Drug Handling in the Body
Spring. 0.5 credit. Minimum 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, adsorption, 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. Minimum 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 organisystem 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. Schwartz
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 considers antibacterial, antifungal, antiparasitic, and antiviral drugs from the point of view of unique pharmacokinetic and performance indications for clinical use, and potential toxicities as the basis for rational use.

VTMED 676 Clinical Ophthalmology
Spring. 0.5 credit. Third- and fourth-year veterinary students. S-U grades only. R. Riis, N. Iby, 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.

VTMED 677 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 data entry software currently used in dairy management. Local dairy herds serve as additional laboratories for class projects.

VTMED 678 Small-Animal Theriogenology
Spring. 1 credit. Minimum enrollment 6; maximum enrollment 100. Third- and fourth-year veterinary students. Letter grades only. D. H. Voitmann.
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 management, 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 679 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 be a teaching tool. Pharmacological concepts are available, pharmacokinetic considerations, and potential drug interactions/toxicities. This course is offered at the time students are about to embark on their clinical rotations. It is designed as a practical aspects of pharmacology in the clinical setting, using basic concepts obtained during formal course work. The onus is placed on the student to explain/rationalize drugs employed in clinical problems of horses. History-taking, counseling, diagnostics, 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 680 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, diagnostics, 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. Each student has the opportunity to participate in three cases. Behavioral and pharmacological concepts for behavior problems are presented.

VTMED 681 Behavior Problems of Small Animals
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 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 concepts for behavior problems are presented.

VTMED 682 Topics in Veterinary Emergency and Critical Care Medicine
Spring. 1 credit. Minimum enrollment 20. First-, 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 most of the discussions center on small animal medicine, the same principles apply to both small and large animal situations. Topics covered include triage, shock, trauma, stabilization, cardiopulmonary resuscitation, respiratory emergencies, cardiac emergencies, heat stroke, hypothermia, envenomations, acute renal failure, hemolytic emergencies, transfusion medicine, respiratory monitoring, hemodynamic monitoring, acute abdomen, emergency surgical procedures, and sepsis.

VTMED 685 Physiology of Pregnancy
Spring. 2 credits. Maximum enrollment 20. Second-, third-, and fourth-year veterinary students. S-U grades only. Staff. This course is presented in lecture fashion. One major reference per lecture is assigned each week. Subjects covered are placental function, fetal growth, central nervous system development, pregnancy, maternal and fetal physiology, parturition, and adaptations to newborn life.

VTMED 689 Fundamentals of Ruminant Digestion and Metabolism
Spring. 0.5 credit. Minimum enrollment 5; maximum enrollment 50. First-, second-, third-, and fourth-year veterinary students; selected graduate students by permission of instructor. Letter grades only. T. R. Houpt. This course is designed for the student who has little or no previous coursework in ruminant digestive physiology. It consists primarily of lectures surveying the functional aspects of control of feed intake; salivation; reticulorumenal motility, including rumination and eructation; microbial flora and fauna; fermentation in reticulorumen (digestion of carbohydrates, proteins, and fats); ruminal gas formation; absorption of short-chained fatty acids; special features of ruminal nitrogen metabolism; passage of nutrients to lower tract; and a brief consideration of the functions of omasum, abomasum, and small and large intestines. Emphasis is on the differences of the ruminant digestive processes from those of the simple-stomached animals.

VTMED 690 Molecular and Genetic Basis of Inherited Disorders in Animals and Application to Clinical Medicine
Spring. 2 credits. Minimum enrollment 15. First-, second-, third-, and fourth-year veterinary students; graduate and undergraduate students also welcome. Letter grades only. Offered every numbered years. J. Ray. This course introduces the molecular basis of inherited diseases in domestic animals. Topics include: several inherited metabolic defects (lysosomal storage diseases, muscular and bone abnormalities; retinal degeneration; and failure of immune systems. Techniques to characterize genes and mutations. Use of molecular techniques for diagnosis and prevention. Molecular tools for the treatment of inherited disorders.

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 options by permission. Letter grades only. Lee, 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 survey course in reproductive physiology/endoendocrinology. 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 embryonic 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 student 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 students are 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
Spring. 1 credit. Minimum enrollment 15. Third- and fourth-year veterinary medical students. J. W. Lukiders, R. D. Gleed, and L. P. Posner. This course is designed for the veterinary student interested in small-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 elementary 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 Mixed Animal Practice
Spring. 1 credit. Minimum enrollment 15. Third- and fourth-year veterinary medical students. R. D. Gleed, J. W. Lukiders, and L. P. Posner. 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 are 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 tenure-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. Specific course objectives and course content are flexible and reflect the specific research environment. Research projects may be arranged to accumulate credit toward requirements in Distribution Sets I, II, III, IV, and V.

VTMED 700 Theriogenology Service
Spring. 2 or 4 credits. Prerequisite: VTMED 551. Minimum enrollment 4 per rotation. Third- and fourth-year veterinary students. Letter grades only. D. H. Volkman and staff.
Two week exposure to clinical procedures in theriogenology 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. Marson.
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 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 4 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 biology, 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 University Hospital for Animals patient load and augmented by teaching herd animals.

VTMED 703 Clinical Wildlife, Exotic-, and Zoo-Animal Medicine
Fall, winter, spring, summer. 2 credits. Prerequisite: VTMED 551. Maximum enrollment 2 per rotation (plus one intern). Third- and fourth-year veterinary students. Letter grades only. G. V. Kollas 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 veterinary, zoo- and exotic-animal medicine include the wildlife clinic cases, ongoing wildlife research and service projects, and trips to the Rosamond Gifford Zoo. Successful completion of the course requires satisfactory performance during this 14-day clinical rotation.

VTMED 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 covers the causes, diagnosis, treatment, and prevention of mastitis. The role of management practices is stressed. The course includes lectures, readings, discussions, laboratory exercises, and farm visits as part of the Quality Milk Production Services. Particpants 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. 2 credits. 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 spent at other teaching hospitals, research laboratories, or zoological facilities. Student proposals are submitted to the associate dean for academic evaluation of cattle operations, focusing on identification of disease risk and the development of a comprehensive set of skills necessary for a veterinarian to perform adequately in these areas, within a structured format. These skills will include the appropriate evaluation (triage) and stabilization of emergency patients, the management of post-operative and other critically ill patients, and sensitive and effective client communication. The participants will access relevant information from various sources related to emergency and critical care medicine and will understand and apply these principles to clinical care. Participants will have patient care responsibilities in the Intensive Care and Intermediate Care units of the Cornell University Hospital for Animals and will work closely with technicians and clinicians to develop familiarity with technical and nursing procedures. Students will participate in the management of incoming emergency cases. The clinical emergency and critical care medicine rotation will be primarily an overnight rotation.

VTMED 710 Animal Behavior Clinic
Fall, winter, spring, and summer. 2 credits. Prerequisite: VTMED 681. Maximum enrollment 2 per student. Third- and fourth-year veterinary students. S-U grades only. K. A. Houp.
The students will participate fully in the Animal Behavior Clinic: answering telephone, mail and e-mail inquiries; conducting or observing and taking charge of behavior cases. In order to answer inquiries, the student is expected to consult several behavioral textbooks or other sources. Taking charge of the cases includes residing the entire behavioral history, interviewing the owner, forming a diagnosis, conferring with Dr. Houp or a behavioral resident as to the proper behavioral and pharmacological treatment, demonstrating behavior modification techniques and writing a letter to the client. Follow-up calls to earlier cases may be made.

VTMED 711 Herd Health and Biosecurity Risk Evaluation Using the NYS Cattle Health Assurance Program (NYSCAP) Model
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, P. 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 720 Issues and Preventive Medicine in Animal Shelters**

Spring. 1 credit. Prerequisite: VTMED 540. Minimum enrollment 5; maximum enrollment 30. Second-, third-, and fourth-year veterinary students. Letter grades only. J. M. Scarlett and staff from the American Society for Prevention of Cruelty to Animals.

Veterinarians often work for or with animal shelters, serve on shelter boards of directors, are 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 palliative health management (including highlighting diseases of the companion animal patient), euthanasia, reasons for relinquishment, 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**


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 in-depth coverage of primary literature relating to the parasite being discussed. Topics vary annually. The course is presented in a lecture/discussion format.

**VTMED 722 Timely Topics in Veterinary Parasitology: Small-Animal**


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 in-depth coverage of primary literature relating to the parasite being discussed. Topics vary annually. The course is presented in a lecture/discussion format.

**VTMED 723 Bacteria and Fungi in Veterinary Medicine**

Spring. 2 credits. Minimum enrollment 8; maximum enrollment 80. 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 because they are covered in 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 724 Reproductive Examinations, Swine**

Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 40. Second-, third-, and fourth-year veterinary students. Letter grades only. R. 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, antibiotic resistance 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. Grading is based on weekly quizzes, a final exam, a short paper and/or oral presentation.

**VTMED 725 Special Topics in Animal Nutrition**

Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 40. 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 Animal Medicine Service. The course consists of participation in scheduled and unscheduled and completion of projects designed to provide experience in herd problem solving, records analysis and implementing herd-health programs. Clinical service assignments are planned to meet individual student goals. Examples of focus areas available include livestock production medicine, dairy reproductive examinations, small-ruminant medicine, and equine ambulatory practice.

**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 with laboratories (limited) reinforcing concepts presented in the lectures.

**VTMED 730 Vaccines: Theory and Practice**

Spring. 1 credit. Prerequisite: introductory course in immunology or VTMED 540 or VETMI 515. 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 weekly quizzes, a final exam, a short paper and/or oral presentation.

**VTMED 731 Veterinary Infectious Diseases**

Spring. 1.5 credits. Letter grades optional. TBA and K. Earnest-Koons.

This course provides veterinary students with a solid introduction to concepts and principles of the diagnostic approach to infectious diseases as they are being applied in the clinical setting. Students learn about specific infectious diseases, antibiotic resistance 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. Grading is based on weekly quizzes, a final exam, a short paper and/or oral presentation.

**VTMED 732 Veterinary Clinical Toxicology**

Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 40. Second-, third-, and fourth-year veterinary students. S-U grades only. TBA and K. Earnest-Koons.

This course provides veterinary students with a solid introduction to concepts and principles of veterinary toxicology and how they are applied in the clinical setting. Students learn about specific components of toxicology, clinical signs in affected animals, and treatment protocols for the toxins in question. Students also gain an understanding of the clinical approach to suspected or unknown toxicoses, sample collection and handling, and resources available for clinical toxicologic problems. The course is conducted with two 1-hour lectures per week and one hour-long large-group discussion per week. Grades are based on weekly quizzes, a final exam, and oral participation.

**VTMED 733 Selected Infectious Diseases of Swine**

Spring. 1.5 credits. Minimum enrollment 6; maximum enrollment 80. Second-, third-, and fourth-year veterinary students. S-U grades only. R. 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, antibiotic resistance 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. Grading is based on weekly quizzes, a final exam, a short paper and/or oral presentation.
uniform system in order 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 metazoan 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 these major parasites with the ultimate goal being to maximize the recognition of the major disease manifestations induced by the different groups of organisms. Laboratories stress certain aspects of some important parasite groups.

**VTMED 739 Viruses in Veterinary Medicine**
Spring. 1.5 credits. Maximum 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 course, given in a survey form, will present an overview of the major groups 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 Pathogens 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 roles 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 or 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 food problems 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. Niaa and M. Wiedmann. This class will meet for one hour twice a week for 8 weeks. In the first two weeks, the instructor will provide an overview of food-safety issues relevant to the veterinary profession. The following four weeks will be dedicated to student presentations on selected food-borne pathogens and food-safety issues. In the final two weeks, lectures and discussion led by the instructors will focus on emerging new issues in food safety and on farm-to-table technologies and approaches that can be used to assure the safety of animal-based foods.

**VTMED 742 Dairy Business Management and Health Economics**
Spring. 2 credits. Minimum enrollment 9; Maximum enrollment 15. Second-, third-, and fourth-year veterinary students. Letter grades only. C. Guard, L. Warnick. 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 to best 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 interpretational modalities. The practical case-based discussions will be presented by experienced representatives of various diagnostic modalities. Topics will include virology (e.g. BVD), bacteriology (e.g. Salmonella), parasitology (e.g. Cryptosporidium), serology (e.g. Johne's Disease), 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 to various food-animal production systems, how veterinarians interact with them, and the synergy between these systems and veterinarians in society. Each week the production structure of the dairy, beef, swine, poultry, or aquaculture industry, veterinarians' role in them, and career opportunities and expectations will be discussed. The offering is intended for first- or second-year students so that they can plan appropriately to take additional courses or set up externships in the following years.

**VTMED 745 Dynamics of Dairy Herd Health and Management**
Spring. 1 credit. First-, second-, third-, and fourth-year veterinary students. Letter grades only. Y. T. Grohn and D. L. Warnick. Competitive pressure, increasing input costs, and comparatively stagnant 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 opportunity areas 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-performance parameters with dairy-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 (two days per week) is a lecture one day and hands-on work with computer software for data management and analysis.

**VTMED 746 Fish Health Management**
Spring. 1.5 credit. Minimum enrollment 8; maximum enrollment 16. First-, second-, third-, or fourth-year veterinary students; others by written permission of instructor. S-U grades optional. P. R. Bowser. A lecture and laboratory course providing an overview of the aquatic environment and the important infectious and non-infectious diseases of fish. Diseases covered will be those important diseases encountered in commercial aquaculture, aquarium systems, and natural waters. The laboratory is designed to provide students with a knowledge base and hands-on diagnostic skills for management of these diseases of fish. Students also will maintain and manage aquarium systems during the course to gain an appreciation for the science behind the operation of these systems. The laboratory will require time outside of scheduled class sessions (to be scheduled by the students) for management of the aquarium 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 and graduate students. Letter grades only. I. K. Morrissey. This course focuses on the husbandry, clinical presentation, diagnosis, and treatment of common diseases of nontraditional small mammals that are kept as pets. These species include ferrets, rabbits, guinea pigs, chinchillas, rats, mice, hamsters, gerbils, hedgehogs, sugar gliders, and other animals. Grading is by letter and based on a mid-term and final examination.
VTMED 748 Canine and Feline Medical Genetics  
- Spring. 2 credits. Prerequisites: VTMED 520, 530, and 551. 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 540. Minimum enrollment 80. 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 V. Students gain an understanding of the diversity and biology of anaerobic bacteria and the niches that they occupy in the animal and avian body. A basic, clinically oriented taxonomy is presented, and students learn about the virulence and pathogenesis of the major anaerobes that they will encounter in 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 jejunal hemorrhage syndrome). 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 enrollment 20. Letter grades only. J. M. Scarlett.
This course, intended as a sequel to VTMED 720, encourages students to apply the principles of infectious disease, epidemiology, and preventive medicine to infectious disease problems in small-animal populations, particularly in shelters (e.g., ringworm, kennel cough). Consideration is given to other small-animal populations (e.g., catteries, kennels).

Biomedical Sciences

VTBMS 346 Introductory Animal Physiology (also BIOAP 311) (Undergraduate)  
- Fall. 3 credits. Prerequisites: BIOG 105, BIOG 106, or BIOG 101, BIOG 103, BIOG 104, BIOG 107, BIOG 108; CHEM 207, CHEM 208, or CHEM 206, or CHEM 215, CHEM 216; MATH 100, 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 optional. E. R. Loew.
A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of species 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 2.5-hour period. By permission of instructor. S-U grades only. Biomedical science staff.

VTBMS 628 Graduate Research in Animal Physiology (Graduate) (also BIOAP 719)  
- Fall, spring. 1–3 credits. By written permission of department chairperson and faculty mentor who will supervise the work and assign the grade. S-U grades optional. Similar to Biological Sciences 499 but intended for graduate students who are working with faculty members on an individual basis.

VTBMS 700 Predictions of Form or Phylogeny  
- Fall. 1 credit. By permission of instructor. S-U grades optional. J. W. Hermanson.
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 versus the arboreal gliding theory of flight evolution? Specific topics pursued are selected by participants in this course. Participation is open to interested graduate students, advanced undergraduate students, and veterinary students.

VTBMS 720 Special Problems in Physiology  
- Fall, spring. 1–3 credits. By permission of instructor. Laboratory work, conferences, collateral readings, and reports. Adapted to the needs of students. S-U grades optional.

VTBMS 788 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 descriptions of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

VTBMS 811 Advanced Physiology Methods I (also BIO S 811) (Graduate)  
- Fall. 2 credits. Enrollment limited. Prerequisite: graduate-student status or permission of course coordinator. S-U grades only. P. L. McDonough and staff.
This is a course primarily for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of physiology faculty members to acquaint students with the latest techniques and methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

VTBMS 812 Advanced Physiology Methods II (also BIO S 812) (Graduate)  
- Spring. 2 credits. Enrollment limited. Prerequisite: graduate-student status or permission of course coordinator. S-U grades only. Lab TBA. J. Ray.
This is a course primarily for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of physiology faculty members to acquaint students with the latest techniques and methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

Clinical Sciences

VETCS 299 Research Opportunities in Clinical Sciences  
- Summer. 6 credits. Prerequisites: one year of biology (scores of 5 on Biology Advanced Placement Examination of the College Entrance Examination Board or BIO G 100 level). Letter grades only. A minimum of 120 hours of laboratory time is expected per three course credits. Clinical science faculty.
This is a mentored research apprenticeship program, designed to give laboratory experience to qualified unmatriculated high school students (participating in Cornell Summer College). Students will be placed in a research laboratory with a designated project under the direct supervision of a research associate (upper-level graduate student, post­doc, 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, students will be expected to give brief (15–20 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.

VETCS 700 Pathophysiology of Gastrointestinal Surgery  
- Fall. 1.5 credits. S-U grades only. Offered every third year. Next offered 2004. N. G. Ducharme.
Normal anatomy and physiology of the gastrointestinal system in carnivores,
herbivores and ruminants is presented initially. This is followed by in-depth discussion of the pathophysiologic mechanisms and sequelae of gastrointestinal obstructions including reperfusion injury, peritonitis, adhesions and short bowel syndrome. The emphasis of this course is development of advanced understanding of surgically relevant gastrointestinal problems that lead to appropriate decision making.

**VETCS 701 Pathophysiology of Orthopedic Surgery (Graduate)**
Spring. 1.5 credits. Prerequisite: D.V.M., M.D., or equivalent or approval of instructor. S-U grades only. Offered every third year. Next offered 2005. E. J. Trotter. This course provides specialized training in the anatomic, physiologic, and pathologic processes of musculoskeletal diseases in animals and humans, with special emphasis on surgical diseases of tendons, bones, and joints.

**VETCS 702 Pathophysiology of Cardiopulmonary Surgery (Graduate)**
Fall. 1.5 credits. Prerequisite: D.V.M. degree in third or fourth year. S-U grades only. Offered every third year. Next offered 2005. R. P. Hacket, S. L. Fusini, N. G. Ducharme, B. Woodie. Using lectures and group discussions, the objective of this course is to explain the pathophysiology of various cardiovascular diseases (cardiac arrest, cardiac arrhythmia under anesthesia) and airway disease (thoracic and upper-airway disease). As a basis for these abnormalities, cardiopulmonary hemodynamics and biomechanical aspects of ventilation are reviewed. The emphasis is placed on understanding these mechanisms and outlining the surgeon's response to them.

**VETCS 703 Surgical Principles and Surgery of the Integumentary System (Graduate)**
Spring. 1.5 credits. For graduate D.V.M.s or equivalent in residency or graduate training programs. S-U grades only. Offered every third year. Next offered 2006. B. Woodie, S. Fusini, and V. Cook. This course is designed for surgery residents and interns in residency programs. The largely discussion format and examines surgical principles and surgery of the integumentary system.

**VETCS 704 Pathophysiology of Urogenital Surgery (Graduate)**
Fall. For graduate D.V.M.s or equivalent in residency or graduate training programs. 1.5 credits. S-U grades only. Offered every third year. B. Woodie, S. Fusini 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. Some classes 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 is designed for third- and fourth-year veterinary medical students, interns, residents, graduate students, and postdoctoral associates who are interested in the fundamental and applied concepts of pain in animals. The course emphasizes the physiologic and pathophysiologic mechanisms involved in pain perception by animals, their responses (physiological and behavioral) to pain, and the pharmacologic mechanisms underlying analgesic therapy. The subject material is presented through lectures, group discussions, group readings, and group evaluation of analgesic protocols.

**VETCS 710 Advanced Veterinary Anesthesiology I**
Fall. 1 credit. Prerequisite: VTMD 568, Veterinary Anesthesiology or permission of instructor. Third- and fourth-year veterinary students, graduate students, interns, and residents. S-U grades only. L. P. Posner, R. D. Gleed, 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. Speakers are from both inside and outside the college. Topics cover the basic sciences as they apply to anesthesiology such as physics and engineering, applied pharmacology, physiology, and pathology. Clinically oriented lectures are also given concerning specific anesthetic species-specific differences in response to anesthetic drugs.

**VETCS 711 Advanced Veterinary Anesthesiology II**
Spring. 1 credit. Prerequisite: VTMD 568, Veterinary Anesthesiology or permission of instructor. Third- and fourth-year veterinary students, graduate students, interns, and residents. S-U grades only. L. P. Posner, R. D. Gleed, 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. Speakers are from both inside and outside the college. Topics cover the basic sciences as they apply to anesthesiology such as physics and engineering, applied pharmacology, physiology and pathology. Clinically oriented lectures are also given concerning specific anesthetic 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 level). Letter grade only. A minimum of 120 hours of laboratory time is expected per three course credits.

Microbiology and Immunology faculty. This is a research emphasis program, designed to give laboratory experience to qualified unmatriculated 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, postdoc, or faculty member). Students will be graded on preparation, participation in laboratory academic life, and appropriate acquisition of technical skills. At the end of the six-week session, they will be expected to give brief (15-20 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 (Undergraduate) (also Biological Science 305)**
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 BLOG 305 courseinfo web site.

**VETMI 320 Principles of Toxicology (Undergraduate) (also Biological Science 320 and Toxicology 320)**
Spring. 3 credits. Prerequisites: one year each of introductory biology and chemistry, with lab; one semester of organic chemistry lecture or waiver by instructor. S-U grades optional. S. Penningroth, R. Dietert, and S. Bloom. This course is an introduction to the interdisciplinary science of toxicology, drawing on material from biology, chemistry, pharmacology, ecology, earth science, risk analysis, and policy studies. Basic principles of toxicological science are presented and illustrated by case examples, such as pesticide toxicity to wildlife reproduction and human health risk assessment at a Superfund hazardous chemical waste site. Chemical risk management is described as a sociopolitical process involving the integration of scientific, economic, and cultural factors.

Independent student projects include a toxic chemical profile and a team analysis of hypothetical "environmental risk scenarios." Periodic talks by toxicology faculty acquaint students with basic research in this interdisciplinary branch of biological science. This is an introductory-level course in toxicology. Format: lecture supplemented by case examples. One field trip to a hazardous chemical waste site. Appropriate for nonmajors seeking basic literacy in environmental and human toxicology. "Gateway course" for students interested in 400- and 600-level toxicology courses.

**VETMI 331 General Parasitology (also BIOMI 331; Undergraduate)**
Spring. 2 credits. Prerequisites: zoology or biology; any of the following courses: BIORS 261, 264, 267, 274, 275, 278; BLOG 101, 102, 103, 104, 106, 107, 108, 109, 110, 170, 202, 207; BIOMI 192, 290 or equivalent courses. Letter grades only. D. D. Bowman. An introduction to the basic animal parasites, stressing systematics, taxonomy, general biology, ecological interactions, and behavior of non-medically important groups. Introduces the major animal parasites, protozoa, nematode, platyhelminth, acanthocephalan, annelid, and arthropod.
This course examines current topics in studies between viruses and their host cell components, viral nucleic acids and epidemiologic, clinical, and zoonotic aspects for the student to work in a research health importance, with emphasis on protozoan, and helminth parasites of public common features between different viral 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.

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.

Fall, spring. 1–3 credits. By permission of instructor. Prerequisite: a good background in immunology and infection biology; any of the following courses: BIOES 261, 263, 264, 267, 274, 275, 278; BIOG 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 170, 202, 207; BIOMI 192, 290, 298 or equivalent course. Letter grades only.

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.

VETMI 707 Advanced Work in Virology, Immunology (Graduate)

Fall, spring. 1–3 credits. By permission of instructor. S-U grades optional.

This is a seminar series designed to acquaint students with interests in parasitology and pathology; mechanisms of cytolysis; immune initiation; antigen presentation pathways; Th1 and Th2 cytokines in protection and pathology; 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.

Fall, spring. 3 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. 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 pathology; 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.

Fall, spring. 2 or 3 credits (3 credits with S-U grades optional). Prerequisite: VETMI 705 Advanced Immunology (Graduate) [also Biological Sciences 705]. S-U grades only.

This course is a mentored research apprenticeship program, designed to give laboratory experience to qualified unmatriculated high school students (participating in Cornell Summer College) or Cornell undergraduates. 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 (15–20 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.

VETMI 772 Advanced Work in Aquatic Animal Diseases (Graduate)

Fall, spring. 1–3 credits. By arrangement with instructor. S-U grades only.

Fall, spring. 1–3 credits. By arrangement with instructor. Letter grades only.

Fall, spring. Variable 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. Triage 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)

Spring. 3 to 6 credits (3 credits per 120 contact hours). Prerequisites: one year of basic biology (Score of 5 on Biology Advanced Placement Examination or College Entrance Examination Board or BIOG 100 level.) Letter grades only.

R. A. Cerione.

This is a mentored research apprenticeship program, designed to give laboratory experience to qualified unmatriculated high school students (participating in Cornell Summer College) or Cornell undergraduates. 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 (15–20 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 BIOM 470)

Spring. 3 credits. Prerequisite: permission of instructor. Letter grades only. M. Lindau.

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 found in articles published in the Biophysical journal. Topics covered include methods that examine both structure and function of biological systems: light microscopy, fluorescence microscopy, Fourier optics and image processing, confocal and multiphoton microscopy, phase contrast, electron microscopy, X-ray diffraction and protein structure determination, multidimensional NMR, spectroscopy, chromatophores, calcium measurements, resonance energy transfer, membrane biophysics, electrophysiology, ion channels, action potentials, ligand-gated channels, fluctuation analysis, patch-clamp, molecular biology of ion channels, rapid kinetics, caged compounds, transmitter release, capacitance measurements, amperometry, optical traps and molecular force measurements. The course format includes assigned literature reviews by the students on specific topics and individual
The fundamentals of NMR are presented and students acquire the tools necessary to establish an in-depth understanding of multidimensional, multinuclear NMR experiments. Application of the technique to proteins for assignment of their secondary structure, determination of structure and characterization of dynamics are presented. Special approaches for applying solution NMR techniques to large proteins are discussed.

VETMM 708 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. Paul.

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. Yen.
This one-credit module provides a brief historical review of the cell cycle; a summary of cell-cycle regulatory processes; and practical methods for cell-cycle analysis, including mathematical representations. Topics include: growth control of bacterial cell cycle including chemostats, mammalian cell tissue culture, cell synchronization, flow cytometry, age-density representation, G1 regulation, labile regulatory protein models, cell transformation, regulation by growth factors and the cytoskeleton, cyclin E/ZF: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
B. U. Paul.
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 metastatic spread; the process of invasational aggression, roles of matrix-degrading enzymes (e.g., metalloproteinases, plasmin, heparatinase, etc.) and angiogenesis, host effects on circulating cancer cells: immunological and hemodynamic considerations; organ preference of metastasis: roles of tumor cell/endothelial cell adhesion receptor/ligand pairs (e.g., polymeric fibrinectin/DPPIV; b4 integrin/CLCA; CD44/hyaluran; cytokine-inducible CAMs); chemokines and chemokine

VETMM 610 Cellular and Molecular Pharmacology
Fall. 2 credits. By permission of the instructors. S-U grades optional. Offered even-numbered years. G. A. Weiland 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 proteins, growth factor signaling; lipid signaling; calcium; 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 even-numbered years. G. A. Weiland and field of Pharmacology faculty. This graduate-level course surveys systems- 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 and antimicrobial agents and cancer chemotherapy.

VETMM 672 Protein Kinetics (also CHEM 672)
Spring. 4 credits. Prerequisite: CHEM 288 or 390, BIBOBM 331, or permission of instructor. Letter grades only. B. A. Baird.
This course focuses 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 role of cell membrane receptors in regulating cellular activities.

VETMM 700 Calcium as a Second Messenger in Cell Activation
Spring. 2 credits. By permission of instructor. Lecture-discussion. S-U grades only. Offered even-numbered years. C. M. S. Freire.
This course focuses on regulation of intracellular calcium and techniques for studying calcium movements and distribution in cells. Topics include calcium channels and exchangers, intracellular binding proteins and calcium stores, phosphatidylinositol turnover, release of calcium from intracellular 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 odd-numbered years. W. S. Schwark.
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 BION 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 theory. Topics discussed are basic methods of radioligand binding assays, including separation and measurement of bound and free ligand; characterization of receptor function; analysis of receptor structure; thermodynamic basis of the binding methods; 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 by 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, and it focuses on mechanisms of neurotransmitter action, the function of the nervous system. It is described in cellular and molecular terms. Roles of selected neurotransmitters in normal and dysfunctional brains are covered. Topics are introduced in lectures and followed up in discussions of recent journal articles.

VETMM 705 Chemistry of Signal Transduction
Fall. 2 credits. S-U grades optional. 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 BION 734)
Fall. 0.5 credits. By permission of the instructor. S-U grades optional. 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 considered.

VETMM 707 Protein NMR Spectroscopy (also BION 730)
This one-credit module presents: a brief cell-cycle analysis, including mathematical representations. Topics include growth control of bacterial cell cycle including chemostats, mammalian cell tissue culture, cell synchronization, flow cytometry, age-density representation, G1 regulation, labile regulatory protein models, cell transformation, regulation by growth factors and the cytoskeleton, cyclin E/ZF: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
B. U. Paul.
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 metastatic spread; the process of invasational aggression, roles of matrix-degrading enzymes (e.g., metalloproteinases, plasmin, heparatinase, etc.) and angiogenesis, host effects on circulating cancer cells: immunological and hemodynamic considerations; organ preference of metastasis: roles of tumor cell/endothelial cell adhesion receptor/ligand pairs (e.g., polymeric fibrinectin/DPPIV; b4 integrin/CLCA; CD44/hyaluran; cytokine-inducible CAMs); chemokines and chemokine...
receptors; extracellular matrix components; etc.; emergence of micrometastases: the roles of adhesion-and/or chemokine-mediated signaling in intravascular growth promotion of arrested and, animal model of metastasis and anti-metastasis treatment strategies.] 

[Section 4—Angiogenesis in Normal Development, Cancer, and Other Diseases B. U. Pauli.
Topics discussed in this one-credit module include: vascular biology, 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 blood flow, 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 non-neoplastic disease: hypoxia-driven pathologic 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 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. Taught daily during the second and third weeks of January. L. M. Nowak.
Students learn theoretical background for patch-clamp experiments during lectures. The experimental techniques of conventional and permeabilized patch whole-cell recording and single-channel recordings in cell-attached and -excised membrane patches are taught in afternoon laboratory sessions.

VETMM 730 Graduate Research in Pharmacology or Molecular Medicine
Fall, spring, and summer. 1-12 credits. By permission of instructor. S-U grades only. This course is offered by individual faculty members in the Department of Molecular Medicine and the Graduate Field of Pharmacology for graduate students undertaking research towards M.S. or Ph.D. degrees. This course cannot be used to fulfill the formal course requirements for the Field of Pharmacology.

VETMM 740 Special Projects and Research in Pharmacology
Fall, spring, and summer. 1-3 credits each topic. By arrangement with the instructor. Letter grade or S-U option. Field of pharmacology faculty. This course cannot be used to fulfill the formal course requirements for the Field of Pharmacology.
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. S. Fewtrell; Mechanisms of Neurotransmitter Release—M. Lindau; Central Nervous System Neurotransmitters—L. M. Nowak; Structure-Function of the Nicotinic Acetylcholine Receptor—R. E. Oswald.

VETMM 760 Directed Readings in Pharmacology
Fall, spring, and summer. 1-3 credits each topic. By arrangement with the instructor. Letter grade or S-U option. Reading and discussion. Field of pharmacology faculty. Individual members of the Graduate Field of Pharmacology offer directed readings and discussions on pharmacological topics to small groups or to individual students. Topics include, but are not limited to: Receptor Mechanisms—G. A. Wetland; Biochemical Neuropharmacology—G. A. Wetland; Amino Acid Neurotransmitters—L. M. Nowak; Stimulus-Secretion Coupling—C. M. S. Fewtrell; Cell Calcium—C. M. S. Fewtrell.

Population Medicine and Diagnostic Sciences
[VTPMD 299 Undergraduate Research in Epidemiology
Summer. 3 credits. Limited to undergraduate students. Letter grades only. Prerequisites are one year of basic biology (Score of 5 on Biology Advanced Placement Examination of the College Entrance Examination Board or BIOC 100 level). Permission of the instructor can be submitted for the prerequisite. J. Scarlett. This is a mentored research apprenticeship program designed to give laboratory experience in applied epidemiology to qualified unmatriculated high school students (participating in Cornell Summer College) or Cornell underclassmen.

Students are placed in a research laboratory with a designed project under the direct supervision of a research associate (upper-level graduate student, post-doc, or faculty member). A minimum of 120 hours of laboratory time is expected per three course credits. Students are graded on preparation in preparation participation in laboratory academic life and appropriate acquisition of techniques. At the end of the six-week session, students are expected to give a brief (15-20 minute) oral presentation on their work and submit a manuscript in a form suitable for publication. The faculty director of the laboratory has ultimate responsibility for evaluating each student's work and assigning the grade.]

VTPMD 664 Introduction to Epidemiology (Graduate)
Fall. 3 credits. Prerequisites: VTPMD/VETCS 665 and Statistics and Biometry 602 (College of Agriculture and Life Sciences). S-U grades optional. Y. T. 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 multivariate (logistic regression) methods, survival analysis and strategies for the analysis of epidemiologic data.

VTPMD 700 Special Projects in Diagnostic Endocrinology
Fall, spring. 1-3 credits. Prerequisite: recommended AS 427. By permission of instructor. Letter grades only. S. F. Schanbacher and S. Lamb.
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. For veterinary residents or graduate students. Letter grades only. Offered odd-numbered years. J. M. Scarlett, H. N. Erb, Y. T. Grohn, and H. O. Mohammed.
This course explains the theory behind and interpretation of parametric and nonparametric statistical techniques commonly used in research/clinical medicine. Students analyze small data sets using a commercial statistical-software package.]

VTPMD 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.
This course enables students outside the section of epidemiology to receive graduate research credits for projects with epidemiological components.

This course enables students in the section of epidemiology to receive graduate grades only. Epidemiology faculty.

The purpose of this course is to investigate an epidemiologic topic with one of the instructors. It provides experience in problem definition, research design, and the analysis of epidemiologic data.

FACULTY ROSTER

Abou-Madi, Noha, D.V.M., U. of Montreal (Canada). 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. Assoc. 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 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. Instructor, 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
Beyenbach, Klaus, Ph.D., Washington State U. Prof., Biomedical Sciences
Beuzidhout, Abraham J., D.V.M., U. of Pretoria. Senior Lecturer, Biomedical Sciences
Bloom, Stephen E., Ph.D., Penn State U. Prof., Microbiology and Immunology
Bowman, Dwight D., Ph.D., Tulane U. Assoc. Prof., Microbiology and Immunology
Bowser, Paul R., Ph.D., Auburn U. Prof., Microbiology and Immunology
Casaret, Alison P., Ph.D., U. of Rochester. Prof. Emeritus, Biomedical Sciences
Casey, James W., Ph.D., U. of Chicago. Assoc. Prof., Microbiology and Immunology
Center, Sharon A., D.V.M., U. of California–Davis. Prof., Clinical Sciences
Cerione, Richard A., Ph.D., Rutgers U. Prof., Molecular Medicine
Chang, Yung Fu, Ph.D., Texas A&M. Assoc. Prof., Population Medicine and Diagnostic Sciences
Christensen, Eric, D.V.M., Cornell U. Instructor, Biomedical Sciences
Clark, Theodore G., Ph.D., SUNY–Stony Brook. Assoc. Prof., Microbiology and Immunology
Collins, Ruth N., Ph.D., Imperial Cancer Research Center. Asst. Prof., Molecular Medicine
Cook, Vanessa L., Veterinary MB, Cambridge U. (U.K.). Lecturer, Clinical Sciences
Cooper, Barry J., Ph.D., U. of Sydney (Australia). Prof. Emeritus, Biomedical Sciences/Administration
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Fortier, Lisa A., D.V.M., Colorado State U. Asst. Prof., Molecular Medicine
Fortune, Joanne E., Ph.D., Cornell U. Prof., Biomedical Sciences
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Geller, Anna, D.V.M., U. of Bern, Switzerland. Lecturer, Clinical Sciences
Gilbert, Robert O., B.V.Sc., U. of Pretoria (South Africa). Prof., Clinical Sciences
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Goldstein, Richard, D.V.M., Hebrew U. (Israel). Lecturer, Clinical Sciences
Gradil, Carlos, Ph.D., Univ. of Minnesota. Lecturer, Clinical Sciences
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Hackett, Richard P., Jr., D.V.O. , Ohio State U. Prof., Clinical Sciences
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Hart, Robert, D.V.M., Michigan State U. Instructor, Clinical Sciences
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Huxtable, Clive R., Ph.D., U. of Sydney. Prof. (visiting), Biomedical Sciences
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Knight, Cameron, D.V.M., Massey U. Lecturer, Biomedical Sciences
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Korich, Jodi, D.V.M., Cornell U Instructor, Clinical Sciences
Kotlikoff, Michael I., V.M.D., Ph.D., U. of California–Davis. Prof., Biomedical Sciences
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Lengemann, Friedrich W., Ph.D., U. of Wisconsin. Prof. Emeritus, Biomedical Sciences
Levine, Roy A., Ph.D., Indiana U. Assoc. Prof., Molecular Medicine
Lewis, Robert M., D.V.M., Washington State U. Prof. Emeritus, Biomedical Sciences
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<tr>
<th>Name</th>
<th>Title/Institution</th>
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<td>Lin, David</td>
<td>Ph.D., U. of California at Berkeley</td>
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<td>Loew, Ellis R.</td>
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<td>Matlow-Cook, Jennifer</td>
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<td>Meyers-Wallen, Vicki N.</td>
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<td>Mohammed, Hussni</td>
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<td>Moon, Paul D.V.M.</td>
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<td>Nikitin, Alexander</td>
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<td>Nixon, Alan J.</td>
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<td>Osterricider, Nikolaus</td>
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<td>Parker, John</td>
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<td>Pauli, Bendicht U.</td>
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<td>Perkins, Gillian D.V.M., U. of Prince Edward Island. Lecturer, Clinical Sciences</td>
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<td>Phemister, Robert D.</td>
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<td>Posner, Lysa D.V.M.</td>
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<td>Quaroni, Andrea Ph.D., U. of Pavia (Italy)</td>
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<td>Randolph, John F.</td>
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<td>Reimer, Thomas J.</td>
<td>Ph.D., U. of Illinois. Prof. Emeritus, Population Medicine and Diagnostic Sciences</td>
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<td>Ris, Ronald C.</td>
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<tr>
<td>Roberson, Mark S.</td>
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<tr>
<td>Sacco, Tyson Ph.D.</td>
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<tr>
<td>Sack, Wolfgang O.</td>
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<td>Scarlett, Janet M.</td>
<td>Ph.D., U. of Minnesota. Assoc. Prof., Population Medicine and Diagnostic Sciences</td>
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<td>Assoc. Prof., Clinical Sciences</td>
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<td>Schat, Karel A.</td>
<td>Ph.D., Cornell U. Prof., Microbiology and Immunology</td>
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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 attracts faculty whose research and scholarly and creative work require first-rate academic facilities and who bring to all their students the profound questioning and exciting ideas of current scholarship. Finally, the college exists within a university of other colleges at Cornell—almost 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 faculty considers competence in a foreign language study. A score of 4 or 5 on an AP language 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 language study. A score of 4 or 5 on an AP language exam earns three credits but does not carry with it proficiency. However, 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 nonintroduction foreign language course at Cornell at the 200 level or above or (b) any other nonintroduction 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.

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.

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, 307 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, 303 Morrill Hall);

Placement in Language Courses and Advanced Placement Credit
Placement into language courses and advanced placement credit are separate results of examinations.

French

<table>
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<td>37–44</td>
<td>370–450</td>
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<td>45–55</td>
<td>460–580</td>
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<td>56–64</td>
<td>590–680</td>
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Italian

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Spanish

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* Students who have a score of 65 or higher on the LPS, or 690 or higher on the SAT II, or an AP score of 4 or 5 may enroll in Spanish 200, 207, or 209 without taking the CASE.
• Russian (schedule available from the Department of Russian Literature, 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 Dozier in Morrill Hall. Spanish-English bilinguals who do not fit the definition of "native speakers," and whose test scores make them eligible, should take the CASE.

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, alternatives to language acquisition 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.

Distribution Requirements

(Use note the different requirements in the arts, humanities, and social sciences for the graduating classes of 2006 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 (social science) and IV (humanities and the arts) below, with at least two in each group and two in the same department (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 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 courses

Biological Sciences: all 3 or 4 credit courses (including any combination of two courses from BIO 101–104) except BIO G 200 and BIO G 499 (unless permission is obtained from the Director of Undergraduate Studies in biology), BIO G 209, BIO G 498, and BIOSM 204.

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 Intro 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 Sexuality 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
530 Intro to Computational Neuroscience
332 Biopsychology of Learning and Memory
396 Introduction to Sensory Systems
424 Neuroethology
429 Offalction and Taste: Structure and Function
431 Effects of Aging on Sensory and Perception Systems
460 Human Neuroanatomy
492 Sensory Function

1. 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 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 courses

Biological Sciences: all 3 or 4 credit courses (including any combination of two courses from BIO 101–104) except BIO G 200 and BIO G 499 (unless permission is obtained from the Director of Undergraduate Studies in biology), BIO G 209, BIO G 498, and BIOSM 204.

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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 Intro to Computational Neuroscience

Crop Science:

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Earth and Atmospheric Sciences: all courses except 150, 250, 435

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429 Offalction and Taste: Structure and Function
431 Effects of Aging on Sensory and Perception Systems
460 Human Neuroanatomy
492 Sensory Function
Students may select additional science courses from the following supplementary list:

**Animal Science:**
- 100 Domestic Animal Biology I
- 150 Domestic Animal Biology II
- 212 Animal Nutrition

**Anthropology:**
- 101 Introduction to Anthropology
- 208 The Evolution of Human Mating
- 370 Environmental Archaeology
- 375 Evolutionary Theory and Human Behavior
- 390 Primate Behavior and Ecology
- 463 Zooarchaeological Method
- 464 Zooarchaeological Interpretation

**Applied and Engineering Physics:**
- 110 The Laser and Its Applications in Science, Technology, and Medicine

**Archaeology:**
- 370 Environmental Archaeology
- 463 Zoological Method
- 464 Zoological Interpretation

**Dance:**
- 312 The Moving Body: Form and Function

**Electrical Engineering:**
- 450 Lasers and Optical Electronics

**Engineering:**
- 110 The Laser and Its Applications in Science, Technology, and Medicine

**Entomology:**
- 212 Insect Behavior

**Food:**
- 200 Introductory Food Science

**Materials Science and Engineering:**
- 281 The Substance of Civilization

**Natural Resources:**
- 201 Environmental Conservation
- 210 Introductory Field Biology
- 301 Forest Ecology

**Nutritional Science:**
- 115 Nutrition and Health

**Psychology:**
- 225 Introduction to Biopsychology
- 320 Evolution of Human Behavior

**II. Mathematics and quantitative reasoning**

In completing four courses in science and quantitative reasoning, students must take at least one of the following courses (please note that EDUC 115, Introductory College Mathematics, counts neither toward the college degree nor toward distribution):

**Applied Economics and Management:**
- 210 Introductory Statistics

**Biochemistry, Molecular and Cell Biology:**
- 321 Numerical Methods in Computational Molecular Biology

**Biometry:**
- 301 (formerly 261) Statistical Methods
- 321 Introduction to Quantitative Methods

**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
- 324 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:**
- 319 Introduction to Statistics and Probability
- 320 Introduction to Econometrics
- 321 Applied Econometrics
- 368 Game Theory
- 431 Monetary Economics
- 476/477 Decision Theory

**Engineering:**
- 115 Engineering Applications of OR & IE
- 172 Computation, Information, and Intelligence
- 321 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
- 385 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:**
- 301 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), ILR 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).

**III. Social sciences and history**

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**

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**

**Anthropology**

**Archaeology**

**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.

**Asian 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, organization, 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**

**Archaeology**

**Asian American Studies**

**Biology and Society**

**Feminist, Gender & Sexuality Studies**

**Near Eastern Studies**

**Religious Studies**

**Science and Technology Studies**

**Visual Studies**

**Students in the graduating classes of 2007 and later** must complete four courses in science and quantitative reasoning as described for the classes of 2006 and earlier.
In addition, they must complete five courses of three or more credits each from the following five categories of courses in the humanities and social sciences; they must include at least one course from four different categories and no more than three in the same department. How an individual course is categorized is indicated with the appropriate abbreviation in its description.

**Cultural Analysis (CA)**

Courses in this area study human life in particular cultural contexts through interpretive analysis of individual behaviors, discourse, and cultural forms. Topics include belief systems (science, medicine, religion), expressive arts and symbolic behavior (visual arts, performance, poetry, myth, narrative, ritual), identity (nationality, race, ethnicity, gender, sexuality), social groups and institutions (family, market, community), power and politics (states, colonialism, inequality).

**Historical Analysis (HA)**

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

**Knowledge, Cognition, and Moral Reasoning (KCM)**

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

**Literature and the Arts (LA)**

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

**Social and Behavioral Analysis (SBA)**

Courses in this area examine human life in its social context through the use of social science 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, conflict resolution).

**Breadth Requirements**

Students must include in their undergraduate program at least one Arts and Sciences course that focuses on a 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 *.

**Restrictions on Applying AP Courses and Credit from Other Institutions to the Distribution Requirements**

Students may not apply AP credit or transfer credit from another institution to the breadth requirements or to any distribution requirement in the arts, humanities, or social sciences, which include the categories of CA, HA, LA, and SBA.

**Students in the graduating classes of 2006 and earlier** may apply up to two courses of approved advanced placement or transfer credit toward distribution requirements in Groups I and II (physical/biological sciences and quantitative/formal reasoning), as long as they take at least one course from the primary list in an Arts and Sciences science department at Cornell. Transfer credit applied to distribution in Group II (quantitative/formal reasoning) must be in mathematics, statistics, or computer science; it may not be in other quantitative subjects. Courses taken at other institutions in mathematics or computer science must be approved for transfer and distribution credit by the Department of Mathematics or Computer Science respectively. Statistics courses taken at other institutions in social science departments must be approved by the relevant department in Arts and Sciences (e.g., psychology or sociology); statistics courses taken in mathematics or statistics departments must be approved by the Department of Mathematics.

**Students in the graduating classes of 2007 and later** may apply no advanced placement or transfer credit to distribution in science and quantitative reasoning.

**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.

**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 towards 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 may apply for acceptance into the major as soon as they have completed the prerequisites and are confident of their choice. This may be as early as the second semester of freshman year, and must be no later than second semester of sophomore year. To apply, they take a copy of their transcript to an appointment with the director of undergraduate studies in their prospective major. A department or program may refuse admission into the major if the applicant's performance does not meet established standards. A student without a major at the beginning of the junior year is not making satisfactory progress toward the degree. That student must meet with an advising dean, and may not be allowed to continue in the college.

**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 feminism, 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 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 the one degree the college awards, a Bachelor of Arts.

**Double majors**

Only one major is required for graduation. Some students choose to complete two or
even more majors. No special permission or procedure is required; students simply become accepted into multiple majors and find an advisor in each department. All completed majors are posted on the official transcript. However, even though courses in a second major 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 the difference between an ordinary and a truly interesting course of study. Students must complete at least four courses and at least 15 credits offered outside the major field and not used to fill another requirement except breadth. AP credits not otherwise used may fulfill elective requirements. Students may group electives to complete one of the established interdisciplinary 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 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 first four semesters 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 prerequisites for admission to the major in time to spend four semesters in the major.
   b. 48 credits in College of Arts and Sciences courses numbered "300" and above and prerequisites for admission to the major in time to spend four semesters in the major. Upper-level courses taken in other colleges at Cornell University may count toward the 48 only if approved as part of the major.

3. 100 credits at Cornell at "C" (not C-) or above. Courses completed with a grade of "S" will count toward the 100 credits. Advanced placement and transfer credits do not count toward this requirement.

4. Students may not use credits earned while on leave of absence to reduce their terms of residence. In other words, they must be eligible to accelerate without applying any credit toward the degree that they earned while on leave.

5. Accelerants may not finish the degree with credits earned 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 institutions and from other colleges at Cornell, must satisfy the eight semester residence requirement and must spend at least four semesters in the college on campus in Ithaca.

Ninth 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 in order 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 circumstances beyond their control.
2) Students who were academically under-prepared for the curriculum at Cornell and needed to begin with a lighter schedule of courses than normal. (See Dean Turner, Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall, about this option.)

Part-time study
Students in good academic standing may take a personal leave of absence and enroll in the School of Continuing Education, but such semesters of extramural study do not count as terms of residence and credits from such semesters may not be used to reduce the terms of residence.

Part-time study in special circumstances
The college and university support students (with financial aid and services) as best they can to make full-time study possible. Occasionally, however, nonfinancial or extraordinary but nonfinancial personal, academic, or medical circumstances may 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. They must register for the thesis 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—that is, an average of four courses during each of six semesters and five courses during each of 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 Department of Theatre, Film, 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 count as eight credits and two courses each. One-credit fall and spring semester FALCON counts as 16 credits and four courses. Archaeology and geology fieldwork for more than six credits counts 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 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, inter-disciplinary concentration.

Using courses towards 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 literature (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 not 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 do not select. As long as the instructor approves, 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 course is the same, both grades nonetheless appear on the transcript and are included in any average that is calculated, but the course and credit count toward the degree only once; students considering repeating a course under these circumstances 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 every course offered by the university. Courses in military training, training as emergency medical technician, service as a teaching assistant, physical education, remedial or developmental reading, precalculus mathematics (including Education 115), supplemental science and mathematics offered by the Learning Strategies Center, English as a second language, keyboarding, and shorthand are among those for which degree credit and graduation credit toward the 12 credits required for good academic standing are not given.

Students enrolled in courses for undergraduate teaching assistants may petition once to have the nondegree credits count toward good academic standing. This would allow continued eligibility for graduating with distinction in all subjects, but would disqualify the student from being on the dean's list that semester.

Advanced placement credit

See p. 6-11. Advanced placement credits count as part of the 120 credits and 34 courses required for the degree. They do not count as part of the 100 credits required in Arts and Sciences at Cornell; their application to distribution and breadth requirements is restricted or prohibited, as explained previously under "Restrictions." AP credits are posted on the transcript during the summer between the freshman and sophomore year, after students have decided whether to accept the credit or forfeit it by taking the Cornell course they had placed out of.

Summer session credit

A student may earn credit toward the degree by completing courses in Cornell's summer session or by successfully petitioning for credit for summer courses at other colleges.

Students should consult their advisers regarding summer study plans.

Credit for summer courses not taken at Cornell must be approved by the appropriate Cornell department. Approval forms and information are available on-line, www.arts.cornell.edu, and in the Office of Undergraduate Advising, 55 or 172 Goldwin Smith Hall. Transcripts for completed work at other institutions must be sent to Robin Perry, 172 Goldwin Smith Hall. Credit approved for summer courses away from Cornell (including courses abroad) counts toward the 120 credits and 34 courses required for the degree, but not toward the 100 credits required in the college at Cornell. For students in the graduating classes of 2006 or earlier, it 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).

Entering students who want to receive credit toward the degree for courses completed before matriculation in a summer session away from Cornell should obtain approval forms as soon as possible and have transcripts sent to Robin Perry, 172 Goldwin Smith Hall. Credits completed in Cornell summer sessions will be awarded automatically.

Summer session at Cornell or elsewhere does not count toward the eight-semester residence requirement.

Transferring credit earned away from Cornell while on leave of absence

Students may petition to transfer credits from other accredited institutions for work completed while on leave of absence.

Petitions are available in 55 and 172 Goldwin Smith Hall and at www.arts.cornell.edu. The relevant department will decide whether the course is comparable to Cornell courses.

Credit approved for transfer counts as part of the 120 required for graduation and as part of the 34 courses. It does not count among the 100 credits required in Arts and Sciences and cannot be used to graduate in fewer than eight semesters. Its application to distribution and breadth requirements is restricted or prohibited as described under "Restrictions."

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 days do 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 college rank and determines the acceptability 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 adhere to the same rules for transferring credit earned on leave as all other students.

**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; 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), 54 courses, and, with 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 an adviser and are assessed by a board of faculty members. Independent majors substitute for established majors, but students must still satisfy all the other requirements for the bachelor's degree. Students should contact Dean 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 in the senior year of the College of Arts and Sciences and the first year of Cornell Law School or the Johnson Graduate School of Management is occasionally possible. A very few exceptionally well-prepared students who have earned 105 credits before the start of the senior year and have been accepted by one of the above-named professional schools may be permitted to register simultaneously in the college and in one or another of these professional schools during the seventh and eighth terms. They earn the B.A. degree after the first year of professional school.

Students with eight or fewer credits and two or fewer courses to complete may apply to enter the Master's of Engineering program during (but no earlier than) their eighth semester; dual-degree students may enter this program no earlier than the ninth semester. They earn the bachelor degree(s) after one semester of graduate school.

Students interested in the joint program with the Law School, the School of Hotel Management, or in early admission to the Master's of Engineering program should apply to the relevant program. All candidates should confirm their eligibility with an advising dean, Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

Double-registered students must, of course, complete all requirements for the B.A. degree, including 100 credits in Arts and Sciences courses.

**Teacher Education**

Students at Cornell may pursue teaching credentials in agriculture, biology, chemistry, earth science, general science, mathematics, and physics. Cornell students from any college are encouraged to apply for admission to the Cornell Teacher Education Program during their sophomore or junior year. Those who are admitted complete their undergraduate major in an agricultural science, mathematics or 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 255-9573.

**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 (proposal 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 six 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 on-going 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 language study on campus with the objective of studying abroad in China or Japan. Students interested in this program should contact the Department of Asian Studies, 388 Rockefeller Hall, e-mail: falcon@cornell.edu.

Language House Program
A complement to classroom cultural and linguistic instruction, the Language House Program 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 the Academic Administrator, 136 Goldwin Smith Hall.

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 person'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 require or 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.

Promedical 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 person'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 require or 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.

Special Academic Options

Study Abroad
Each year about 200 undergraduates in Arts and Sciences include semester- or year-long study abroad as part of their formal undergraduate education. Ideally, study abroad builds on a broad liberal arts background in the early semesters: area studies, language training, and preparation in the proposed field of study are all essential.

Many students go abroad to pursue work in their majors. Focused academic work in an appropriate institution abroad can prepare students for advanced study or honors work in the final semesters back in Ithaca.

The college insists wherever possible on study at foreign institutions alongside their degree candidates rather than study level linguistics program. At least one course specially designed for foreigners. The primary goals of this cultural immersion are to learn firsthand the modes of inquiry, methods of analysis, and educational values of higher education offered to students of another country and to involve students in social relationships with peers who may hold a new and unexpected range of social attitudes.

The college advocates study abroad that enables students to become competent enough in another language to experience daily life, develop social relationships, and accomplish formal course work in that language. Students who intend to study abroad in a country where the host language is not English must demonstrate a serious commitment to learning the language through course work before studying abroad; specific language requirements may vary, but most programs require two semesters of 200-level language.

Students planning to study abroad need solid academic credentials to do so productively and successfully. Students must maintain a minimum overall grade point average of 3.0 for all Cornell course work and good academic standing in the semester immediately before going abroad.

Students abroad is possible during the sophomore and junior years or during the first semester of the senior year. Study abroad in the final semester is rarely approved. Important steps to prepare for study abroad include:

1. substantial progress with college distribution requirements;
2. admission to a major and a faculty adviser in the major;
3. clear academic agenda for study abroad;
4. appropriate preparatory study of the country or region of destination, especially language study.

Study abroad can earn up to 15 arts and sciences credits per semester of full-time course work, as long as the curriculum abroad is consistent with that of the college. A maximum of 10 credits is awarded for each trimester of study. Courses that fall outside the scope of the liberal arts and sciences may earn non-Arts credits. Students must carry a full course-load as defined by the host institution. Students may spend up to two semesters abroad. Only those with compelling academic reasons may study in more than one location over two semesters. The college does not approve study abroad that tours more than one country or that is more touristic than scholarly in content and structure. Students must continue study of the host language while abroad. Only in exceptional circumstances will the college approve programs which, in non-English speaking countries, provide no language training.

Applications to study abroad must have the approval of a faculty adviser in the major and the approval of Dean Pat Wasylyw in the Office of Undergraduate Admissions and Advising, 55 Goldwin Smith Hall. Although students investigate options for study abroad and submit final applications through the Cornell Abroad office, Arts and Sciences applicants submit to the college an essay describing the academic rationale for study abroad, an outline of prospective courses to be taken and any other relevant materials.

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, however, become part of the Cornell grade point average.

Students who transfer to Cornell and must complete at least four semesters of residence on campus in Ithaca may not study abroad as one of those four semesters.

All applicants for study abroad during the academic year must go through the Cornell Abroad Office after being approved by the College of Arts and Sciences. For more information see Dean Wasylyw, 55 Goldwin Smith Hall.

Summer Residential Programs in Archaeology
During the summer months students may participate in a Cornell-sponsored archaeological project. In recent years the program has organized archaeological projects in Central America, Greece, Israel, Italy, Turkey, and New York State. Students should consult the Archaeology Program for information about the sites currently available. Students planning on attending field schools organized by other institutions should see Prof. Peter Kunholm, B48 Goldwin Smith Hall.

Marine Science
Shoals Marine Laboratory is a seasonal field station that offers a variety of courses and experiences designed to introduce undergraduates to the marine sciences. The laboratory is located on Appledore Island, six miles off the Maine/New Hampshire coasts. Students should contact the Shoals Marine Laboratory Office, G14 Stimson Hall, for further information.

Cornell in Washington
The Cornell in Washington program offers students from all colleges in the university an opportunity to earn full academic credit for a semester in Washington, D.C. Students take courses from Cornell faculty, conduct individual research projects, work as externs. The Cornell in Washington program offers two study options: (1) studies in public
policy, and (2) studies in the American experience. The program also offers unique externship opportunities: students serve as externs in a federal agency, congressional office, or non-governmental organization and take part in a public policy or humanities seminar. They define and carry out individual research projects under the supervision of Cornell faculty. Potential externships are arranged through, and approved by, the Office of Undergraduate Admissions and Advising, 172 Goldwin Smith Hall.

Fieldwork
Sometimes fieldwork is an appropriate part of a student's major. A three-member faculty committee helps the student plan the project, investigates the project at the end of the term, and evaluates the project at the end of the term. Fieldwork involves writing a long paper or several short ones, as well as practical experience. All proposals for fieldwork must be presented in advance to the college's Committee on Academic Records for approval. A maximum of 15 credits in fieldwork may be earned. For further information, students should contact an advising dean in Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall.

ACADEMIC INTEGRITY
Academic integrity is the heart of intellectual life—both in learning and in research. All members of the university community simply must support each other's efforts to master new material and discover new knowledge by sharing ideas and resources, by respecting each other's contributions, and by being honest about their own work. Otherwise the university will fail to accomplish its most central and important goals.

Cornell's Code of Academic Integrity and policy about acknowledging the work of others are among the documents new students receive. Students should read them carefully and not assume they understand what integrity and cheating are and are not. Academic integrity implies more here at the university than it usually did in high school. The standards of integrity are those that prevail in professional life. This means that students must acknowledge and cite ideas they adopt from others (not just direct quotations) and help they receive from colleagues or parents. With productive emphasis on collaborative learning and writing, students must understand the general standards and policies about academic integrity and be sure they understand the expectations in individual courses as well. When in doubt, ask the instructor.

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 advisers 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.

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, internal transfers and minority students—255–4835
Gerard Cox, seniors (2003–04 only)—255–4833
Maria Davidis, Dean's Scholars, Cornell Presidential Research Scholars Fellowships, and Mellon Minority Fellows (on leave 2003–04)—255–5004
Administrator—Language House Program—255–0543
Stephen Friedfeld, Independent Major Program and student ambassadors—255–4833
Ken Gabard, first- and second-year students and College Scholar Program—255–5004
Lisa M. Harris, career services and pre-law advising—255–6926
Irene Komor, career counseling—254–5295

Diane J. Miller, career services—255–6924
Sally O'Hanlon, registrar—255–5051
Janice Turner, minority students and pre-med advising—255–9407
Peggy Wallbridge, transfer students and students with disabilities—255–4833
Catherine Wagner, juniors and dual degree students—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 fulfills 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 norm. 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
Now 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 must 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 schedules on “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 change 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; it is freely given for first-year students.

Maximum number of credits per semester

First-term freshmen must petition to register for more than 18 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 extra-curricular activities, although most will be as flexible as is sensible for a student’s academic program.

Adding and Dropping Courses

After course enrollment (also known as pre-enrollment), students may not adjust their schedules until the new 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 normally 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 meet with an advising dean to obtain petition forms.

Courses officially dropped after the seventh week will be noted on the transcript by a "W" where the grade would normally appear. This is a matter of record and cannot be petitioned. Petitions to withdraw from courses may not be submitted after the end of the twelfth week in the term.

Deadlines for short courses will be adjusted according to the length of the courses.

The effective date of all course changes will be the day the student submits all completed paperwork to the Office of Undergraduate Admissions and Advising.

Leaves of Absence

Taking time off from college to gain experiences or funds or to find direction is sometimes useful. Usually, of course, students take leaves at the end of a semester for the following semester. Students in good academic standing, however, may take a leave as late as the seventh week of a semester, although there are serious financial consequences to taking leaves after a term has begun. Five minimum length of time a student may be on leave and return without special permission. Leaves of absence are of four types:

1) Personal leaves impose no conditions concerning reentering the college except for the five-year limit. Readmission is automatic upon written request made by August 1 for a fall term and January 1st for a spring term.

2) Medical leaves, for at least six months, are granted by the college only on recommendation by University Health Services. Before they may return, students must normally satisfy UHS that the condition requiring the leave has been corrected. The student’s academic standing is also subject to review at the time of the leave and on return. The college may set academic conditions for return, conditions appropriate to the individual situation.

3) Conditional leaves are granted when the student is not in good academic standing or, in unusual circumstances and with the approval of the college faculty’s

Committee on Academic Records, between the seventh and twelfth weeks of the term. 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 or until specific and individual conditions, such as completing unfinished work, have been met. Students may be granted conditional absences after the twelfth week of a term only under extraordinary circumstances, usually medical emergencies, and with the approval of the faculty’s Committee on Academic Records.

4) Required leaves: The Committee on Academic Records may require a leave of absence if a student is not making satisfactory progress toward the degree. See the section “Academic Actions.”

Any student who wishes to take a leave of absence should consult an advising dean in the Office of Undergraduate Admissions and Advising, 55 or 172 Goldwin Smith Hall. On readmission, the student’s graduation date will be recalculated.

Transferring Credits Earned While on Leave

Students who take courses elsewhere in the United States while on leave may petition to have credits transferred. Approval depends on acceptable grades and the judgment of the relevant departments about the quality of the courses. If approved, these credits may be applied toward the 120 credits and 34 courses needed for graduation, but not toward the 100 credits required in the college. They may be applied to elective requirements or to the major, as allowed by the department, but not to breadth requirements or to distribution in the humanities and the social sciences. For students in the graduating classes of 2006 or earlier, they may be applied to part of Group I and II distribution requirements. For students in the graduating classes of 2007 and later, they may not be applied to any distribution requirement. Credits earned during a leave do not count toward the eight semesters of residence and may not be used to reduce the terms of residence below the required eight. See the section “Residence.”

Study Abroad and International Students on Leave of Absence

Study abroad undertaken during a leave of absence will not receive academic credit. International students on leave of absence from the College of Arts and Sciences may enroll in courses at a college or university in their home country only, as such enrollment is not defined as study abroad. They may petition for transfer of credit upon return to Cornell. If approved, the credit will count as described in the previous paragraph.

Withdrawals

A withdrawal is a permanent severance from the university and from candidacy for the degree. Students planning to withdraw should consult their advising dean. Students not requesting a leave and failing to register for a term will be withdrawn from the college. The college faculty’s Committee on Academic Records may require a student to withdraw for 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 record at Cornell and the high school record for the work of one semester. It is also based on ability to complete the B.A. degree within a reasonable time. Internal transfers are required to spend four semesters in Arts and Sciences and thus should initiate the transfer process no later than the second semester of sophomore year. They also must complete at least 100 credits at Cornell with grades of C (not C-) or above. Interested students should see Dean Yolanda Clarke, 172 Goldwin Smith Hall.

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 any relevant documentation. Students may appeal a decision or action of the committee, if they have new relevant information and documentation. They must consult an advising dean about appealing.

Warning

Any student who fails to maintain good academic standing will, at a minimum, be warned. A warning is posted on a student’s college record but is not reported to the university registrar and does not appear on official transcripts.

Required leave of absence

A student in serious academic difficulty may be required by the faculty Committee on Academic Records to take a leave of absence, normally for a full year. Usually, but not always or necessarily, the Committee on Academic Records warns students before suspending them. Before being allowed to return and re-enroll in the college, students must document what they did on leave and how they resolved their problems, and they must submit a plan for completing the degree. In some cases students will be required to furnish evidence that they are ready to return or satisfy other conditions before being allowed to reenroll in the college. Students who request to return in less than a year must present to the committee extraordinarily convincing evidence of their readiness to return. “Required leave” is posted on the student’s official transcript.

Required withdrawal

The faculty Committee on Academic Records may dismiss a student from the college because of a highly unsatisfactory record for one 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 special treatment, 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.

GRADES

Letter Grades


S-U Grades

The S-U (satisfactory-unsatisfactory) option allows students to explore unfamiliar subjects or take advanced courses in subjects relatively new to them without being under pressure to compete with better prepared students for high grades. Students are expected to devote full effort and commitment to a course and complete all work in a course they take for an S-U grade. The S-U option is contingent upon the instructor’s willingness to assign such grades. Students must select their grading option and obtain the instructor’s approval for the S-U option during the first three weeks of the term. Virtually no exceptions to this deadline are permitted, and consequently students adding courses after the third week of the term must normally 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 orUX.

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 count toward major requirements or serve as prerequisites for admission to the major. First-year writing seminars and most language courses disallow the S-U option. In any case, students are advised to use the S-U option sparingly; if they intend to apply to graduate school or for transfer to another college. There is no limit on the number of courses each 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, based 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, *Artem Baccalarii*, 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 August may attend graduation ceremonies in the preceding May. Students graduating in January are invited to a special recognition ceremony in December; they may also attend graduation ceremonies the following May.

Honors

Bachelor of Arts with Honors

Almost all departments offer honors programs for students who have demonstrated exceptional accomplishment in the major and succeeded in research. The honors programs are described by individual departments. The degree of Bachelor of Arts *cum laude, magna cum laude, or summa cum laude* will be conferred upon a student who, in addition to having completed the requirements for the degree of Bachelor of Arts, has been recommended for a level of honors by the major department, the Independent Major Program, or the College Scholar Program. Concentrations do not offer honors programs.

Bachelor of Arts with Distinction

The degree of Bachelor of Arts with distinction in all subjects will be conferred on students who have completed the requirements for the degree of Bachelor of Arts, if they have met the following requirements by the end of their final semester:

1. completed at least 60 credits while registered in regular sessions at Cornell;
2. 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.

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<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Last day for adding courses without petition.</td>
<td>Sept. 19</td>
<td>Feb. 13</td>
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<tr>
<td>Last day for adding a First-Year Writing Seminar.</td>
<td>Sept. 12</td>
<td>Feb. 6</td>
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<tr>
<td>Last day for changing grade option to S-U or letter.</td>
<td>Sept. 19</td>
<td>Feb. 13</td>
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<tr>
<td>First deadline for submitting independent major requests.</td>
<td>Sept. 29</td>
<td>Feb. 23</td>
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<tr>
<td>Last day for dropping courses without petition.</td>
<td>Oct. 17</td>
<td>March 12</td>
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<tr>
<td>Last day to petition to withdraw from a course.</td>
<td>Nov. 21</td>
<td>April 23</td>
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<tr>
<td>Second deadline for submitting independent major requests.</td>
<td>Dec. 1</td>
<td>April 5</td>
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Deadline for requesting internal transfer to the College of Arts and Sciences for the following term. April 28

Deadline for applying to the College Scholar Program. See Cornell Abroad, to study abroad, 474 Uris Hall

Course enrollment (preregistration) for the following term. TBA

ADMINISTRATION

Peter Lepage, acting dean—255-4146
David DeVries, associate dean of undergraduate admissions and education—255-3386
Paul Houston, senior associate dean—255-4147
Jonathan B. Monroe, associate dean and director of writing programs—255-4061
Jane V. Pedersen, associate dean of administration—255-7507
Harry Shaw, senior associate dean—255-4147

Departments, Programs, and Courses

AFRIKAANS

See Department of German Studies (Dutch).

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 is consistently offered, fall and spring semesters and taught during summer/winter session.

This 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 joint major 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 major 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 (β) and geographical breadth (γ) 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 and African 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 or African-
The center’s undergraduate faculty representative 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, 351, 390, 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

The center encourages joint majors 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 undergraduate faculty representative, Professor Bekerie, will assist students in the design and coordination of joint major programs. However, in any joint major program, the center will require at least 16 credits be taken in Africana studies courses, including AS&RC 290.

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 “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 “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 Professor Bekerie (the center’s undergraduate faculty representative) 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 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 151, 132, 133, and 134 provides qualification, and the addition of 202 provides proficiency. AS&RC 131 is 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. Laboratory time TBA.
A. Nanji.
Beginner’s Swahili. Part 1—Grammar for speaking, reading, and writing. Requires no knowledge of language. Swahili is spoken in the East and Central parts of Africa.

AS&RC 132 Swahili
Spring. 4 credits. Prerequisite: Swahili 131. A. Nanji.
Continued study of the basic grammatical formation of the language and the introduction of social, material ranging from short stories. A great many drills are used in this course to help develop the student’s comprehension of the language. Swahili tapes are utilized during all of these sequences.

AS&RC 133 Swahili
Fall. 4 credits. Prerequisites: Swahili 131 and 132. Language laboratory time TBA. A. Nanji.
Advanced study in reading and composition.

AS&RC 134 Swahili
Spring. 4 credits. Provides language qualification. Prerequisite: Swahili 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 Socialization of Black Children (III)
Bekerie
Fall. 3 credits. Staff.
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 parental roles, 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. Faculty.
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 the 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)
Fall. 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 Africanity, Islam, and Western civilization; main historical developments and transitions; and contemporary political, economic, social, and cultural change. Africa’s ties with the United States (from trans-Atlantic slavery to the present), its impact on the emerging world order, and its contribution to world civilization are also explored.

AS&RC 202 Swahili Literature @ (IV) (LA)
Fall. 4 credits. Prerequisite: Swahili 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 Racialisation: A Comparative Study (III)
Spring. 4 credits. A. Bekerie.
The primary focus of this course is on the historical and contemporary significance of racialisation in the United States and South Africa with regard to societal development and inter-relations. It includes an analysis of the historical development of racialised barriers as an instrument of power and privilege. The ways in which racialisation is used as an instrument of ideology to social status, cultural hierarchy and economic positions are also examined. Particular emphasis is given to the development and perpetuation of scientific racism in both places. The apparent success against Jim Crow form of racism in the United States and apartheid in South Africa appears to transform racism into subtle and scientific sphere. This transformation and its continued impact in perpetuating social inequality are further analyzed.

AS&RC 205 African Cultures and Civilizations @ @ (III) (CA)
Spring. Offered in summer session. 3 credits. D. Oluadile.
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 socio-political organization of African societies, their kinship
This course deals with the history of and complexity of Black resistance and between European domination and Black resistance. The focus is on literary texts by authors such as Langston Hughes, Toni Morrison, James Baldwin, Marilyn Conde, and Chinua Achebe, with an emphasis on analyzing common experiences, reframing 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. Du Bois and Marcus Garvey, Nelson and Winnie Mandela.

AS&RC 231 African-American Social and Political Thought (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 African-Americans in the struggle for liberation. We focus specifically on the political philosophy and historical significance of Malcolm X, and the work and movement of Marcus Garvey, as the prime movers of nationalism and pan-Africanism among Black people in this century. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism and internal colonialism, and the political and social views of Black women are discussed. Black political thought is viewed in its development as responses to concrete conditions of oppression and expression.

AS&RC 271 Introduction to African Development (also CRP and GOVT 271) @ (III)
For description, see CRP 271.

AS&RC 280 Race, Power, and Privilege in the United States (formerly Racism in American Society) (III)
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 the 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 2003. D. Ohadike.
This course deals with the history of resistance and liberation movements in Africa, Brazil, the Caribbean, and the United States. It is concerned with the clarifying relationships between European domination and Black resistance. It examines the methods, strength, and complexity of Black resistance and liberation, together with the rise of revolutionary classes in Africa and the Diaspora. It draws attention to the importance of unity and organization in resistance and then shows similarities, connections, and continuities of Black resistance. Finally, it demonstrates that African background helped shape the nature of struggles for independence and civil liberties in the Caribbean, Brazil, and the United States.

AS&RC 290 The Sociology of the African-American Experience (SBA)
Fall. 3 credits. J. Turner.
This is an introductory course to the field of Africana Studies. It assumes a historical/sociological approach to the examination of the African-American experience. The course surveys the African beginnings of human kind and the classical and racial 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 304 African American Art (also ART H 377) @ (IV) (LA)
Spring. 3 credits. B. Habian.
This course investigates the different forms of African-American visual artistic traditions in relation to their historical origins and socio-cultural 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 traditions in the decorative arts including: pottery, architecture, ironwork, quiltmaking, and basketry. This is followed by a fine art survey spanning the eighteen 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 Aesthetics," and "Pan-Africanism" are also explored. 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 Art in African Culture and Society (also ART H 378) @ (IV) (LA)
Fall. 3 credits. J. Turner.
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 socio-cultural 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 different artistic forms, such as "improvisation," "Black Aesthetics," and "Pan-Africanism." These include the elder tradition to presidential times, from the colonial period to the present day, from the pre-colonial era to the present day, from the pre-colonial era to the present day. The course considers such issues as cross-cultural perspectives on gender; the history of work and family life in different societies; the gendered division of labor in local, national, and international economies; the impact of colonialism; the organized efforts of women to define gender relations; and the role of the state in constructing an engaged economy and polity.

AS&RC 311 Government and Politics in Africa @ (III) (SBA)
Fall. 3 credits. Not offered fall 2003. M. Mazrui.
This course deals with power and political participation in Africa. Topics include: the colonial background and its political consequences; the pre-colonial continuities in the post-colonial politics; ethnicity and allegiance in the African polity; and the monarchical tendency in African political culture. Discussion covers a spectrum of topics from the warrior tradition to the military coup in the post-colonial era, from the elder tradition to presidential gerontocracy; from the urge tradition to intellectual meritorocracy. The major topics include class versus ethnicity in African politics; the one-party versus the multiparty state; socio-cultural versus socio-economic ideologies; the gender question in African politics; the soldier and the state; and the African political experience in a global context.

AS&RC 332 Twentieth-Century Black Cultural Movements @ (IV) (CA)
Fall. 4 credits. A. Adams.
This course will examine the major cultural currents of the 20th century in the Black World. The topics will be structured around the historical, social, and political forces that produced 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 International Politics (SBA)
Spring. 3 credits. L. Edmondson.
Pan-Africanism addresses the shared experiences and aspirations of African people around the world, oriented on a search for greater linkages and unifying measures. Informed by the exploration of the racial factor in international relations, this course examines Pan-African theories, ideologies, and movements, past and present, in their political, socio-economic, and cultural manifestations, focusing mainly on the African continent, the Caribbean, and Black America.

AS&RC 362 Global Perspectives on Gender
Spring. 4 credits. N. Assie-Lumumba.
The course examines how forms of gender inequality have been shaped by international forces and structured by differences in national histories. The class is taught by a rotating set of two faculty members from different departments. Contingent on the particular faculty member directing the course, the class considers such issues as cross-cultural perspectives on gender; the history of work and family life in different societies; the gendered division of labor in local, national, and international economies; the impact of colonialism; the organized efforts of women to define gender relations; and the role of the state in constructing an engaged economy and polity.

AS&RC 380 African History: Earliest Times to 1800 @ # (III) (HA)
Fall. 3 credits. A. Bekere.
As the second largest continent with vast and varying geographical and sociocultural conditions combined with recently established fact as an original home of human species, Africa provides rich and diverse oral and
written early history. The course covers some of the major historical signposts from the origins of human species to 1800. Among the topics for discussion are: Historical Perspectives and Sources, The Nile River Cultural Complex, Berber, Carthage and Maghreb of North Africa, Upper Guinea and Western Sudan of West Africa, Cities of the Eastern African Coast, and Great Zimbabwe and other sites of Southern Africa.

**AS&RC 381 African History, 1800-Present**

Fall. 4 credits. D. Oshodi.

This is a survey of African history in the nineteenth and twentieth centuries. It deals with African revolutions in the nineteenth century; the ending of the slave trade and the politics of the abolition; European scramble and partition of Africa; resistance to European colonial conquest; African societies in the colonial period; the politics of decolonization; Neo-colonialism; the rise and decline of military regimes; African debt crisis; and conflict and reconciliation in Africa.

**AS&RC 404 Afrocentricity: Paradigm and Critical Readings**

Fall. 4 credits. A. A. Mazzrui.

What is Afrocentricity? It is a theoretical framework designed to study and interpret the histories and cultures of peoples of Africa and African descent by locating them at the center of their experiences. In other words, it is a method of knowing the life experiences of African peoples from the inside out. The course examines—through the writings of Asante, Kete, Clarke, Jean, Myers, Amin, Mazrui, Gates, Appiah, Richards, Schlesinger, and others—interpretation and depth of the paradigm, its relevance in the production and utilization of knowledge, particularly emancipatory knowledge, the history of the paradigm, and the debate it generates among a wide range of thinkers and scholars.

**AS&RC 410 African American Politics**

Spring. 4 credits. J. Turner.

The central thesis of African American politics has been its movements for political change and democratic access and human rights. This development since the seventeenth century is a complex one. It is a political history of course that conducts a close study of African American political practice and theoretical analysis of the American political system. Implications of the political systems for prospects and limitations to participation by Black people are analyzed. Critical historical stages in the process of Black politics are examined. The development of electoral offices in federal and statewide politics, and the significant urban political power bases—giving rise to African American mayoralty politics in critical industrial centers, as well as rural hamlets, center the course. Presidential politics—the Jesse Jackson campaign—and new political formations including Black Republicans/conservatives constitute the emphasis on contemporary events. The course reviews the development of the literature in African American politics.

**AS&RC 420 Public Policy and the African-American Urban Community**

Spring. 4 credits. J. Turner.

The socioeconomic conditions of the African-American urban community are the central focus of the course. Community development models are explored in relationship to the social needs of the African-American population. The changing configuration of internal organization of the African American community nationally is examined.

**AS&RC 422 African Literature**

Spring. 4 credits. A. Adams.

With such great focus, both inside and outside Africa, on issues of Africa's "development," what place does "literature" take? Is African literature influencing or influenced by the mundane realities of daily living faced by African people? Or does African literature concern itself with philosophical ideas and ideals that transcend materialities to embrace the general human condition? Or, does it do both? The texts that we read in this course are approached in terms of these issues of "African development" and "the universal human experience."

**AS&RC 435 African Cinema**

Fall. 4 credits. S. Hassan.

This course offers an overview of African cinema and filmmaking. It surveys historically the evolution of African cinema from its early days to the present. Through screening of selected African filmmakers' different African films are explored, such as "Return to the Sources" and the rediscovery of the pre-colonial past; the "Social Realist" narrative and critique of post-independence Africa; reconstructing the story of colonialism from the perspective of colonialism and the entertainment genre. Techniques, styles, and aesthetics of African cinema are also discussed. The course offers a unique opportunity of looking at African culture and society at issues of social change, gender, class, tradition, and modernization through African eyes.

**AS&RC 451 Politics and Social Change in the Caribbean**

Fall. 4 credits. L. Edmondson.

A study of the historical, geostategic, political, economic, and social (including racial and cultural) forces affecting the domestic and international experiences of Caribbean societies. Special attention is given to conflicting definitions and perceptions of the Caribbean; contending theories of Caribbean social structure; and models of development; the continuing salience of struggles for change and transformation; prospects of regional integration; and Caribbean challenges to the global system, especially with regard to the region's relations with the United States and the region's position in the Third World in the context of the North-South cleavage.

**AS&RC 455 Caribbean Literature**

Fall. 4 credits. A. Adams.

This course examines the prose literature of the Caribbean islands. Through the reading of several novels and short stories from the various languages and cultural strains that comprise the Caribbean societies, students study the points of commonality and the diversity within this body of literature. The recurrence of certain historical, social, and cultural issues that have formed the multi-ethnic Caribbean peoples are analyzed in their varying manifestations across the linguistic and other boundaries to uncover the underlying shared experience.

**AS&RC 459 Education in Africa and the Diaspora**

Fall. 4 credits. N. Assie-Lumumba.

This course deals with educational innovations geared to promoting educational 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 some libraries and contemporary cases of educational innovations. The case studies in the United States include the creation and expansion of historically black institutions such as Lincoln University, Spelman College, Tuskegee Institute (now Tuskegee University), and other schools in the South, and the Westside Preparatory School in Chicago. The African cases studied include African languages for instruction with a focus on a Nigerian case, Ujamaa and education for self-reliance in Tanzania, and the case of Cote d'Ivoire which adopted television as a medium of instruction.

**AS&RC 463 Islam in Global Africa**

Fall. 4 credits. A. A. Mazzrui.

This course addresses the historical dimension of Islam in the black experience, examining global Africa as a whole, and focused on Western Africa as the experience of Africa in its interaction with its own diaspora dispersed in the rest of the world. Within the African continent, Islam is part of the triple religious heritage that includes Christianity and coexistence with African indigenous religions. In the Americas, Islam is up against Western secularism as well as Western Christianity. This course attempts to explore these religious complexities and affects of how Islam affected the cultures of the African peoples worldwide—from sculpture to family life, from architecture to the dress code, from poetry to politics? The issue of slavery and Islam also will be addressed as an important theme in the course. We are also concerned with the interaction between Islam and contemporary ideologies of socialism, nationalism, and race consciousness in the black experience.

**AS&RC 468-469 Honors Thesis**

Fall, 468; spring, 469. Africana Center faculty.

For senior Africana Studies majors working on honors thesis, 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**

Fall. 4 credits. R. Harris.

The course analyzes the personalities, ideas, and activities central to the struggle for African-American liberation 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 Family and Society in Africa**

Fall. 4 credits. Not offered fall 2003. N. Assie-Lumumba.

**AS&RC 479 Women and Gender Issues in Africa**

Spring. 4 credits. N. Assie-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 are: 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 of Women; and the four World Conferences on Women (Mexico 1975, Copenhagen 1986, Nairobi 1985, and Beijing 1995).

[AS&RC 484 Politics and Social Change in Southern Africa @ (III) (SBA)]
Spring. 4 credits. I. Edmondson.
This course focuses on the legacies of apartheid and the challenges of transformation toward a post-apartheid society in South Africa. Topical emphases include: the rise and decline of apartheid; the historical continuity of Black resistance against racism; women under apartheid, and after apartheid; South Africa’s relations with its neighbors; geopolitical, economic, and racial dimensions of the American connection; politics of negotiation and transition to majority rule; prospects for stability, democracy, and equality; and South Africa’s new role in the African continental and global arenas. Instructor’s lectures are supplemented by films and class discussions.

[AS&RC 501 Global Africa: Comparative Black Experience]
Spring. 4 credits. A. Mazrui.
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 African 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 colonization. The course addresses these areas of Black comparison: Comparative Slavery—A Triple Heritage; Race and Race Mixture in Four Traditions; Comparative Emancipation from Slavery; Colonialism; Comparative Struggle for Civil Rights; The Gender Question in Global Africa; and Comparative Quest for Global Equality.

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[AS&RC 483 History of African Political Thought @ (III)]

[AS&RC 502 Education and Development in Africa]
Spring. 4 credits. N. Assié-Lumumba.

[AS&RC 503 African Aesthetics (also ART H 571)]
Fall. 4 credits. Not offered fall 2003. S. Hassan.

[AS&RC 504 Political Change in Africa]
Fall. 4 credits. A. Mazrui.
The study of Africa can be approached dialectically (focusing on the tension between opposing forces) or thematically (focusing on themes as chapters of experience). This course borrows from both those approaches. In their class assignments and examinations students are free to use either approach. The first approach explores the dialectic between continuity and change; tradition and modernity; dependency and liberation; foreign and indigenous influences; anarchy and order; political decay and political development; democracy and authoritarianism; and socialism and capitalism. The thematic approach examines African Nationalism; race consciousness and Pan-Africanism; political parties and interest groups; executive power; ethnicity in politics; class-formation; civil-military relations; economic and cultural dependency; sub-regional and continental Pan-Africanism; crisis of the African state; and Africa in World Politics.

[AS&RC 510 Historiography and Sources: The Development of African-American History]
Spring. 4 credits. Prerequisite: upperclass graduate or standing or permission of instructor. Not offered 2003–2004. R. Harms.

[AS&RC 530 Womanist Writing in Africa and the Caribbean]
Spring. 4 credits. A. Adams.
Theoretical essays on the nature, relevance, and articulation of feminist thought from African and Caribbean writers complement literary texts. Gender issues, as manifested both at home and in emigrant situations abroad are examined in texts by such writers as Sisteren, Conde, Dangarembga, Aidoo, Warner-Vieyra, Ba, Emcheta, Kincaid, and W. Mandela. (Francophone works may be read in the original by individuals who so desire.)

[AS&RC 532 Twentieth-Century Black Cultural Movements]
Fall. 4 credits. A. Adams.
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 were produced by, 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 598-599 Independent Study]
Fall, 598; spring, 599. Variable credit. For graduate students.

[AS&RC 601-602 Africana Studies Graduate Seminar]
Fall, 601; spring, 602. 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 per semester. Each participating faculty member is responsible for a topological segment of topics 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
Sec Department of Near Eastern Studies.

AMERICAN STUDIES
Emeritus: J. Silbey

The Major
The major in American Studies, appropriate for a wide array of future professions, began as a program of coordinated study in the history, literature, and politics of the United States. These remain the core elements, but American Studies aims to be inclusive in its subject matter. Given the nation’s diverse population and cultures, the program wants its majors to examine American experience in broad terms, drawing on the materials and methods of a variety of disciplines.

The prerequisites are two courses from the following: AM ST 101, AM ST 102, AM ST 109, AM ST 110, ENGL 240, ENGL 262, ENGL 265, ENGL 279, GOVT 111, HIST 101, HIST 102, HIST 260, HIST 261. Students normally complete the prerequisite courses by the end of their sophomore year, but they may sign up for the major while enrolled in one of the courses. Students with a score of 5 on the AP exam in American history may use that credit to satisfy HIST 102.

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 adviser.
ARTS AND SCIENCES - 2003-2004

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 500/501 taught in Washington, DC, 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 towards 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 member 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. Altschuler and D. McCall.
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 lecture, and they are treated as literature and historical/cultural documents. Texts include: Common Sense by Thomas Paine; The Blithedale Romance 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 (II)]
Fall. 4 credits. G. Altschuler and D. McCall.
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, 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 & Rich.

[AM ST 109 Introduction to American Studies: Themes to Understanding American Diversity, the Nineteenth Century (II)]
Spring. 4 credits. N. Salvatore.
This course examines the first century-and-a-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 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 (I)]
Also MIST 161, LSP 110 (II or IV)
M. C. Garcia.
This course examines American national life in the twentieth century and asks questions about the changing light of national 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 430.1 The Politics of the American Civil War (also GOVT 408)
Fall. 4 credits. Prerequisite: permission of instructor. R. Bensel.
The Civil War, along with the founding of the nation in the late eighteenth century, is one of the two most important influences on the course of American Political development. Arising out of intense ideological, cultural, and economic competition between the slave South and the free labor North, the conflict created two new national states: a northern Union that replaced the loose federation of the antebellum period and a southern Confederacy that perished at Appomattox. In this course, particular attention is paid to the political economy and culture of plantation slavery in the antebellum South; the apparent inevitability of collision between the slave and free states and their respective societies; the military, political, and economic forces that determined, on both sides, the course and duration of the war; the limits and possibilities of reform of southern society during Reconstruction; and the impact of the Civil War on the subsequent development of the United States.

AM ST 430.2 America in the Camera's Eye (also HIST 430, ART H 430)
Fall. 4 credits. Prerequisite: permission of instructor. 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.

Hollywood filmmakers have also 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 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 The Postmodern Presidency (also GOVT 407)
Spring. 4 credits. Prerequisite: permission of instructor. D. Rubenstein.
This course examines the presidencies of Reagan, Bush, and Clinton in relation to what scholars have called "the postmodern presidency." While this term has been used by institutionalist students of the presidency as a periodizing hypothesis, our emphasis is on the work of cultural critics and historians. We 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) is an attendant subtheme. The postmodern presidency is read less as a site of political power, but as cultural contestation. The Kennedy assassination serves 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. Because this is a presidential election year, we examine popular representations of the 2004 campaign.

Readings will include Frances Fitzgerald, Way Out There in the Blue; Edmund Morris, Dutch; Lydia Millet, George Bush, Dark Prince of Love; Michael Rogen's Independence Day, or How I Learned to Stop Worrying and Love the Enola Gay; and Ronald Reagan, the Movie.
We will examine films/film excerpts including Daze, Mars Attacks, Forrest Gump, Independence Day, Primary Colors, Murder at 1000, JFK, Nixon, and House of Yes.
AM ST 240.6 The Milman Seminar
Spring. 4 credits. Prerequisite: permission of instructor. G. C. Altshuler.
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)
For description, see ANTHRO 221.
AM ST 323 American Economic History (also ECON 323)
Spring. 4 credits. P. McClelland.
For description, see ECON 323.
AM ST 377 The United States (also ANTHR 377 and LSP 377)
Fall. 4 credits. V. Santiago-Irizarry.
For description, see ANTHRO 377.

Literature and Theatre Arts
AM ST 206 Introduction to American Literature: Land, Labor, and Language (also ENGL 203)
Fall. 4 credits. B. Maxwell.
For description, see ENGL 203.
AM ST 207 Introduction to American Literature: Narrating the Nation (also ENGL 204)
Spring. 4 credits. K. McCullough.
For description, see ENGL 204.
AM ST 215 Comparative American Literature (also COM L 215)
Fall. 4 credits. B. Maxwell.
For description, see COM L 215.
AM ST 219 Introduction to Narrative: LA Close Up (also ENGL 206)
Fall. 4 credits. M. P. Brady.
For description, see ENGL 206.
AM ST 220 Film Style and the Cinema Experience (also FILM 202)
Spring. 4 credits. Limited to 15. Preference given to sophomores. S. Haenni.
Though many American films are known for their urban thrillers, both Fritz Lang and Martin Scorsese
have made films in a wide variety of genres. This course is designed to give students a
good grounding in film style, film analysis, and writing about film, while it also takes up
larger questions of film authorship and the artist's status in capitalist culture. Tracing
the careers of Lang and Scorsese across seven decades of film history, the course introduces
students to a wide variety of genres that define who we are as filmgoers, from film
noir, detective films, the gangster film, science fiction, social melodramas, historical dramas,
comedies, even the musical. We ask what it means for a director to work in different
genres, with a number of different collaborators, and under a capitalist mode of
production. And we also pay attention to the director's different—and ever changing—status
in recent decades. Much emphasis is placed on close analysis of these films and on writing
based on these analyses. Screenings include films such as Fury, The Big Heat, Woman in
the Window, Metropolis, While the City Sleeps, Rancho Notorious, Tiger of Eschmunzar, Mean
Streets, Taxi Driver, Gangster, The Last Waltz, The Last Temptation of Christ, and The Age of Innocence
and will be accompanied by readings in film history and film analysis.
AM ST 230 Survey of American Film (also FILM 276) (IV) (LA)
Fall. 4 credits. Each student must enroll in one course per week. S. Haenni.
Focusing mostly on Hollywood film, this course surveys some major 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 an industrial system of production, social and aesthetic norms and codes, and
particular modes of reception. The course introduces methodological issues in American
film history—especially questions of narrative, genre, and authorship—and focuses
on the ways film shapes gender, race, class, 
ethnic, and national identities. Screenings include works by D. W. Griffith, John Ford,
Howard Hawks, Orson Welles, Vincente Minnelli, Robert Altman, Charles Burnett,
Spike Lee, and others and are supplemented
with the close reading of texts. The main
themes are gender, race, class, and film
style, film analysis, and film criticism.
AM ST 240 Survey in U.S. Latino Literature (also ENGL 240, LSP 240)
Fall. 4 credits. M. P. Brady.
For description, see ENGL 240.
AM ST 252 Twentieth-Century Women Novelist (also ENGL 251)
Spring. 4 credits. S. Samuels.
For description, see ENGL 251.
AM ST 260 Introduction to American Indian Literature (also ENGL 260)
Spring. 4 credits. E. Cheyfliz.
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 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 radical justice, the Vietnam War, the counterculture, the New Left, the woman's
movement, and the movement for gay and lesbian rights. Texts include The
Autobiography of Malcolm X, Dispatches,
Slaughterhouse Five, the poems of Ginsburg and Rich, speeches of King, films, manifestos, and
music.
AM ST 275 The American Literary Tradition (also ENGL 275)
The problem of an American national literary tradition 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 276 Literature in the Cold War Culture (also ENGL 276)
Fall. 4 credits. Some course work in film
useful but not required. S. Haenni.
AM ST 291 American 1920s: Literature and Culture (also ENGL 291)
For description, see ENGL 291.
AM ST 293 Survey in African American Literature (also ENGL 293)
Fall. 4 credits. H. Spillers.
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 348 Film Noir (also FILM 346) (IV) (LA)
Spring. 4 credits. Some course work in film
useful but not required. S. Haenni.
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 gangs, private eyes, and lovers on
the run, and that centered on issues of violence, crime, paranoia, betrayal, pessimism, and self-
AM ST 361 Early American Literature (also ENGL 361)
Fall. 4 credits. J. Porte.
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 366 The Nineteenth-Century American Novel (also ENGL 366)
Spring. 4 credits. S. Samuels.
For description, see ENGL 366.

AM ST 367 The Modern American Novel (also ENGL 367)
For description, see ENGL 367.

AM ST 368 The American Novel Since 1950 (also ENGL 368)
For description, see ENGL 368.

AM ST 369 Survey of African American Literature to 1917 (also ENGL 375)
For description, see ENGL 375.

AM ST 370 Survey in African American Literature: 1918 to Present (also ENGL 376)
For description, see ENGL 376.

AM ST 372 American Poetry Since 1950 (also ENGL 378)
For description, see ENGL 378.

AM ST 374 Slavery in Twentieth Century American Film and Fiction (also ENGL 374 and FGSS 378)
Fall. 4 credits. N. Waligora-Davis.
For description, see ENGL 374.

AM ST 393 International Film of the 1970s (also FILM 393)
Fall. 4 credits. 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 particularly the martial arts film; the emergence of film subcultures, such as black independent film and blaxploitation. 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 and are guided by readings in film criticism and film history.

AM ST 394 Public Discourse, Political Stages: African-American Drama and Performance, 1950-Present (also THETR 394)
Fall. 4 credits. J. Frank.
For description, see THETR 394.

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 396, LSP 398)
Spring. 4 credits. M. P. Brady.
For description, see ENGL 396.

AM ST 403 Studies in American Poetry: A. R. Ammons (also ENGL 403)
Spring. 4 credits. R. Gilbert.
For description, see ENGL 403.

AM ST 461 Asian Americans and Popular Culture (also AAS 461, ENGL 461, THETR 461)
For description, see AAS 461.

AM ST 465 Prosemir in American Studies (also ENGL 465)
For description, see ENGL 465.

AM ST 469 William Faulkner (also ENGL 469)
Fall. 4 credits. H. Spillers.
For description, see ENGL 469.

AM ST 470 Studies in the Novel: Forms of American Fiction: The Short Story as Novel (also ENGL 470)
For description, see ENGL 470.

AM ST 473 American Indian Autobiography (also ENGL 473)
For description, see ENGL 473.

AM ST 475 Seminar in Cinema I (also FILM 475)
For description, see FILM 475.

AM ST 476 American Melodrama and Film (also FILM 476)
For description, see FILM 476.

AM ST 479 Jewish-American Writing (also ENGL 479 and JWST 478)
For description, see ENGL 479.

Government and Public Policy

GOVT 111 Introduction to American Government and Politics
Fall. 3 credits. T. J. Lowi.
An introduction to government through the American experience. Concepts of political science are explored in the light of the institutions of government and politics as mechanisms of social control.

AM ST 302 Social Movement in American Politics (also GOVT 302)
Fall. 4 credits. M. E. Sanders.
For description, see GOVT 302.

AM ST 310 Civil Liberties in the United States (also GOVT 327)
Spring. 4 credits. J. Rabkin.
For description, see GOVT 327.

AM ST 315 Prisons (also GOVT 314)
Fall. 4 credits. M. Katzenstein.
For description, see GOVT 314.

AM ST 316 The American Presidency (also GOVT 316)
For description, see GOVT 316.

AM ST 319 The U.S. Congress (also GOVT 318)
Fall. 4 credits. M. Shaffer.
For description, see GOVT 318.

AM ST 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. Rubenstein.
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 an “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 exploration 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 Francqui-Rene de Chateaubriand’s René and Atala 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 Beaumont's writings on prison.

**AM ST 328 Constitutional Politics: The United States Supreme Court (also GOVT 328)**
Fall. 4 credits. J. Rabkin. For description, see GOVT 328.

**AM ST 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.

**AM ST 353 Feminism Movements and the State (also GOVT 353, FGSS 353)**

**AM ST 376 American Political Thought from Madison to Malcolm X (also GOVT 368, and CHNS 316)**
Fall. 4 credits. I. Kramnik. For description, see GOVT 366.

**AM ST 388 Science in the American Polity, 1800–1960 (also S&TS 390, GOVT 308)**
4 credits. For description, see S&TS 390.

**AM ST 389 Science in the American Polity, 1960–Now (also S&TS 391, GOVT 309)**
4 credits. For description, see S&TS 391.

**AM ST 422 War at Home (also GOVT 420)**
Fall. 4 credits. M. Shetter and J. Rabkin. For description, see GOVT 420.

**AM ST 428 Government and Public Policy: An Introduction to Analysis and Criticism (also GOVT 428)**
Fall. 4 credits. T. Lowi. For description, see GOVT 428.

**AM ST 429 Government and Public Policy: An Introduction to Analysis and Criticism (also GOVT 428)**
Spring. 4 credits. 428 and consent of instructor are required for 429. T. Lowi. 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. J. Parmenter. 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. D. Chang. 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 expanded rights for women and working people in the twentieth century, free-speech issues, the civil-rights movement, religiously-based critiques of American culture, and conservative critiques of American liberalism. The course serves as an investigation of the ways in which political expression takes forms in modern American culture. In addition to lectures, the course features several afternoon programs. 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)**
Spring. 4 credits. J. Parmenter. For description, see HIST 158.

**AM ST 201 Popular Culture in the United States, 1900–1946**
4 credits. Not offered 2003–2004. G. Altshuler. American Studies 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**
4 credits. Not offered 2003–2004. G. Altshuler. American Studies 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 depicts popular culture as "contested terrain," the place where social classes, racial and ethnic groups, women and men, the powerful and less powerful, seek to "control" images and themes. Topics for 202 include: the "Honeymooners" and 1950s Television, soap operas; "Gross-out" movies; Elvis, The Beatles, and Guns On Roses; Gothic Romances; and People Magazine and USA Today.

**AM ST 204 Comparative Migration in the Americas (also HIST 202)**

**AM ST 208 Seminar: Era-Franklin D. Roosevelt (also HIST 208)**

**AM ST 209 Seminar in Early America (also HIST 209)**
Fall. 4 credits. Limited to 20 students. M. B. Norton. For description, see HIST 209.

Fall. 4 credits. Not offered 2003–2004. N. Salvatore. In this seminar we read a variety of texts that underscore the fierce struggle to define the meaning of civil rights in American society during this era. We explore this from multiple perspectives through readings of historical, legal, political, theological, and literary traditions.

**AM ST 211 American Diversity in the Twentieth Century (also HIST 213, AAS 212) (III) (HA)**
Fall. 4 credits. Permission of instructor required. Preference given to AM ST majors. Limited to 15 students. D. Chang. This seminar offers an in-depth analysis of diversity in America during the twentieth century. It uses local case studies and examines national discourses to investigate the experiences of people in an increasingly diverse nation. It also explores contests over the meaning and role of "diversity" in twentieth-century American politics. Course materials include some of the most significant monographs recently published as well as primary documents.

**AM ST 212 African American Women: Twentieth Century (also HIST 212 and FGSS 212)**
Spring. 4 credits. M. Washington. For description, see HIST 212.

**AM ST 213 Introduction to Asian American History (also HIST 264 and AAS 213)**

**AM ST 214 Seminar on American Foreign Policy (also HIST 214)**
Fall. 3 credits. Prerequisite: permission of instructor. W. LaFever. For description, see HIST 214.

**AM ST 225 The U.S.-Mexico Border: History, Culture, Representation (also HIST 225 and LSP 225)**

**AM ST 229 Jefferson and Lincoln (also HIST 229)**
Fall. 4 credits. Limited to 15 students. Preference given to underclassmen. E. H. Cash. For description, see HIST 229.

**AM ST 241 History of Childhood in the United States (also HD 241 and HIST 271)**
ARTS AND SCIENCES - 2003-2004

[AM ST 242 Religion and Politics in American History from J. Winthrop to R. Reed (also HIST 242 and RELST 242)]
R. L. Moore.
For description, see HIST 242.1

[AM ST 251 Black Religious Traditions from Slavery to Freedom (also HIST 251 and RELST 251)]
M. Washington.
For description, see HIST 251.1

[AM ST 258 Historical Development of Women as Professionals, 1800 to Present (also HD 256, HIST 278, FGSS 238)]
J. Brumberg.
For description, see HD 258.

[AM ST 259 Latinos in the US: Colonial Period to 1898 (also HIST 260, LSP 260)]
M. C. Garcia.
For description, see HIST 260.1

AM ST 261 Latinos in the US: 1898 to the Present (also HIST 261, LSP 261)
Spring. 4 credits. M. C. Garcia.
For description, see HIST 261.

AM ST 273 Women in American Society, Past and Present (also HIST 273)
Spring. 4 credits. M. B. Norton.
For description, see HIST 273.

AM ST 303 African American Women in Slavery and Freedom (also HIST 303 and FGSS 307)
For description, see HIST 303.

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 306 History of American Workers: 1960-90s (also ILRCB 306)
Fall. 3 credits. J. Cowie.
For description, see ILRCB 306.

AM ST 308 Working-Class America in Mass Media and Popular Culture (also ILRCB 303)
Spring. 3 credits. J. Cowie.
For description, see ILRCB 303.

[AM ST 309 The Cinema and the American City (also FILM 342)]
S. Haenn.
The emergence of the cinema in the late-nineteenth century coincided with the emergence of a new kind of metropolis, characterized, among other things, by new traffic systems (elevated train, subway, automobile), new racial, ethnic, and sexual regimes, and new urban planning. In this course, we examine how the cinema has participated and intervened in urban transformations by imagining and representing the American city variously as a panorama, a musical symphony, a mystery to be deciphered, a stage for civic theater, a modernist artwork, or a post-apocalyptic wasteland. How does the cinema produce a particularly modern, urban experience? How has it been shaped by urban politics and how, in turn, does it shape the way in which we understand the city? Screenings may include films such as Manhattan, The Crowd, Skyscraper Souls, 42nd Street, Naked City, Asphalt Jungle, Just Another Girl on the I.R.T., Blade Runner, and will be supplemented by readings in film history, as well as urban history and urban theory.

AM ST 317 American Constitutional Development (also HIST 316)
Fall. 4 credits. R. Polenberg.
For description, see HIST 318.

[AM ST 320 Understanding Work in America, 1800-1990 (also HIST 315)]
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 321 Colonial North America to 1763 (also HIST 321)
Fall. 4 credits. M. B. Norton.
For description, see HIST 321.

[AM ST 322 Age of the American Revolution, 1763-1815 (also HIST 325)]
M. B. Norton.
For description, see HIST 325.

[AM ST 324 Varieties of American Dissent, 1880-1990 (also HIST 324)]
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 331 Causes of the American Civil War, 1815-1860 (also HIST 331)
Fall. 4 credits. E. Baptist.
For description, see HIST 331.

[AM ST 332 The Urbanization of American Society, 1600 to 1860 (also HIST 332)]
S. Blumin.
For description, see HIST 332.

[AM ST 333 The Urbanization of American Society, 1860-2000 (also HIST 333)]
S. Blumin.
For description, see HIST 333.

AM ST 336 Capitalism and Society in Developing America, 1607-1877 (also HIST 336)
Fall. 4 credits. S. Blumin.
For description, see HIST 336.

AM ST 337 Entrepreneurialism and Organization in the Age of the Corporation: Capitalism and Society in Modern America, 1840-2000 (also HIST 337)
Spring. 4 credits. S. Blumin.
For description, see HIST 337.

[AM ST 340 Recent American History, 1925-1980 (also HIST 340)]
R. Polenberg.
For description, see HIST 340.

[AM ST 341 Recent American History, 1960-Present (also HIST 341)]
R. Polenberg.
For description, see HIST 341.

AM ST 343 American Civil War and Reconstruction, 1860-1877 (also HIST 343)
Spring. 4 credits. E. Baptist.
For description, see HIST 343.

AM ST 344 African-American History (also HIST 335)
Fall. 4 credits. M. Washington.
For description, see HIST 335.

AM ST 345 Intellectual/Cultural Life of Nineteenth-Century Americans (also HIST 345 and RELST 345)
Fall. 4 credits. R. L. Moore.
For description, see HIST 345.

AM ST 346 Modernization of the American Mind (also HIST 346)
Spring. 4 credits. R. L. Moore.
For description, see HIST 346.

[AM ST 359 American Families in Historical Perspective (also HD 359 and FGSS 357)]
J. Brumberg.
For description, see HD 359.

[AM ST 378 Topics in U.S. Women's History (also HIST 378 and FGSS 378)]
M. B. Norton.
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)
Spring. 4 credits. Limited to 15 students. E. Baptist.
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)  
Fall. 4 credits. Limited to 15 students.  
L. M. Chang.  
For description, see HIST 420.

AM ST 421 Undergraduate Seminar in American Cultural History (also HIST 421)  
Fall. 4 credits. Prerequisite: permission of instructor. M. Kamen.  
For description, see HIST 421.

AM ST 439 Reconstruction and the New South (also HIST 439)  
Fall. 4 credits. Limited to 15 students. M. Washington.  
For description, see HIST 439.

[AM ST 440 Undergraduate Seminar in Recent American History (also HIST 440)  
For description, see HIST 440]

AM ST 455 Bad Boys (also HD 455, FGSS 465, and HIST 465)  
Spring. 4 credits. J. Brumberg.  
For description, see HD 455.

AM ST 466 Iroquois History (also HIST 466)  
Fall. 4 credits. Not open to freshmen. J. Parmenter.  
For description, see HIST 466.

AM ST 499 New World Encounters, 1500-1800 (also HIST 499)  
Spring. 4 credits. J. Parmenter.  
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. Blum 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: 1890-1985 (also MUSIC 101)  
For description, see MUSIC 101.]

[AM ST 222 A Survey of Jazz (also MUSIC 222)  
For description, see MUSIC 222.]

[AM ST 223 History of Rock Music (also MUSIC 221)  
Fall. 3 credits. J. Pernino.  
For description, see MUSIC 221.]

[AM ST 224 Beyond Tradition: Native American Art, 1850–Present (also ART H 215, AIS 215)  
Fall. 4 credits. K. Morris.  
For description, see ART H 215.]

[AM ST 243 Inside Out: The American Everyday Interior (also DEA 243, 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)  
For description, see LA 282.]

[AM ST 355 U.S. Art from FDR to Reagan (also ART H 365)  
Fall. 4 credits. J. E. Bernstock.  
For description, see ART H 365.]

[AM ST 360 Painting and Everyday Life in Nineteenth-Century America (also ART H 360)  
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)  
For description, see ART H 461.]

[AM ST 472 Reel/Real Indians: Art and Indigenous Identities in the Twentieth Century (also ART H 470, AIS 470)  
Spring. 4 credits. K. Morris.  
For description, see ART H 470.]

Honors

Please see description of major for information about registration in these courses.

AM ST 493-494 Honors Essay Tutorial  
Fall; 494, spring. Up to 4 credits each semester. By 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 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 their 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 the heading "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 should 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; primate and human behavior; prehistory of the Americas, or Europe, or Africa; cultural construction of...
the person; etc. When warranted, 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 fill the requirement). 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: the Department of Anthropology encourages students to consider a semester of study abroad or off-campus study developed as an integral part of the student's major concentration. The Director of Undergraduate Studies serves as the Anthropology Study Abroad 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. For further information, consult David Holmberg or Kathryn March in the Department of Anthropology.

Other anthropologically-relevant study abroad options, using existing Cornell Abroad and off-campus options, can be worked out in consultation with the major adviser, 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. Students majoring in anthropology who will guide the honors thesis are invited to 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 3.5 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 candidates must 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 this course, students must enroll in 491 (fall or spring) "Honors Thesis Write-up." 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 anthropology collections. Olin Library houses some of the most extensive collections of materials on the ethnology of Southeast Asia, South Asia, East Asia, and Latin America to be found anywhere in the United States. The biological anthropology laboratory (McGraw 215) 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/Anthro/).

I. Introductory Courses

A. Nature and Culture:

ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind (I/PBS Supplementary List)
Fall. 3 credits. Fee for lab usage and maintenance, S.S. M. Small. The evolution of humankind is explored through the fossil record, studies of the biological differences among current human populations, and a comparison with our closest relatives, the primates. This course investigates the roots of human biology and behavior with an evolutionary framework.

ANTHR 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 will present a presentation on the nature of their 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 100) (HA)
Spring. 3 credits. T. Volman. A survey of the archaeological and fossil record of human evolution. Contributions by researchers from a variety of disciplines are highlighted, as are the discoveries that have enlivened the study of human evolution for more than a century. Critical evaluation of evidence and interpretation are stressed. Demonstrations and films supplement the lectures.

ANTHR 211 Sophomore Seminar: Nature and Culture 6 (III) (SBA)
Spring. 4 credits. Staff. A. Nature and Culture is a sophomore seminar that examines and evaluates contrasting views of how best to understand the interactions of nature and culture. The examination surveys the familiar terrain of "nature" versus "nurture" debates. Beyond these debates, cultural anthropological study of other societies reveals that assumptions about human nature are intrinsically intertwined with the legitimacy of social arrangements (family organization, beliefs about gender and procreation, forms of political authority). This cross-cultural perspective on linkages between ideas of nature and culture, on the one hand, and social-institutional arrangements, on the other, provides a useful critical vantage in a consideration of similar linkages in our own society. In addition, the course takes up current political debates in which ideas about nature and culture divide opinion. The course is premised on a strong claim for the contribution of cultural anthropology to the development of better science and to a reflective understanding of human potential. This is a special seminar sponsored by the John S. Knight Instructional Seminars Programs. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

ANTHR 275 Human Biology and Evolution (also BIOEE 275 and NS 275) (I) (PBS)

B. Culture and History:

ANTHR 100 Introduction to Archaeology (also ARKEO 100) (III or IV) (HA)
Fall. 3 credits. Staff. 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) (CA)
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 states. At the conclusion of the course, students 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 pose distinct cultural systems in relief are developed. Fiction, films, and exercises supplement the formal anthropological materials.

ANTHR 103 The Scope of Anthropology Spring. 1 credit. Prerequisite: concurrent enrollment in pre-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. Staff.
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., African, Latin America, the West). Among the issues considered: "political correctness" and truth; nativism and ecological diversity; race, ethnicity, and sexuality; sin, religion, and war; and global process and cultural integrity.

ANTHR 202 Interpretive Archaeology (also ARKEO 202) (III)

ANTHR 215 Stone Age Art (also ARKEO 215) @ (III) (CA)

ANTHR 240 Old World Prehistory (also ARKEO 240) @ (III) (HA)

II. Honors and Independent Study

ANTHR 483 Honors Thesis Research Fall or spring. Credit TBA. Prerequisite: consent of the Honors Committee. 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 491 Honors Thesis Write-Up Fall or spring. Credit TBA. Staff.

ANTHR 497 Independent Study: Undergrad I 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, logic, symbols, myths, and religions among the many other means human beings 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 see 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)

ANTHR 321 Sex and Gender in Cross-Cultural Perspective (also ANTHR 621 and FGSS 321/631) @ (III) (SBA)
Fall. 4 credits. Staff.
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. B. 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 326 Economic Anthropology (III) (SBA)

ANTHR 328 Conflict, Dispute Resolution, and Law in Cultural Context (III) (SBA)
Fall. 4 credits. V. Santiago-Izzoary.
Rule-making and dispute resolution are integral aspects of social reality in any culture. The ways in which conflict is treated and interpreted—be they of small or large—articulate with the cultural domains such as religion, politics, and economics as part of the material and symbolic processes that enable sociocultural interaction. At issue then are the formal and processual means that the treatment of conflict takes in different societies. These means constitute frames for the definition of social experience that are used by social factors in the interpretation of events within the terms of an overriding sociocultural logic that is in turn configured by these interpretive frames.

ANTHR 385 The Anthropology of Intellectuals (III) (CA)

ANTHR 388 Masks of Power and Strategies of Resistance 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 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 2003–2004. D. Holmberg.

ANTHR 426 Ideology and Social Production (also ANTHR 726) (III) (SBA)
Spring. 4 credits. S. Sangren.
This course is premised on the notion that understanding social life requires understanding how social institutions are produced and sustained. This course serves to familiarize or validate each society's particular social arrangements. These ideologies play an important role in social production, on the one hand, and are also products of social processes, on the other. This course explores the linkage between ideology and social production in readings drawn from social theory and
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ethnographic case studies. We discuss strongly diverging views (psychoanalytic, post-modernist, poststructuralist, practice-theory, neo-Marxist) on how best to conceive social processes. An integrating theme is that understanding ideology and its alienating operations is essential in developing a coherent understanding of what culture, in the last analysis, is.

ANTHR 429 Anthropology and Psychoanalysis @ (III) (SBA) Fall. 4 credits. D. Holmberg.
Psychoanalysis holds that desire emerges from the clash between individuals’ predispositions and the need to accommodate to others in society. Yet anthropology has been resistant to the role that psychoanalytic theory might play in linking individual desire to culture. Does psychoanalysis have anything to offer cultural anthropology? Can an understanding of collective institutions be advanced with reference to theories of individual motivation and desire? Conversely, can collective life be understood without reference to individual motivation and desire? Is desire best understood as sexual in nature, or is it better understood in more abstract and existential terms? With such questions in mind, this course surveys anthropology’s engagements with psychoanalysis. We read theoretical works as well as ethnographically grounded case studies on topics including religious experience, mythic narratives, the cultural construction of gender and desire, and modern popular culture.

ANTHR 440 Ethnographic Approaches to Studying Professionals and Institutions (III) (SBA) Spring. 4 credits. D. Boyer.
Anthropological research on institutions and professions is a rapidly expanding area of inquiry. Anthropology is broadening horizons of research on complex societies, social elites, and reflexivity. This mode of research has conceptual and methodological challenges all its own, some of which require rethinking or adapting the “traditional” armature of anthropological theory and field research. For example, how can anthropological theories of language and culture be made helpful/relevant to understanding the everyday life of institutions and professionals? How can ethnographers gain access to institutions (such as consulting and advertising firms) where logics of proprietary knowledge are paramount? This course reviews past and present ethnography on professionals and institutions with special attention to what conceptual paradigms and methods are suitable to the objects of inquiry.

[ANTHR 444 God(s) and the Market @ (III) (CA)] Spring. 4 credits. Not offered 2003-2004. H. Miyazaki.

ANTHR 479 Ethnicity and Identity Politics: An Anthropological Perspectve (also AAS 479) @ (III) (SBA) Spring. 4 credits. V. Munasinghe.
The most baffling aspect of ethnicity is that while ethnic sentiments and movements gain ground rapidly within the international arena, the claim that ethnicity does not exist in any objective sense is also receiving increasing credence within the academic community. How can something be “not to exist” have such profound consequences in the real world? In lay understandings, ethnicity is believed to be a “natural” disposition of humanity. If so, why does ethnicity mean different “things” in different places? Anthropology has much to contribute to a greater understanding of this perplexing phenomenon. After all, the defining criterion for ethnic groups is that of critical distinctiveness. Through case studies, the course examines some of the key anthropological approaches to ethnicity. We explore the relationship of ethnicity to culture, ethnicity to nation, and ethnicity to state to better understand the role ethnicity plays in the identity politics of today.

B. Interpretive Approaches in Cultural Anthropology:

These courses stress symbolic or textual approaches to human society. They take as their object of analysis structures of meaning in such diverse areas as performance and text, myth and religion, views of the self, gender, and the sociology of knowledge. These same topics arise in more focused courses as well (Section D), but take center stage in the following courses.

ANTHR 232 Media, Culture, and Society (III) (SBA) Fall. 3 credits. D. Boyer.
This course provides an introduction to understanding the relationship between media and culture from an anthropological perspective. The primary goal of the course is to help students develop an ethnographic awareness of the complex factors influencing mass media production, representation, and reception. We work toward this goal by studying how media technologies affect the representation and reproduction of cultural identities, how mass media representations mediate the negotiation of national identities and moral/legal situations and professional practices influence media production, and how state and market forces both create and restrict possibilities of media expression. A wide range of social and historical contexts, both domestic and international, is employed in readings and lectures. Course materials include print, visual, and electronic media. Course assignments encourage students to engage the contemporary American media both analytically and critically.

ANTHR 250 The Anthropology of Food and Cuisine @ (III) (CA) Fall. 4 credits. J. Fajans.
You are what you eat! This course examines the way food is prepared, purchased, exchanged, presented, and given meaning in cultures around the world. It examines the symbolic content of food. Who prepares food and how is it done? Who feels whom and how these relations are expressed and valued? In addition to looking at these questions we analyze ideas about commensality, how food is used in public contexts for presentation or exchange, and how food is a marker of gender, class, status, ethnicity, and identity. In addition to looking specifically at food, we analyze cultural ideas about gender and identity in terms of how these cultural patterns are produced and expressed through concrete activities like eating, fasting, and special diets. In this class we stress critical and comparative thinking about subjects we tend to take for granted.

ANTHR 320 Myth, Ritual, and Symbol (also RELST 320) @ (III) (CA)
Spring. 4 credits. J. Fajans.
This course examines the systems of thought, symbolic forms, and ritual practice are formulated and expressed in primarily non-Western societies. It focuses on anthropological interpretations of space, time, cosmology, myth, and cosmological systems (such as color, totems, food, dress, kinship), taboos, sacrifice, witchcraft, sorcery, and rites of passage (birth, initiation, marriage, death). Examines both the roles of specialists (spirit mediums, curers, priests, ascetics, etc.) and nonspecialists in producing these cultural forms.

ANTHR 343 Anthropology Through China Ethnography @ (III) (SBA)
Fall. 4 credits. S. Sangren.
For description, see section III. C., Understanding Cultures and Societies.

ANTHR 350 Art, Material Culture, and Society @ # (III) (SBA)
Fall. 4 credits. J. Winegar.
This course explores the anthropological approaches to the relationship between objects and social life. Since the beginning of their discipline, anthropologists have analyzed the different functions of objects in human societies and the meanings that different cultures attribute to them. They have also studied the relationship between the aesthetic properties of objects and the political, economic, and social relations specific to the different cultures that produce them. In this course, we analyze the major themes in these anthropological studies of art and material culture by looking at examples from Africa, the Middle East, Australia, Oceania, and Europe and subcultural groups in the United States and Great Britain. These include: how and why objects are categorized in different cultures (e.g., as art objects, utilitarian objects, ritual objects); the debate over the cross-cultural applicability of "art" and "aesthetics", the ideologies of "the artist" in different societies, the ways that different objects are used to define groups of people (e.g., according to clan, gender, class, nationality); the relationship between the exchange/circulation of objects and social relations between different groups; the commodification of objects; the international trade in tourist objects and art; and the role of museums in representing/constructing cultures through objects. Students create a comprehensive design for a museum exhibition as their final project.

ANTHR 379 Culture, Language, and Thought (III) (CA)
Spring. 4 credits. V. Santiago-Infraary.
The relationship among culture, language, and thought has been a core concern in anthropology. Language and culture are commonly defined as processes that are public and shared yet they also operate within and upon subliminal experiential realms. In this course we examine how anthropologists have explored this relationship, which is engendered in the interaction between culture and language as parallel mediating devices for the constitution, interpretation, and expression of human experience.
ANTHR 387 Comparative Islamic Movements (also NES 387) @ (III) (CA)  
J. Rigi.

For course description, see section IIIC, Understanding Cultures and Societies.

ANTHR 406 The Culture of Lives (also FGSS 406) @ (III) (CA)  

ANTHR 408 Gender Symbolism (also FGSS 408) @ (IV) (CA)  

ANTHR 418 Sacred Time and Ordinary Time (also S HUM 417)  
Spring. 4 credits. Limited to 15 students.

This course examines the interpenetration of sacred and ordinary in a variety of cultural settings, from small-scale societies to modern states. It looks at the allocation of labor for the sacred, and the inclusionary and exclusionary relations this creates, as well as the re-emergence of sacredness within secular states, historicizing and engendering both processes.

ANTHR 425 Hope as a Method (also S HUM 420)  
Spring. 4 credits. H. Miyazaki.

This course is designed for students who are interested in exploring questions of hope, despair, and destiny in anthropological and theological contexts. It will examine how cultural productions, religious narratives, and political ideologies shape the experience and meaning of hope in a variety of settings, from small-scale societies to modern states. The course will include readings from anthropology, philosophy, history, and literature, as well as case studies from around the world. 

ANTHR 427 Giving and Humanitarianism (also S HUM 426)  
Spring. 4 credits. Limited to 15 students. 
E. Bornstein.

This seminar explores the boundaries between secular and sacred practices of giving and humanitarianism. It addresses the cultural specificity of global humanitarian aid and the ways that charitable giving has been theorized historically. For example, what makes charity a recognizable and culturally appropriate practice? How do different cultural understandings of charity shape the art and practice of humanitarian efforts that promote giving to strangers? In institutionalized giving, how are supposedly universal conceptions of humanity addressed in local settings? Using Christian, Islamic, and Hindu religious texts, we compare conceptions of charity in a historical and cross-cultural perspective. Along with primary religious texts, we read social theories of giving and international humanitarianism as well as anthropological examples of giving in specific local contexts of the United States, Africa, and India. The seminar is divided into four thematic sections: humanitarianism and the three salvational religions. Readings include selections from the Bible, the Quran, Vedic and Upanishadic texts, and the Bhagavad Gita as well as anthropological theory, ethnographic case studies, and literary examples.

ANTHR 445 Gift and Exchange @ (III) (SBA)  
Fall. 4 credits. H. Miyazaki.

This course examines the theory and practice of gift giving and exchange in anthropological contexts. It focuses on the social, cultural, and political dimensions of gift giving and exchange, as well as the implications of gift giving and exchange for understanding political and social relations. The course will include readings from anthropology, philosophy, history, and literature, as well as case studies from around the world. 

ANTHR 456 Mesoamerican Religion, Science, and History @ (III) (CA)  

ANTHR 469 Gender and Age in Archaeology (also AAS 210)  
Spring. 4 credits. Limited to 15. 
V. Munasinghe.

This interdisciplinary course with an emphasis in anthropology will introduce students to the myriad cultural contexts in which gender and age are central to the construction and valuation of identity. We will also examine how gender and age shape and are shaped by cultural practices, social relations, and political processes. 

ANTHR 503 Asians in the Americas: A Comparative Perspective (also AAS 303) (III) (CA)  
Fall. 4 credits. V. Munasinghe.

This course examines the experiences and cultural identities of Asian populations in the Americas, with a focus on the historical and social factors that have shaped their experiences and identities. It covers a wide range of historical periods, from the early colonial period to the present day, and includes case studies from the United States, Canada, and Latin America. 

ANTHR 513 Topics in the Anthropology of Japan @ (III) (SBA)  
H. Miyazaki.

This course is designed for students who are interested in exploring questions of hope, despair, and destiny in anthropological and theological contexts. It will examine how cultural productions, religious narratives, and political ideologies shape the experience and meaning of hope in a variety of settings, from small-scale societies to modern states. The course will include readings from anthropology, philosophy, history, and literature, as well as case studies from around the world. 

ANTHR 516 Power, Society, and Culture in Southeast Asia @ (III) (CA)  
A. Willford.

ANTHR 536 Change and Continuity in the Pacific Islands @ (III) (CA)  
J. Farray.
[ANTHR 337] Gender, Identity, and Exchange in Melanesia (also ANTHR 739) (SBA)

[ANTHR 339] Peoples and Cultures of the Himalayas (also ANTHR 739) (III) (CA)

K. March.

[ANTHR 343] Anthropology Through China
Ethnography (also ANTHR 738) (SBA)
Fall. 4 credits. S. Sangren.

This course develops an integrative approach to anthropological theory by means of an intensive examination of local life in China. Among the linked topics are family and kinship, local identity, ritual, cultural constructions of space and time, gender, ideology, and “modes of production of desire.” Its primary objective is to illustrate the advantages of a broadly synthetic approach to socio-cultural anthropology by means of a close analytical examination of elements among historical, psychoanalytic, and Marxist perspectives.

[ANTHR 344] Male and Female in Chinese Culture and Society (also FGSS 344) (SBA)

S. Sangren.

[ANTHR 346] The Kayapo of Brazil (also ANTHR 646) (III) (CA)

T. Turner.

[ANTHR 355] Ancient Mexico and Central America (also ARKEO 355) (SBA)
Fall. 4 credits. J. Henderson.

A survey of the cultural history of ancient Mexico and Central America, emphasizing Aztec and Maya civilizations. The use of ethnographic and historical information to enrich archaeological interpretation is a general theme. Specific topics include the emergence of settled farming life, the rise of civilization and the state, and the development of mechanisms that linked the many societies in the region into a single sphere of interaction.

[ANTHR 356] Archaeology of the Andes (also ARKEO 356) (III) (CA)

J. Henderson.

[ANTHR 377] The United States (also LSP 377 and AM ST 377) (III) (CA)
Fall. 4 credits. V. Santiago-Irazarry.

The anthropological inquiry into one’s own culture is never a neutral exercise. This course explores issues in the cultural construction of the United States as a “pluralistic” society. We look at the ideological context for the production of a cultural profile predicted upon ideas that are intrinsic to American images of identity such as individualism, freedom, and equality and the way these are applied in practice. The course readings include historic documents and accounts, popular writing, and recent ethnographies on the United States.

[ANTHR 383] Topics in African Ethnography: The State and Civil Society in Colonial and Contemporary Africa (also ANTHR 784) (SBA)

J. Schoss.

[ANTHR 384] Africa in the Global Economy (also ANTHR 764) (SBA)
Fall. 4 credits. J. Schoss.

This course examines the shifting and various ways in which African societies and nation states have been and continue to be enmeshed in global economic structures. Topics include past and present African engagement in global trade; the nature of commodity, high culture, and postcolonial Africa; the burgeoning African tourist industry; the intersection between local communities and international development efforts; and the crucial role of state and commoditized commodities export industries, with particular consideration of diamond mining. Course readings will focus on a few key ethnographic and/or social historical texts. These texts will be supplemented by materials from mass media sources, contemporary African films, and critical commentaries by African scholars.

[ANTHR 387] Comparative Isamic Movements (also NES 387) (III) (CA)
Fall. 4 credits. J. Rigi.

The course analyzes the emergence of Islamic movements in Russia, the Caucasus, Central Asia, and the Middle East with particular attention to their ideologies, their constituencies, and their relations with the state, nationalism, culture, and society. We explore several major questions: To what extent have these movements emerged in response to contemporary social and political issues? To what extent do these movements draw on Koran and Hadith? To what extent are programs and ideologies modern inventions? What are the similarities and differences between these movements cross-regionally? And finally, what is the historical context and significance of these movements?

[ANTHR 413] Religion and Politics in Southeast Asia (also ASIAN 413) (III) (CA)

A. Willford.

[ANTHR 441] Himalayan Ethnographies (also ANTHR 741) (CA)
Fall. 4 credits. D. Holmberg.

This course will focus on a systematic reading of the monographic literature on the peoples and cultures of the Himalayas. “Classic” and contemporary ethnographies will be juxtaposed in an attempt to trace the history of the anthropological of the Himalayas. Although we will read studies focused on Tibetan cultures and Hindu cultures continuous with those of India, the majority of monographs will be drawn from the literature on Nepal because the greatest number of ethnographies on Himalayan peoples and cultures have been produced in reference to Nepal. Engagement with this ethnographic literature will be the context for assessing the state of anthropological study of the Himalayas on topics as diverse as the environment, ritual, and gender. The course will be framed in a more general reflection on problems in ethnographic research and writing as they have emerged in critiques of ethnography in the last two decades.

[ANTHR 442] Violence, Symbolic Violence, Terror and Trauma in South Asia and the Himalayas (also ANTHR 642) (III) (CA)

D. Holmberg.

[ANTHR 450] The Anthropology of Europe (also ANTHR 750)

This rotating seminar will deal with diverse topics related to the anthropology of Europe. Examples are postsocialist transitions, the ethnographic representation of transnational relations and institutions in European integration in the West, and disintegration in the East of Europe, immigration, regionalism, and ethnic conflict. Each year it will be staffed by one of the three Europeans in the Department of Anthropology—Dominic Boyer, Davydd Greenwood, and Jakob Rigi. The course will serve to balance the area curriculum of the department by adding the “West” to our offerings. It will also serve the Modern European Studies Concentration and the International Relations Concentration directly as an additional, much-needed offering at the upper levels. As the topics and professors will shift, students can take more than one of these seminars.


J. Henderson.

[ANTHR 462] Catalhoyuk and Archaeological Practice (also ANTHR 762 and ARKEO 462/762) (III) (HA)
Fall. 4 credits. N. Russell.

Catalhøyuk is a famous and extraordinary Neolithic site in Anatolia. It has intrinsic interest as one of the largest sites in the world at this time, for its spectacular wall paintings and other art, and for many claims of myths of origin that have been made about it (first city, first cattle domestication, first drum, first town plan, etc.) In addition to the many fascinating aspects of the site itself, it is the nexus of many key issues in current archaeology. The current excavations not only employ a wide range of the latest scientific methods but aim to forge a new humanistic approach to fieldwork, putting postprocessual archaeology into practice. The site has been adopted as a sacred place by the goddess movement and plays a role in local, national, and international politics as well as the construction of national identity. Thus it exemplifies the intersection of politics and archaeology. Both the earlier and the current project have made explicit efforts to communicate with nonarchaeologists, thus engaging the issues of public archaeology. It is a key site, in the context of other work in the region, for the understanding of animal domestication, Neolithic ritual and religion, gender relations in the prehistoric Near East, and the effects of aggregated settlement. In this course, we will use the site as a focus to examine these and other issues in archaeological practice in general and the Neolithic of the Near East in particular.

[ANTHR 477] Ethnology of Island Southeast Asia (III) (CA)

[ANTHR 493] Seminar in Archaeology (also ARKEO) (III) (CA)
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) (SBA) Spring. 4 credits. T. Turner and J. Rigi. A reading and interpretation of Marx's principal writings, emphasizing both the continuities and the changes from his earlier 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. T. Volman. For description, see section V. Human History and Archaeology.


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. Not offered 2003–2004. J. Fajans.

ANTHR 458 Archaeological Analysis (also ANTHR 658 and ARKEO 458/658) (III) (SBA) Spring. 4 credits. Prerequisite: one course in archaeology or permission of instructor. Limited to 15 students. J. Henderson. An introduction to methods of recording, processing, and analyzing archaeological data. Topics include recording of excavation and survey data in the field; processing artifacts in the laboratory; storing and retrieving data; and basic methods of describing, tabulating, analyzing, and interpreting artifacts (mainly ceramic vessels), stratigraphy, and spatial distributions. Intended for those with some understanding of the uses to which archaeological data are put in regional synthesis and interpretation; previous field experience is helpful.

ANTHR 459 Archaeology of the Household (also ANTHR 659 and ARKEO 459/659) @ # (III) (HA) Fall. 4 credits. Not offered 2003–2004.


ANTHR 495 Action Research Practicum Fall and spring. 2 credits. Prerequisite: student must be holder of Bartels Action Research Undergraduate Fellowship. D. Greenwood.


ANTHR 494 Seminar in Archaeology: The Archaeology of Human Origins (also ARKEO 494) (III) (HA) Spring. 4 credits. T. Volman. An exploration of the archaeological record associated with early modern and neomodern humans as well as their non-modern contemporaries, such as the Neanderthals. Major issues include: what behaviors and capabilities are indicated for various populations, and how and why did these change over the course of the later Pleistocene? To what extent does the archaeological record support the "Out-of-Africa" hypothesis of a recent, African origin for all modern humans?

ANTHR 495 Action Research Practicum Fall and spring. 2 credits. Prerequisite: student must be holder of Bartels Action Research Undergraduate Fellowship. D. Greenwood.

The Henry E. Bartels Undergraduate Action Research Fellowship Program offers opportunities for Cornell University undergraduate students from all colleges, departments, and majors to engage in action research projects in the local community, including the Ithaca area and the Cornell campus community. This is a two-part course.

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 worldviews 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)  
Spring. 3 credits. T. Volman.  
For course description, see section IA, Introductory Courses.

ANTHR 215 Stone Age Art (also ARKEO 215) @ (IIIA) (CA)  

ANTHR 240 Old World Prehistory (also ARKEO 240) # (III) (HA)  

ANTHR 242 Early Agriculture @ (III) (HA)  
Spring. 3 credits. N. Russell.  
Throughout most of the human career, people survived by hunting and gathering wild foods. The advent of food production is one of the most profound changes in (pre)history. This course examines the current evidence for the appearance and spread of agriculture (plant and animal domestication) around the world. We consider definitions of agriculture and domestication, the conditions under which it arises, the consequences for those who adopt it, and why it has spread over most of the world.

ANTHR 317 Stone Age Archaeology (also ARKEO 317) (III) (HA)  

ANTHR 330 Humans and Animals (also ARKEO 330) @ (III) (CA)  
Spring. 4 credits. N. Russell.  
For course description, see section IV, Anthropological Thought and Method.

ANTHR 355 Ancient Mexico and Central America (also ARKEO 355) @ (III) (HA)  
Spring. 4 credits. J. Henderson.  
For course description, see section III, Understanding Cultures and Societies.

ANTHR 356 Archaeology of the Andes (also ARKEO 356) @ (III) (HA)  

ANTHR 370 Environmental Archaeology (also ANTHR 670 and ARKEO 370/670) (@PBS Supplementary List)  
Fall. 4 credits. T. Volman.  
A survey of selected topics in paleoenvironmental analysis and reconstruction, with emphasis on how they inform interpretations of the archaeological record. The course ranges broadly from a general consideration of human ecology and the role of environment in culture change to detailed study of specific techniques and approaches.

ANTHR 371 Human Paleontology (also BIOEE 371) @ (I) (PBS)  
Fall. 4 credits. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Lecs, M W F 2–30; lab, 1 hour each week, TBA; occasional field trips. Offered alternate years. K. A. R. Kennedy.  
A broad survey of the fossil evidence for human evolution with special attention to skeletal and dental anatomy, geological contexts, paleoecology, dating methods, archaeological associations, and current theories of human origins and physical diversity.

ANTHR 372 Hunters and Gatherers (also ANTHR 672 and ARKEO 372/672) # (III) (SBA)  
Fall. 4 credits.  
A survey of contemporary and recent peoples with economies based completely or mainly on hunting and gathering. Selected societies from various parts of the world will be examined to compare aspects of technology, subsistence practices, organization, and beliefs. The impact of contact with more economically advanced societies will be considered.

ANTHR 405 Archaeological Research Design (also ANTHR 605 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 @ (III) (CA)  

ANTHR 458 Archaeological Analysis (also ANTHR 458 and ARKEO 456/658) (III) (SBA)  
Spring. 4 credits. J. Henderson.  
For course description, see section IV, Anthropological Thought and Method.

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)  
Fall. 4 credits. N. Russell.  
For course description, see section III, Understanding Cultures and Societies.

ANTHR 463 Zooarchaeological Method (also ARKEO 463) (@PBS Supplementary List)  

ANTHR 464 Zooarchaeological Interpretation (also ARKEO 464) (@PBS Supplementary List)  

ANTHR 467 Origins of Agriculture (also ARKEO 467) @ (III) (HA)  

ANTHR 469 Gender and Age in Archaeology (also ANTHR 669, ARKEO 469/669) # (III) (SBA)  

ANTHR 493 Seminar in Archaeology (also ARKEO 493) (HA)  

ANTHR 494 Seminar in Archaeology: The Archaeology of Human Origins (also ARKEO 494) (III) (HA)  
Spring. 4 credits. T. Volman.  
For course description, see section IV, Anthropological Thought and Method.

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 The Evolution of Human Mating (UPBS Evolutionary List)  

ANTHR 211 Sophomore Seminar: Nature and Culture @ (III) (SBA)  
Spring. 4 credits. S. Sangren.  
For course description, see section IA, Introductory Courses.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

ANTHR 242 Early Agriculture @ (III) (HA)  
Spring. 3 credits. N. Russell.  
For course description, see section V, Human History and Archaeology.

ANTHR 344 Male and Female in Chinese Culture and Society (also FGSS 344) @ (III) (SBA)  

ANTHR 370 Environmental Archaeology (also ANTHR 670 and ARKEO 370/670) (@PBS Supplementary List)  
Fall. 4 credits. T. Volman.  
For description, see section V, Human History and Archaeology.

ANTHR 371 Human Paleontology (also BIOEE 371) @ (I) (PBS)  
Fall. 4 credits. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Lecs, M W F 2–30; lab, 1 hour each week, TBA; occasional field trips. Offered alternate years. K. A. R. Kennedy.  
For course description, see section V, Human History and Archaeology.

ANTHR 372 Hunters and Gatherers (also ANTHR 672 and ARKEO 372/672) @ (III) (SBA)  
Fall. 4 credits. T. Volman.  
For description, see section V, Human History and Archaeology.

ANTHR 375 Evolutionary Theory and Human Behavior (also ANTHR 675) (@PBS Supplementary List)  

ANTHR 390 Primate Behavior and Ecology (@PBS Supplementary List)  
Spring. 4 credits. Prerequisite: ANTHR 101 or permission of instructor: A. Clark Arcadi.

The course investigates all aspects of non-human primate life. Based on the
The graduate program in anthropology is described in much greater detail in the Graduate Program brochure which is available through an evaluation of ecological constraints imposed on primates in different habitats. Subjects include: primate taxonomy, diet and foraging, predation, cooperation and competition, social ontogeny, kinship, and mating strategies. Field trip fee: $15.

ANTHR 409 Approaches to Archaeology (also ANTHR 609 and ARKEO 409/609) (III) (CA)

ANTHR 422 Anthropology and Environment @ (III) (SBA)
Fall. 4 credits. Limited to 15 students. Prerequisite: anthropology major or permission of instructor. Not offered 2003–2004. D. Holmberg.

ANTHR 490 Topics in Biological Anthropology
Spring. 4 credits. Prerequisites: ANTHR 101, ANTHR 390, or permission of instructor. A. Clark Arcadi.

Relevant courses in other departments

[BIOPL 247 Ethnobiology

[BIOPL 348 The Healing Forest
Spring. 2 credits. D. M. Bates, E. Rodriguez.]

[BIOPL 442 Current Topics in Ethnobiology
Fall. 2 credits. Permission to register is required. Limited to 12 students. D. Bates.]

[MUSIC 104 Introduction to World Music II: Asia
Fall. 3 credits. Not offered 2003–2004. M. Hatch.]

[MUSIC 245 Gamelan in Indonesian History and Cultures
Fall. 3 credits. Permission of instructor required. M. Hatch.]

[NS/HO/B&B/SOC 347 Human Growth and Development: Biological and Social Interactions
theories of violence. We also consider colonial war and the jihad.

[ANTHR 420 Chinese Ethnology]

[ANTHR 422 Andean Symbolism]

ANTHR 435 Southeast Asia: Readings in Special Problems
Fall or spring. Credit TBA. Staff.
Independent reading course on topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

[ANTHR 440 Problems in Himalayan Studies]

ANTHR 441 South Asia: Readings in Special Problems
Fall or spring. Credit TBA. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

[ANTHR 442 Violence, Symbolic Violence, Terror and Trauma in South Asia and the Himalayas (also ANTHR 442)]

ANTHR 444 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; considering ethical issues and human subjects protection procedures; and preparing appropriate budgets. This is a writing seminar, and students will complete a proposal suitable for submission to a major funding agency in the social sciences.

[ANTHR 446 The Kayapo of Brazil (also ANTHR 346)]

[ANTHR 452 Evidence: Ethnography and Historical Method]

ANTHR 455 East Asia: Readings in Special Problems
Fall or spring. Credit TBA. Staff.
Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

[ANTHR 456 Maya History (also ARKEO 456)]

ANTHR 458 Archaeological Analysis (also ANTHR 458 and ARKEO 458/658)
Spring. 4 credits. J. Henderson.
For description, see ANTHR 458, section IV, Anthropological Thought and Method.

[ANTHR 459 Archaeology of the Household (also ANTHR 459 and ARKEO 459/659)]

[ANTHR 460 Language, Ideologies and Practices (also LSP 460)]

ANTHR 462 Democratizing Research: Participation, Action, and Research (also ANTHR 382)
Fall. 4 credits. D. J. Greenwood.
For description, see ANTHR 362, Section IV, Anthropological Thought and Method.

ANTHR 463 Action Research
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.

[ANTHR 465 Topics in Native American Societies and Cultures (also AIS 465)]

ANTHR 467 Contemporary Archaeological Theory (also ARKEO 467)
Fall. 4 credits. Prerequisite: undergraduates with permission of instructor only. N. Russell.
This course surveys recent developments and current debates in archaeological theory. This includes the processual/postprocessual debate and contrasts between scientific and humanistic approaches more generally, as well as other approaches (Marxist, feminist, etc.). We also discuss ethical concerns and engagements with groups outside archaeology with interests in the past.

ANTHR 468 Marx: An Overview of His Thought (also ANTHR 368)
Spring. 4 credits. T. Turner and J. Rigi.
For course description, see ANTHR 368, section IV, Anthropological Thought and Method.

[ANTHR 469 Gender and Age in Archaeology (also ANTHR 469 and ARKEO 469/669)]

ANTHR 470 Environmental Archaeology (also ANTHR 370 and ARKEO 370/670)
Fall. 4 credits. T. Volman.
For description, see ANTHR 370, section IV, Human History and Archaeology.

[ANTHR 471 Palaeoanthropology of South Asia (also BIOEE 471 and ASIAN 630)]

ANTHR 472 Hunters and Gatherers (also ANTHR and ARKEO 372/672)
Fall. 4 credits.
For description, see ANTHR 372, section V, Human History and Archaeology.

[ANTHR 473 Human Evolution: Concepts, History, and Theory (also BIOEE 473)]
Fall. 3 credits. Prerequisite: one year of introductory biology, ANTHR 101, or permission of instructor. Offered alternate years. Not offered 2003–2004.
K. A. R. Kennedy

[ANTHR 477 The Anthropology of Global Turbulence]

ANTHR 478 Violence and Life: From Gift to Spectacle
Spring. 4 credits. J. Rigi.
A major aspect of the contemporary world is an unprecedented dialectical process of commoditization of life-world and culture on the one hand, and the semiotization of commodities and economy on the other. In other words, culture and economy have mutually appropriated each other's logics and their boundaries are blurred: culture has emerged as a particular branch of economy, and economy has become a particular branch of cultural production. The aim of the course is to analyze the dialectical unity and tension between culture and economy through reviewing theories and ethnographies of value. Here value is considered in a broad sense: economic, cultural, moral and ethical. The course starts with classical discussion on gift/commodity, reciprocity/market, then moves to discuss rationality by addressing substantivist/formalist debate; then focuses on Marxian tradition (value, money, fetishism, alienation, commodity reification). Marx will be compared with Simmel. In the third stage, we will move to contemporary theories of value (Baudrillard, Jameson, Mandel, David Harvey, Guy Debord). By engaging with these theories we shall try to arrive to a critical understanding of the contemporary culture, economic, and political processes.

[ANTHR 479 Technocracy: Anthropological Approaches]

[ANTHR 480 Anthropology and Globalization (also ANTHR 480)]

ANTHR 482 Perspectives on the Nation
Fall. 4 credits. V. Munasinghe.
This course will critically examine the key texts that have informed our understanding of the nation and nationalism. Beginning with some of the founding texts such as Hahn Kohn's The Idea of Nationalism. A Study in its Origins and Backgrounds (1994), Plamenatz's Two Types of Nationalism (1976), and Renan's What is a Nation (1939), we will then move on to more contemporary writings by Gellner, Hobbsawn, and Anderson and end with alternate analytical approaches that have been informed by the "national question" in the Third World such as Partha Chatterjee's Nationalist Thought and the Colonial World. A central theme will be how notions of culture, power, and history are implicated in constructions of "the nation." We will also explore the possibilities of an ethnographic
approach to the nation and ask if such an analytical/methodological move may help us better grapple with the perplexing emotive dimension of nationalisms. The intersection of gender and nation will also form a section of this course.

[ANTHR 690] Ritual and Myth: Structure, Process, Practice

ANTHR 693 Law and Social Movement in East Asia (also LAW 744)
Spring. 4 credits. A. Riles.
This seminar aims to rethink the anthropological understanding of law and of social movements, respectively, by considering how legal scholars, activists, organizing officials, and activists conceive of the relationship between knowledge and politics. We will focus attention on a comparison of feminist theory and legal theory on the one hand, and gender and sexuality-focused social movements and bureaucratic and judicial action on the other. Readings will focus primarily, but not exclusively, on examples from East Asia. One objective of the seminar is to experiment with a variety of possibilities and approaches anthropologists might wish to deploy in the ethnography of law and social movements. Toward this end, four weeks of the course will be devoted to engaging with the work of four anthropologists working on these questions from radically differing perspectives. These four anthropologists will come to Cornell to participate in our class discussions during the week in which we discuss their work. The seminar will coincide with a conference on feminist and legal theory in East Asia.

[ANTHR 699] Current Fields in Biological Anthropology

ANTHR 701 Independent Study: Grad I
Fall or spring. Credit TBA. Intended for graduate 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 702 Independent Study: Grad II
Fall or spring. Credit TBA. Intended for graduate students only. Staff.
For course description, see ANTHR 701, section VII, Graduate Seminars.

ANTHR 703 Independent Study: Grad III
Fall or spring. Credit TBA. Intended for graduate students only. Staff.
For course description, see ANTHR 701, section VII, Graduate Seminars.

[ANTHR 720] Development of Anthropological Thought (also ANTHR 420)

ANTHR 726 Ideology and Social Production (also ANTHR 426)
Spring. 4 credits. S. Sangren.
For description, see ANTHR 426, section III. A. Understanding Cultures and Societies.

[ANTHR 739] Peoples and Cultures of the Himalayas (also ANTHR 339)

ANTHR 741 Himalayan Ethnographies (also ANTHR 441)
Fall. 4 credits. D. Holmberg.
For description, see ANTHR 441, section III. A. Understanding Cultures and Societies.

ANTHR 750 The Anthropology of Europe (also ANTHR 450)
For description, see ANTHR 450, section III. A. Understanding Cultures and Societies.

ANTHR 762 Catalhoyuk and Archaeological Practice (also ANTHR 462 and ARKEO 462/762)
Fall. 4 credits. N. Russell.
For description, see ANTHR 462, section III. C. Understanding Cultures and Societies.

ANTHR 784 Africa in the Global Economy (also ANTHR 384)
For description, see ANTHR 384, section III. C. Understanding Cultures and Societies.

ARABIC AND ARAMAIC
See under 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 masters' 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 Archaeology 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.

The majority of work in archaeology is centered on uncovering and interpreting them. Sixteen of the credits 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.

Either ARKEO 481 or ARKEO 482 (Honors Thesis, fall and spring) can count toward the major, but not both. In addition to ARKEO 481 or 482, 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 geography 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 may enroll in Archaeology 481 (fall) or Archaeology 482 (spring) for this purpose.

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) Archaeology 100 and four other courses from categories B-D (described above), at least three of which must be basic courses, or (2) five courses from categories B-E, 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

ARKEO 100 Introduction to Archaeology (also ANTHR 100) @ (III or IV) (1A)
Fall. 3 credits. Basic. Staff.
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 undergraduates.

[ARKEO 201 Lost Tribes and Sunken Continents (also ANTHR 201) @ # Summer only. 3 credits. Not offered 2003-2004. D. Evertt.]

ARKEO 300 Individual Study in Archaeology and Related Fields Fall and spring. Credit TBA. Prerequisite: ARKEO 100 or permission of instructor. Students pursue topics of particular interest under the guidance of a faculty member.

ARKEO 481-482 Honors Thesis Fall, 482, spring. 4 (V) credits. S-U only. Prerequisite: admission to Honors Program. The student, under faculty direction, prepares a senior thesis.

ARKEO 600 Special Topics in Archaeology Fall and spring. 4 (V) credits. Students pursue advanced topics of particular interest under the guidance of a faculty member(s).

ARKEO 681-682 Master’s Thesis 681, fall; 682, spring. 4 (V) credits. S-U only. Limited to students admitted to Master's Program in Archaeology. Students, working individually with faculty member(s), prepare a Master’s Thesis in Archaeology.

II. Anthropological Archaeology

[ARKEO 202 Interpretive Archaeology (also ANTHR 202) Fall. 3 credits. Limited to 50 students. Not offered 2003-2004. T. P. Volman.] For description, see ANTHR 202.]

ARKEO 203 Early People: The Archaeological and Fossil Record (also ANTHR 203) Spring. 3 credits. T. P. Volman. For description, see ANTHR 203.

[ARKEO 204 Ancient Civilizations (also ANTHR 204) Fall. 3 (4) V credits. Not offered 2003-2004. T. P. Volman. For description, see ANTHR 204.]

[ARKEO 215 Stone Age Art (also ANTHR 215) Fall. 3 credits. Not offered 2003-2004. T. P. Volman.]

ARKEO 242 Early Agriculture (also ANTHR 242) Spring. 3 credits. N. Russell. For description, see ANTHR 242.

ARKEO 255 Great Empires of the Andes (also ANTHR 255) @ # (III) (HA) Summer only. 3 credits. M. Malpass. The Andes region of South America, stretching from northern Colombia to Tierra del Fuego, saw the rise and fall of some of the world’s most spectacular societies, from the Moche of the north Peruvian coast to the Incas. Not only were the cultures of this area highly developed, but many of the technologies—metalurgy, textiles, ceramics, and stonemasonry, to name just four—were unusually sophisticated. The Andean region saw the indigenous domestication of plants and animals as well as the rise of state-level societies. This course introduces students to the cultural developments of this fascinating area, from the earliest times to the fall of the Incas in AD 1543.

[ARKEO 317 Stone Age Archaeology (also ANTHR 317) Fall. 4 credits. Not offered 2003-2004. T. P. Volman.]

ARKEO 330 Humans and Animals (also ANTHR 330) Spring. 4 credits. N. Russell. For description, see ANTHR 330.

ARKEO 355 Ancient Mexico and Central America (also ANTHR 355) Spring. 4 credits. J. Henderson. For description, see ANTHR 355.

[ARKEO 356 Archaeology of the Andes (also ANTHR 356) @ # (III) (HA) Spring. 4 credits. Not offered 2003-2004. J. Henderson.]

ARKEO 372 Hunters and Gatherers (also ARKEO 672 and ANTHR 372/672) Spring. 4 credits. T. Volman. For description, see ANTHR 372.

[ARKEO 409 Approaches to Archaeology (also ARKEO 609 and ANTHR 409/609) Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. Staff.]

[ARKEO 459 Archaeology of the Household (also ARKEO 659 and ANTHR 459/659) Fall. 4 credits. Not offered 2003-2004. J. Henderson and N. Russell.]

ARKEO 462 Cataloyuk and Archaeological Practice (also ARKEO 752 and ANTHR 462/762) Fall. 4 credits. N. Russell. For description, see ANTHR 462.

[ARKEO 469 Gender and Age in Archaeology (also ARKEO 669 and ANTHR 469/669) Spring. 4 credits. Not offered 2003-2004. N. Russell.]

[ARKEO 493 Seminar in Archaeology (also ANTHR 493) Fall. 4 credits. Not offered 2003-2004.]

ARKEO 494 Seminar in Archaeology: The Archaeology of Human Origins (also ARKEO 494) Spring. 4 credits. T. P. Volman. For description, see ANTHR 494.

ARKEO 609 Approaches to Archaeology (also ARKEO 409 and ANTHR 409/609) Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. N. Russell.


ARKEO 667 Contemporary Archaeological Theory (also ANTHR 667) Spring. 4 credits. Prerequisite: undergraduates by permission of instructor. Limited to 14 students. N. Russell. For description, see ANTHR 667.

[ARKEO 669 Gender and Age in Archaeology (also ARKEO 469 and ANTHR 469/669) Spring. 4 credits. Not offered 2003-2004. N. Russell.]


[ARKEO 656 Maya History (also ANTHR 656) Spring. 4 credits. Not offered 2003-2004. J. Henderson.]

LA 260 Preindustrial Cities and Towns of North America (also CRP 260) Fall. 3 credits. S. Baugher. For description, see LA 260.

III. Classical, Near Eastern, and Medieval Archaeology

[ARKEO 221 Minoan-Mycenaean Art and Archaeology (also CLASS 221 and ART H 221) 3 credits. Not offered 2003-2004. J. Coleman.]

ARKEO 227 The Bible and Ancient Near Eastern Civilization (also NES 227, JWST 227, and RELST 227) Spring. 3 credits. J. Zorn. The Hebrew Scriptures are a composite work containing a wide array of literary forms: historical works, prophetic texts, and wisdom literature, among others. These works themselves were compiled from an even wider assortment of text types: cosmologies, folk tales, love songs, palace records, treaties, letters, and more. These texts were not written in a cultural vacuum but find a home in the literary world of Israel's neighbors, including Mesopotamians, Egyptians, Hittites, and others. This course examines the different literary genres found in the Hebrew Scriptures in comparison with similar material from the ancient Near East. This in turn will clarify the interpretation, dating, and purpose of the Biblical material.

[ARKEO 232 Archaeology in Action I (also ART H 224 and CLASS 223) Fall. 3 credits. Not offered 2003-2004. P. I. Kuniholm.]

[ARKEO 233 Archaeology in Action II (also ART H 225 and CLASS 233) Spring. 3 credits. Prerequisite: permission of instructor. Not offered 2003-2004. P. I. Kuniholm.]

[ARKEO 240 Old World Prehistory (also ANTHR 240) Fall. 3 credits. Not offered 2003-2004. N. Russell.]

ARKEO 263 Introduction to Biblical History and Archaeology (also NES 263, JWST 263, and RELST 264) Spring. 3 credits. J. Zorn. For description, see NES 263.
[ARKEO 266 Jerusalem through the Ages (also NES 266, JWST 266, RELST 266)] Fall. 3 credits. Not offered 2003-2004. J. Zorn.


[ARKEO 321 Mycenae and Homer (also CLASS 321 and ART H 321)] Fall. 4 credits. Prerequisite: at least 1 previous course in Archaeology, Classics, or History of Art. J. Coleman. For description, see CLASS 321.

[ARKEO 360-361 Origins of Mesopotamian Civilization (also NES 360-361)] 360, fall; 361, spring. 4 credits. D. Owen. For description, see NES 360-361.


[ARKEO 380 Introduction to the Arts of China (also ART H 380)] Fall. 4 credits. Not offered 2003-2004. A. Pan.

[ARKEO 417 Early Medieval Archaeology and Literature (also ARKEO 617, ENGL 417 and 617)] Fall. 4 credits. Prerequisite: permission of instructor. Enrollment limited to 15 students. This course may be used as one of the three pre-1800 courses required of English majors. Not offered 2003-2004. R. T. Farrell.


[ARKEO 432 Sardis and the Cities of Asia Minor (ART H 424 and CLASS 432)] 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. A. Ramage.

[ARKEO 434 The Rise of Classical Greece (also ART H 434 and CLASS 434)] Spring. 4 credits. Recommended: CLASS 220 or 221 or ART H 220 or 221, or permission of instructor. Not offered 2003-2004. P. I. Kuniholm.

[ARKEO 435 Seminar on Roman Art and Archaeology (also CLASS 435 and ART H 427)] Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. A. Ramage.

[ARKEO 520 Seminar in Classical Archaeology (also ART H 520 and CLASS 630)] Spring. 4 credits. P. Kuniholm. Seminar on Greek Archaeology.

[ARKEO 617 Early Medieval Archaeology and Literature (also ARKEO 417, ENGL 417 and 617)] Fall. 4 credits. Not offered 2003-2004. R. T. Farrell.

[ARKEO 629 The Prehistoric Aegean (also CLASS 629)] 4 credits. For graduate students and advanced undergraduates with permission of instructor. J. E. Coleman. For description, see CLASS 629.


[CLASS 240 Greek Art and Archaeology] Spring. 3 credits. J. Coleman. For course description, see CLASS 240.


[CLASS 322 Greeks and Barbarians (also ART H 328)] Fall. 4 credits. Prerequisite: CLASS 220 or 221, or permission of instructor. Not offered 2003-2004. J. Coleman.


[CLASS 333 Greek and Roman Mystery Cults and Early Christianity (also RELST 333)] Fall. 4 credits. A previous course in Classics (civilization or language) or RELST 101 is recommended. Not offered 2003-2004. K. Clinton.

[ART H 322 Arts of the Roman Empire (also CLASS 350)] Fall. 4 credits. Not offered 2003-2004. A. Ramage.

[ART H 325 Greek Vase Painting (also CLASS 325)] Fall 4 credits. Not offered 2003-2004. A. Ramage.

[ART H 327 Greek and Roman Coins (also CLASS 327)] Fall. 4 credits. Not offered 2003-2004. A. Ramage.

[LA 545 The Parks and Fora of Imperial Rome] Spring. 3 credits. Prerequisites: advanced standing in a design field, classics or history of art, or by permission of the instructor. K. Gleason. For description, see LA 545.

IV. Methodology and Technology


ARKEO 262 Laboratory in Landscape Archaeology (also LA 262) Spring. 3 credits. S. Baugher. For description, see LA 262.

[ARKEO 285 Art, Archaeology, and Analysis (also ENGR 185, EAS 200, MS&E 285)] Spring. 3 credits. Does not meet liberal studies distribution requirements. Staff. For description, see EAS 200.

[ARKEO 309 Dendrochronology of the Aegean (also ART H 309 and CLASS 309) # (IV) (HA)] Fall and spring. 4 credits. Limited to 10 students. Letter only. Prerequisite: permission of instructor. P. I. 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.

[ARKEO 317 Stone Age Archaeology (also ANTHR 317) (HA)] Fall. 4 credits. Not offered 2003-2004. T. Volman.

[ARKEO 370 Environmental Archaeology (also ARKEO 670 and ANTHR 370 and 670)] Spring. 4 credits. T. P. Volman. For description, see ANTHR 370.


[ARKEO 423 Ceramics (also ART H 423 and CLASS 431)] Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. A. Ramage.

[ARKEO 437 Geophysical Field Methods (also EAS 437)] Fall. 3 credits. Prerequisites: PHYS 213 or 208 or permission of instructor. L. D. Brown. For description, see EAS 437.

[ARKEO 458 Archaeological Analysis (also ARKEO 658 and ANTHR 458/658)] Spring. 4 credits. Prerequisite: 1 course in archaeology or permission of instructor. Enrollment limited to 15 students. J. S. Henderson. For description, see ANTHR 458.


[ARKEO 600 Special Topics in Archaeology] Fall. 4 credits. Staff.
ARKEO 601 Graduate Colloquium in Archaeology  
Fall. 4 credits. Open to graduate students and advanced undergraduates by permission of instructor. J. Olley. Faculty members of the Program in Archaeology and invited speakers present summaries of the different aspects of archaeological analysis. Topics may include: lithics, ceramic typology, petrographic and neutron activation analysis, dendrochronology and other chronological techniques, settlement patterns, inscriptions, human and animal bones.  

ARKEO 602 Designing Archaeological Exhibits (also ARKEO 402)  

ARKEO 605 Archaeological Research Design (also ARKEO 405 and ANTHR 405/605)  

ARKEO 670 Environmental Archaeology (also ARKEO 370 and ANTHR 370 and 670)  
Spring. 4 credits. T. P. Volman. For description, see ANTHR 370.  

ANTHR 474 Laboratory and Field Methods in Human Biology (also BIOES 474)  

BIOEE 275 Human Biology and Evolution (also ANTHR 275)  

BIOEE 371 Human Paleontology (also ANTHR 371)  
Fall. 4 credits. Prerequisite: one year of introductory biology, ANTH 101, or permission of instructor. K. A. R. Kennedy. For description, see BIOEE 371.  

BIOEE 671 Paleoanthropology of South Asia (also ANTHR 671 and ASIAN 620)  

BIOEE 673 Human Evolution: Concepts, History, and Theory (also ANTHR 673)  
Fall. 3 credits. Prerequisite: one year of introductory biology or ANTH 101 or permission of instructor. Not offered 2003–2004. K. A. R. Kennedy.  

LA 261 Urban Archaeology (also CRP 261)  
Fall. 3 credits. S. Baugher. For description, see LA 261.  

LA 569 Archaeology in Preservation Planning and Design (also CRP 569)  
Spring. 3 credits. S. Baugher. For description, see LA 569.  

V. Relevant Courses at Ithaca College  
Contact Sherene Baugher in Landscape Architecture at sshb or the Ithaca College Anthropology Department at 607–274–1331 for further information or visit their web site at www.ithaca.edu/hs/anthro/  

Prehistory of South America. M. Malpass. Every other year.  
New World Complex Societies. M. Malpass. Irregular offering.  
World Prehistory. J. Rossen. Every semester.  
Ethnoarchaeology. J. Rossen. Every other year.  

ASIAN STUDIES  
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, literatures, 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 adviser 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 degree at Cornell may take a concentration in East Asia studies by completing at least 18 credits of coursework.  

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 taken through Cornell Abroad in East Asia. Students must have completed at least one year 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 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 Asian studies by completing at least 18 credits of course work in South Asian studies, including ASIAN 255-605 (Introduction to South Asia) and four courses or seminars at the intermediate or advanced levels, 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 Asia 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 program faculty. Such students are encouraged to commence work on a Southeast Asian language either at the 10-week intensive courses offered by the Southeast Asia Studies Summer Institute (SEASSI) or by studying for one semester at IKIP Malang, Indonesia; Khon Kaen University, Thailand; or Hanoi University, Vietnam; fellowships are available for undergraduates through the Cornell Abroad Program.

### Intensive Language Program (FALCON)

The FALCON Program offers intensive instruction in Japanese or Chinese. The program is available 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://cnel.illinois.edu/falcon and apply online.) Students may take the entire sequence of 160, 161, 162, or any other portion of the program if they have the necessary background (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 and others.

Cornell is affiliated with IUP, the Inter-University Program for Chinese Language Studies in Beijing (at Tsinghua University) and is a member of CIEE and IES, organizations sponsoring study abroad programs offering Chinese language instruction at several levels as well as courses in Chinese studies in the humanities and social sciences. Students may also study Chinese at China, Hong Kong, and Taiwan. The Chinese FALCON program includes a spring term in Beijing.

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 the 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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>ASIAN 125</td>
<td>Introduction to the Urdu Script (also URDU 125)</td>
<td>Spring. 4 credits. T. Loos, V. Kopschmann.</td>
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<tr>
<td>ASIAN 191</td>
<td>Introduction to Modern Asian History (also HIST 191) @ (III)</td>
<td>Fall. 4 credits. M. Shin.</td>
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<tr>
<td>ASIAN 192</td>
<td>Introduction to World Music: Asia (also MUSIC 104) @ (IV) (CA)</td>
<td>Fall. 3 credits. M. Hatcher.</td>
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<tr>
<td>ASIAN 206</td>
<td>The Occidental Tourist: Travel Writing and Orientalism in Southeast Asia (also HIST 207) @ (III)</td>
<td>Spring. 4 credits. T. Loos.</td>
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<tr>
<td>ASIAN 208</td>
<td>Introduction to Southeast Asia @ (III or IV) (CA)</td>
<td>Spring. 3 credits. T. Chaloemtiarana.</td>
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</table>

Asia both as the nation-states that have emerged since 1945 (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam) and as a larger cultural world extending from southern China to Madagascar and Polynesia. Students find a serious, organized introduction to a variety of disciplinary and topical approaches to this region, including geography, linguistics, history, religion and ideology, anthropology, marriage and family systems, music, literacy and literature, art, and architecture, agriculture, industrialization and urbanization, politics and government, warfare and diplomacy, ecological and human degradation, and business and marketing. The course teaches both basic information and different ways of interpreting that information.

### ASIAN 211 Introduction to Japan: Japanese Texts in History @ # (IV) (HA)

**Fall. 3 credits. B. deBary.**

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 eighteenth-century *Tale of Genji*, puppet theater, Ainu autobiography, and films and comic books dealing with themes of nuclear warfare.

### ASIAN 212 Introduction to China @ # (IV) (CA)

**Spring. 3 credits. K. Taylor.**

An interdisciplinary introduction to Chinese culture especially designed for students not majoring in Asian Studies. The class explores literature, history, religion, art and archaeology, and other aspects of China's rich and diverse heritage, from earliest times to the present.

### ASIAN 215 Introduction to South Asian Civilization @ (IV) (HA)

**Spring. 3 credits. A. Blackburn.**

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 multi-disciplinary 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)


### ASIAN 241 China's Literary Heritage: An Introduction in Translation @ # (IV) (LA)

**Fall. 3 credits. Not offered 2003–2004. D. X. Warner.**
ASIAN 245 Game in Indonesian History and Culture (also MUSIC 245) @ (IV) (LA)
Fall or spring. 3 credits. M. Hatch. See MUSIC 245 for description.

[ASIAN 249 Peddlers, Pirates and Prostitutes: Subaltern Histories of Southeast Asia, 1800–1900 (also HIST 249/648) @ # (III) (HA)

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)

[ASIAN 284 Southeast Asia in the World System: Capitalism and Incorporation, 1500–Present (also HIST 284) @ # (III)
See HIST 284 for description.]

ASIAN 293 History of China up to Modern Times (also HIST 293) @ # (III) (HA)
Spring. 4 credits. C. Peterson. See HIST 293 for description.

ASIAN 294 History of China in Modern Times (also HIST 294) @ (III) (HA)
Spring. 4 credits. Staff. See HIST 294 for description.

[ASIAN 298 The U.S.-Vietnam War (also HIST 298) @ (III) (HA)

[ASIAN 299 Buddhism (also RELST 290) @ # (IV) (CA)

[ASIAN 301 Schools of Thought-Ancient China @ (IV)

[ASIAN 302 Art of War in Ancient China @ (IV) (HA)
Fall. 4 credits. Not offered 2003–2004. 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 2003–2004. J. M. Law.]

ASIAN 307 Indian Dance (also DANCE 307)
Fall. 0-3 credits. D. Boucher. For description, see DANCE 307.

ASIAN 308 Indian Dance II (also DANCE 317, PE 161)
Fall. 0-3 credits. Students may receive 3 credits for attending additional Friday lecture and completing academic requirements. G. Pradhan. The continuation of ASIAN 307/DANCE 307, Odissi Classical Dance. Emphasis is mainly on choreography as well as continuing to refine and perfect the basic movements learned in the preliminary course. Guru Pradhan will explore the nine rasas or emotions used in dramatic dance based on the teaching of the ancient text the "Natyasastra." Meets twice weekly for movement classes.

ASIAN 312 Intellectuals in Early Modern Korea @ # (IV) (HA)
Fall. 4 credits. Prerequisite: one course on modern Japan or Korea. M. Shin. An introduction to early modern Korean history (mid 19th century to the Korean War) through a survey of its major intellectuals. The course will give an overview of the political and socio-economic background that gave rise to these intellectuals and then examine how they commented on the conditions of their times. All readings in English.

ASIAN 315 Japanese Cinema and the City (also VISST 315 and FILM 326)
Spring. 4 credits. No knowledge of the Japanese language or prior course work in cinema are required. A. Freedman. Centering on depictions of the city, this introduction to Japanese film explores important movements and major directors from early cinema to anime. The class will analyze form and genre and discuss how filmmakers represented the Japanese city, its social problems, and diverse population.

ASIAN 328 Construction of Modern Japan (also HIST 328) @ (III)
Spring. 4 credits. J. V. Koschmann. For description, see HIST 328.

[ASIAN 347 Tantric Traditions (also RELST 347) @ # (IV) (CA)

[ASIAN 348 Indian Devotional Poetry (also RELST 348) @ # (IV) (LA)

[ASIAN 351 Indian Religious Worlds (also RELST 351) @ (IV) (CA)

[ASIAN 354 Indian Buddhism (also RELST 354) @ # (IV) (HA)

[ASIAN 355 Japanese Religions (also RELST 355) @ (IV) (CA)

[ASIAN 356 Theravada Buddhism (also RELST 363) @ (IV) (CA)
Fall. 4 credits. Not offered 2003–2004. A. Blackburn.]

[ASIAN 357 Chinese Religions (also RELST 357)

[ASIAN 358 Japanese Buddhism: Texts in Context (also RELST 358) @ # (IV) (HA)
Spring. 4 credits. J. M. Law. We focus on six figures in Japanese Buddhism: Saicho (767–822), Kukai (774–835), Honen (1133–1212), Nichiren (1222–1282), Dogen (1200–1253) and Hakuin (1686–1769), studying their lives, writings, core practices and doctrines, and a central religious dynamic the work of each embodies: establishment of a Mahayana ordination, esoteric practice, the popularization of Buddhism, Buddhist pro-nationalist ideologies, and establishment of Zen meditation as iconic "Japanese" Buddhism.

ASIAN 373 Twentieth-Century Chinese Literature @ (IV) (LA)
Fall. 4 credits. E. Dunn. A survey of the principal works in English translation, the course introduces fiction, drama, essays, and poetry of China beginning with the Republican era and continuing up to the present in the People’s Republic and Taiwan, with attention to social and political issues and literary theory.

[ASIAN 374 Chinese Narrative Literature (also COM 374) @ # (IV) (LA)

[ASIAN 380 Vietnamese Literature in Translation @ # (IV) (LA)

ASIAN 381 Introduction to the Arts of Japan (also ART H 384) @ # (IV) (LA)
Fall. 4 credits. A. Pan. See ART H 384 for description.

[ASIAN 383 Introduction to the Arts of China (also ART H 380 and ARKEO 380) @ # (IV) (LA)

[ASIAN 384 Representation and Meaning in Chinese Painting (also ART H 385) @ # (IV) (CA)
Spring. 4 credits. A. Pan. See ART H 385 for description.]

[ASIAN 385 History of Vietnam (also HIST 388/688) @ # (IV) (HA)
Fall. 4 credits. K. Taylor. This course is a survey of Vietnamese history and culture from earliest times to the present. Graduate students may enroll and attend a seminar section.]

[ASIAN 388 Theorizing Gender and Race in Asian Histories and Literatures (also ASIAN 688 and COM L 398/698) @ # (IV) (CA)
Fall. 4 credits. N. Sakai. This course offers a series of discussions on (1) the historically specific modes of sexism and racism in Japan and East Asia, (2) the
mutual implication of sexism and racism in various contexts, (3) the roles of gender and race in the production of knowledge about Japan and East Asia, and (4) the conceptions of gender and race in the social formations particular to East Asia.

[ASIAN 390] The Sanskrit Epics (also CLASS 390) @ (IV) [LA]
C. Minkowski.

[ASIAN 392] Cosmology and Divination in Antiquity (also CLASS 392 and NES 392) @ # (IV) [HA]
C. Minkowski.

[ASIAN 394] The House and the World: Architecture of Asia (also ART H 395) @ # (IV) [LA]
K. McGowan.
See ART H 395 for description.

[ASIAN 395] Classical Indian Philosophical Systems (also CLASS 395 and RELST 395) @ # (IV) [KCM]
Spring. 4 credits. Prerequisite: some background in philosophy of or in classical culture. Not offered 2003–2004.
C. Minkowski.

[ASIAN 396] Southeast Asian History from the Eighteenth Century (also HIST 396) @ (III) [HA]
Spring. 4 credits. T. Loos.
See HIST 396 for description.

[ASIAN 406] The Sacred in Secular India (also S HUM 406) @ # (IV) [LA]
Fall. 4 credits. D. Gold.
See S HUM 406 for description.

[ASIAN 410] Chinese Film (also VISST 410) @ (IV) [LA]
Spring. 4 credits. E. Gunn.
The course surveys Chinese films from the 1920s to the present and various responses to them. Films from mainland China, Hong Kong, and Taiwan are included, together with critical studies employing a variety of different critical methods.

[ASIAN 411] History of the Japanese Language (also LING 411 and JAPAN 410) @ # (III) [HA]
J. Whitman.
See LING 411 for description.

[ASIAN 412] Linguistic Structure of Japanese (also LING 412) (III) [KCM]
J. Whitman.
See LING 412 for description.

[ASIAN 413] Religion and Politics in Southeast Asia (also ANTHR 413) @ # (III)
Spring. 4 credits. A. Willford.
See ANTHR 413 for description.

[ASIAN 414] Second Language Acquisition I (also LING 414) (III) [KCM]
Y. Shirai.
See LING 414 for description.

[ASIAN 415] Virtual Orientalisms (also S HUM 415 and COM 418)
B. de Bary.

[ASIAN 416] Undergraduate Seminar on Gender and Sexuality in Southeast Asian History (also HIST 416) @ (III) [CA]
Spring. 4 credits. T. Loos.
See HIST 416 for description.

[ASIAN 417] Second Language Acquisition II (also LING 415) (III) [KCM]
Y. Shirai.
See LING 415 for description.

[ASIAN 421] Religious Reflections on the Human Body (also RELST 422) (IV) [KCM]
Spring. 4 credits. Prerequisite: one course in Religious Studies or permission of instructor. J. M. Law.
We study understandings of and ideologies about the body as it defines parameters of religious experience and expression, reading from cultural anthropology, history of religions, philosophy, and psychoanalysis, with cases from Japan. Kukai's formulation of the body in Shingon Buddhism, the body in ascetic and shamanic practice, ritual purity systems, illness and healing, the body in spiritual cultivation and ritual practice. Comparative cases will also be examined.

[ASIAN 425] Theories of Civilization (also HIST 494) @ # (III or IV) [HA]
K. Taylor.

[ASIAN 430] Structure of Korean (also LING 430 and KOREA 430) (III) [KCM]
J. Whitman.
See LING 430 for description.

[ASIAN 438] Monks, Texts, and Relics: Transnational Buddhism in Asia (also ASIAN 638 and RELST 438) (IV) [CA]
Spring. 4 credits. Prerequisite: one previous 300-level or above course in ASIAN or RELST or permission of the instructor. Not offered 2003–2004.
A. Blackburn.

[ASIAN 441] Mahayana Buddhism (also RELST 441) @ # (IV) [CA]
D. Boucher.

[ASIAN 444] Youth in Japanese Literature and Culture (also VISST 444) (IV) [LA]
Fall. 4 credits. All readings in English. No knowledge of Japanese language is required. A. Freedman.
Through analysis of literature, film, and popular culture from the nineteenth century to the present, this seminar examines the images and lives of Japanese boys and girls and the social and political implications of their representation. The class also explores how youth expressed disapproval and initiated change through cultural movements.

[ASIAN 445] 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 2003–2004.
M. Shin.

[ASIAN 446] History and Methods of the Academic Study of Religion (also RELST 449) @ (III) [KCM]
Spring. 4 credits. Prerequisite: 1 course satisfying the religious studies major.
D. Boucher.
This course provides advanced students in Religious Studies or the humanities familiarity with important methodological issues in the academic study of religion. Following a brief historical outline, we survey major approaches to the academic study of religion currently used and discussed in Religious Studies. We read works from the following approaches to the study of religion: anthropology, philosophical hermeneutics, phenomenology, history of religions, the sociology of religion and critical ideological studies. In the final segment of the class, we focus on recent developments in the field of Religious Studies.

[ASIAN 450] Crime and Diaspora in Southeast Asian History (also HIST 451) @ # (III)
T. Loos.
See HIST 451 for description.

[ASIAN 460] Indian Meditation Texts (also RELST 460) @ # (IV) [KCM]
D. Gold.

[ASIAN 462] Religion, Colonialism, and Nationalism in South and Southeast Asia (also ASIAN 662 and RELST 462) (IV) [CA]
Spring. 4 credits. Prerequisite: one previous course in ASIAN, RELST, HIST, ANTH at 300 level or above or permission of instructor. Not offered 2003–2004.
A. Blackburn.

[ASIAN 476] Senior Seminar: Comparative Colonial Law and Society (also HIST 476 and FGSS 476) @ (III)
T. Loos.
See HIST 476 for description.

[ASIAN 479] Art of the T'ang Dynasty (also ART H 481) @ # (IV)
A. Pan.
See ART H 481 for description.

[ASIAN 481] Translation and Identities @ (IV) [KCM]
N. Sakai.

[ASIAN 482] Seminar: Gender Adjudicated (also HIST 480) @ # (III)
T. Loos.
See HIST 480 for description.

[ASIAN 483] Internationalism, Nationalism, and Modern Japanese Discursive Space @ (III) [KCM]
N. Sakai.

[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 2003–2004.
J. M. Law.
[ASIAN 491 Art and Collecting: East and West (also ART H 490) @ IV (CA)]

[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. See HIST 492 for description.

[ASIAN 493 Problems in Modern Chinese History (also HIST 493/693) @ III (HA)]
Fall. 4 credits. S. Cochran. See HIST 493 for description.

[ASIAN 494 Problems in Modern Chinese History (also HIST 499/694) @ III (HA)]

[ASIAN 495 Problems in Asian Art: Body, Memory, and Architecture (also 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)]
Fall. 4 credits. T. Chaloemtiarana, T. Loos. This seminar tackles the issues that dominate the political, sociocultural, economic, and historic landscape of Thailand. It will ask where this colonized country "fits" in the scholarship on (post)coloniality, globalization, and development. We read both the classics and contemporary works on Thailand spanning the fields of the humanities and social sciences. The seminar is created for upper-level undergraduates and graduate students and will provide an important pivot point for comparativists and those in interdisciplinary studies examining countries in Asia and the developing world.

[ASIAN 602 Southeast Asia Seminar]
Spring. 4 credits. Staff.

[ASIAN 603 Southeast Asia Topical Seminar: Sociology of Natural Resources and Development (also R SOC 607)]

[ASIAN 604 Southeast Asia Topical Seminar]

[ASIAN 605-606 Master of Arts Seminar in Asian Studies (also ASIAN 609)]
605, Fall; 606, Spring. 2-4 credits. Staff.

[ASIAN 610 SLA and the Asian Languages (also LING 609)]

[ASIAN 612 Japanese Bibliography and Methodology]
Fall. 1 credit. Prerequisite: permission of instructor. Required of honors students and M.A. candidates. P. Rotas.

[ASIAN 613 Southeast Asian Bibliography and Methodology]
Fall. 1 credit. Prerequisite: permission of instructor. A. Riedy.

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 arcan 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 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 626 The 18th Century and the Emergence of Literacy Modernity]

[ASIAN 639 Monks, Texts, and Relics: Transnational Buddhism in Asia (also RELST 430)]
Spring. 4 credits. Prerequisites: one previous 300 level or above course in ASIAN or RELST or permission of the instructor. Not offered 2003-2004. A. Blackburn.

[ASIAN 648 Paddlers, Pirates, and Prostitutes: Subaltern Histories of Southeast Asia, 1800-1900 (also HIST 249/648)]

[ASIAN 650 Seminar in Asian Religions]
Fall. 4 credits. Graduate students only. Limited to 10 students. Required of at least one Southeast Asian language or other Asian language (especially Chinese or Japanese) while also drawing upon 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 651 Southeast Asian History (also HIST 487/687)]
Fall. 4 credits. T. Chaloemtiarana, T. Loos. This seminar is designed to help students explore these genres in the primary languages (Sanskrit or Chinese) while also drawing attention to the scholarship on them.

[ASIAN 654 Indian Buddhism]
Fall. 4 credits. Graduate students attend ASIAN 354 and arrange additional meetings with instructor. Not offered 2003-2004. D. Boucher.

[ASIAN 655 Problems in Modern Chinese History (also HIST 493/693)]
Fall. 4 credits. S. Cochran. See HIST 493 for description.

[ASIAN 662 Religion, Colonialism, and Nationalism in South and Southeast Asia (also RELST 462)]
Spring. 4 credits. Prerequisites: one previous course in ASIAN, RELST, HIST, ANTH at 300 level or above or permission of instructor. Not offered 2003-2004. A. Blackburn.

[ASIAN 676 Southeast Asia Reading Seminar: Thai Political Novel]

[ASIAN 684 Southeast Asia in the World System: Capitalism and Incorporation, 1500-Present (also HIST 284/684)]

[ASIAN 685 History of Vietnam (also HIST 389/688)]
Fall. 4 credits. K. Taylor. This course is a survey of Vietnamese history and culture from earliest times to the present. Graduate students may enroll and attend a seminar section.

[ASIAN 686 Theorizing Gender and Race in Asian Histories and Literature]
Fall. 4 credits. Students enrolling in ASIAN 686 must have a reading knowledge of Japanese. N. Sakai. See ASIAN 388 for description.

[ASIAN 687 Problems in Modern Chinese History (also HIST 499/694)]
Fall. 4 credits. S. Cochran. See HIST 493 for description.

[ASIAN 688 Theorizing Gender and Race in Asian Histories and Literature]
Fall. 4 credits. Students enrolling in ASIAN 688 must have a reading knowledge of Japanese. N. Sakai. See ASIAN 388 for description.

[ASIAN 696 Modern Southeast Asia: Graduate Proseminar (also HIST 396/696)]
Spring. 4 credits. T. Loos. See HIST 396 for description.

[ASIAN 701-702 Seminar in East Asian Literature]
701, Fall; 702, Spring. 1-4 credits. Staff.

[ASIAN 703-704 Directed Research]
703, Fall or Spring; 704, Fall or Spring. 1-4 credits. Staff.

[ASIAN 705 Crosslinguistic Topics—Language Acquisition (also LING 700.2)]
This course complements the verbal skills writing skills. Reading and Conversation, by improving developed in BENGL 201-202, Intermediate when immersed in the environment and/or to enable students to interact productively language. carry out research in primary material in the

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
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<tbody>
<tr>
<td>BENGL 201-202 Intermediate Reading and Conversation</td>
<td>Prerequisites: for BENGL 201, BENGL 122 or examination. D. Mookerjea-Leonard. The emphasis is on basic grammar, speaking, and comprehension skills; Bengali script is also introduced.</td>
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<tr>
<td>BENGL 203-204 Intermediate Bengali Composition and Conversation</td>
<td>Prerequisites: for BENGL 203, BENGL 122 or examination. D. Mookerjea-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.</td>
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<tr>
<td>BENGL 300 Directed Studies</td>
<td>Prerequisites: permission of instructor. D. Mookerjea-Leonard.</td>
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Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**BURM 103-104 Burmese Conversation Practice**

103, fall, 104, spring. 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**

121, fall, 122, spring. 4 credits each term. BURM 122 provides language qualification. Prerequisite: for BURM 122, BURM 121. 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**

201, fall or spring; 202, fall or spring. 3 credits each term. BURM 201 provides language proficiency and satisfies Option 1. Prerequisites: for BURM 201, BURM 123; for BURM 202, BURM 201. 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. S. Tun.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**BURM 301-302 Advanced Burmese**

301, fall or spring; 302, fall or spring. 3 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 will 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.

**BURM 303-304 Advanced Burmese II**

303, fall or spring; 304, fall or spring. 3 credits each term. Prerequisite: for BURM 303, BURM 202 or permission of instructor; for BURM 304, BURM 303. S. Tun.

This is a course for students who have good conversational ability in Burmese and some familiarity with Burmese culture, but who need to strengthen reading skills and further enrich their vocabulary. Students, in consultation with the instructor, are able to select reading materials. There is also an opportunity for those who need it, to strengthen listening skills, through the study of current films, TV, and radio programs in Burmese.

**CHIN 101-102 Elementary Standard Chinese (Mandarin)**

101, fall; 102, spring. 6 credits each term. Prerequisite: CHIN 101, or equivalent. Letter grades assigned unless student receives exceptional permission from the course coordinator for S/U. You must enroll in lecture and 1 section. Since each section is limited to 10-12 students, students missing the first 2 class meetings without a university excuse are dropped, so others may register. No student will be added after the second week of classes. Satisfactory completion of CHIN 102 fulfills the qualification portion of the language requirement. S. Hoare and staff.
A course for beginners only, providing a thorough grounding in conversational and reading skills. Students with some facility in the spoken language (because Chinese is spoken at home) but who do not read characters should take 109-110. Students who read Chinese, but who speak 'dialects,' such as Cantonese or Amoy, should enroll in CHIN 215.

CHIN 109-110 Beginning Reading and Writing (Standard Chinese) 109, fall or spring. 4 credits each term. 
**CHIN 110 provides language qualification.** Prerequisites: must have permission of instructor to enroll. Students who complete CHIN 110 normally continue with CHIN 209 and 210. Because of high demand 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: CHIN 110. May not register. F. Lee Mehta.

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 focusing on daily life topics. Written training includes reading aloud and writing Cantonese characters and the skills to write simple compositions in Cantonese characters.

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 focusing on daily life topics. Written training includes reading aloud and writing Cantonese characters and the skills to write simple compositions in Cantonese characters.

CHIN 213-214 Intermediate Reading and Writing for Cantonese Speakers 213, fall; 214, spring. 4 credits each term. Prerequisite: permission of instructor. Staff.

A course intended primarily for students who are Cantonese speakers (e.g., at home) and have basic formal training in reading and writing Chinese characters, or students who have equivalent abilities. H. Huang.

Chin 111 teaches Cantonese as spoken in Canton and Hong Kong for beginners who have no Chinese language background. CHIN 111-112 gives comprehensive training in oral/aural skills and reading/writing in Cantonese. CHIN 111 focuses primarily on oral/aural skills.

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. Y. Wang.

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 100 or equivalent; CHIN 210, CHIN 209. After completing 210, students must only take 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 Mandarin 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 Mandanese from heritage but have very limited formal training in Mandarin character reading and writing. For 212, CHIN 211 or equivalent. H. Huang.

A course that gives comprehensive training in oral and written Mandarin at a higher level than CHIN 111-112. Oral training covers conversational Mandarin expression focusing on daily life topics. Written training includes reading aloud and writing Mandarin characters and the skills to write simple compositions in Mandarin Chinese.

CHIN 215 Mandarin for Cantonese Speakers 215, fall. 4 credits. Prerequisite: Advanced Mandarin with a native-like reading and writing ability. T. H. Huang.

A course intended primarily for students who are Cantonese speakers (e.g., at home) and have basic formal training in reading and writing Chinese characters, or students who have equivalent abilities. H. Huang.

CHIN 300 Directed Studies 300, fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. Staff.

A course intended primarily for students who are Cantonese speakers (e.g., at home) and have basic formal training in reading and writing Chinese characters, or students who have equivalent abilities. H. Huang.

CHIN 301-302 High Intermediate Chinese 301, fall; 302, spring. 4 credits each term. 
**CHIN 301 provides language proficiency and satisfies Option 1.** Staff.

Continuing instruction in spoken Chinese and in various genres and styles of written Chinese.

CHIN 304 Advanced Mandarin Conversation 304, spring. Prerequisite: CHIN 202, CHIN 215, CHIN 301, or permission of instructor. Limited to 10 students. Staff.

A course intended primarily for students who are Cantonese speakers (e.g., at home) and have basic formal training in reading and writing Chinese characters, or students who have equivalent abilities. H. Huang.

CHIN 411-412 Advanced Chinese: Fiction, Reportage, Current Events 411, fall; 412, spring. 4 credits each term. Prerequisite: CHIN 411, CHIN 302 or equivalent; for CHIN 412, CHIN 411 and permission of instructor required. Q. Teng.

A course that gives comprehensive training in oral and written Mandarin at a higher level than CHIN 111-112. Oral training covers conversational Mandarin expression focusing on daily life topics. Written training includes reading aloud and writing Mandarin characters and the skills to write simple compositions in Mandarin Chinese.

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


Introduction to spoken and written Mandarin. Lectures on linguistic and cultural matters, intensive practice with native speakers, and laboratory work. Students who complete this course with a grade of at least B are normally eligible to enroll in CHIN 201.

CHIN 161-162 Intensive Mandarin 161, fall; 162, spring. 16 credits each term. 
**CHIN 161 provides language proficiency and satisfies Option 1.** Prerequisites: for CHIN 161, CHIN 160 or equivalent or permission of instructor; for CHIN 162, CHIN 161 or placement by FALCON staff prior to beginning of spring term. Students must apply formally to the program, and must apply no later than 16 weeks before the first day of class. Students who complete this course with a grade of at least B are normally eligible to enroll in CHIN 201.

A course intended primarily for students who are Cantonese speakers (e.g., at home) and have basic formal training in reading and writing Chinese characters, or students who have equivalent abilities. H. Huang.

CHIN 411-412 Advanced Chinese: Fiction, Reportage, Current Events 411, fall; 412, spring. 4 credits each term. Prerequisite: CHIN 411, CHIN 302 or equivalent; for CHIN 412, CHIN 411 and permission of instructor required. Q. Teng.

A course that gives comprehensive training in oral and written Mandarin at a higher level than CHIN 111-112. Oral training covers conversational Mandarin expression focusing on daily life topics. Written training includes reading aloud and writing Mandarin characters and the skills to write simple compositions in Mandarin Chinese.
__Literature in Chinese__

**CHLIT 213-214 Introduction to Classical Chinese @ (LA)**

213, fall; 214, spring. 3 credits each term. Provides language proficiency and satisfies Option I. Prerequisite: qualification in Chinese or permission of instructor. May be taken concurrently with CHIN 101-102, 201-202, 301-302. D. Zhang.

This is a two-part introductory course. Students will learn the fundamental grammar and vocabulary of classical Chinese by analyzing and translating short passages. The course is open to students who have studied at least two years of any language that employs the Chinese writing system (e.g., Mandarin, Cantonese, Japanese).

**CHLIT 300 Reading from the Early Masters @ # (HA)**

Fall. 4 credits. Prerequisites: CHLIT 213-214 or permission of instructor. Not offered 2003-2004. R. McNeal.

**CHLIT 307 Readings in Classical Chinese Literature @ (IV) (LA)**

Spring. 4 credits. Prerequisite: CHLIT 214 or permission of instructor. D. X. Warner.

This course surveys selected texts—primarily in prose—from the ancient and medieval periods. Through close reading, students expand their knowledge of the diction, syntax, and nuances of classical Chinese, as well as the various genres, themes, and literary styles that were foundational for the later Chinese literary tradition.

**CHLIT 421-422 Directed Study**

Fall or spring. 2-4 credits each term.

Prerequisite: permission of instructor. Staff.

Students choose a faculty member to oversee this independent study. The student and the faculty member work together to develop course content.

**CHLIT 423 Readings in Chinese History @**

Fall. 4 credits. Satisfies Option I. Y. Wang. Topic: Fall 2003: Modern Approaches to China's Past. The main purpose of this class is to read articles that introduce major figures, events, and findings in the development of the fields of Chinese historical studies and archaeology. Learning to read in these two fields, students will deepen their knowledge of Chinese history and interpretive approaches to China's past.

**CHLIT 425 Chinese Buddhist Texts @ # (IV)**

Fall. 4 credits. Prerequisite: 1 year of classical Chinese or permission of the instructor. Not offered 2003-2004. D. Boucher.

**CHLIT 497 Disjunctive: Text and Exegesis @ (IV) (LA)**

Spring. 4 credits. Prerequisite: permission of instructor. Students should have completed the equivalent of CHLIT 214 and any CHLIT course at the 300 level. Not offered 2003-2004. R. McNeal.

**CHLIT 603 Seminar in Chinese Fiction and Drama**

Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. E. Gunn.

**CHLIT 605 Seminar in Chinese Fiction and Drama**

Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. Staff.

**CHLIT 610 Chinese Cultural Criticism**


**CHLIT 615 Seminar: Ideas and Literature of Medieval China**


**CHLIT 618 Seminar on Ancient China**

Fall. 4 credits. Also fulfills Humanities requirement. Prerequisite: CHLIT 213-214 or permission of instructor. Not offered 2003-2004. R. McNeal.

**CHLIT 621-622 Advanced Directed Reading: Chinese Historical Syntax**

621, fall; 622, spring. 2-4 credits. Prerequisite: permission of instructor. Staff. Students choose a faculty member to oversee this independent study. The student and the faculty member work together to develop class readings.

**CHLIT 697 Disjunctive: Text and Exegesis**

Spring. 4 credits. Prerequisite: permission of instructor. Staff. Students should have completed the equivalent of CHLIT 214 and any CHLIT course at the 300 level. Not offered 2003-2004. R. McNeal.

__Indonesian__

For students who have completed INDO 121-122 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 information is available from the Southeast Asia Program (180 Uris Hall, 255-2378).

**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 sharps 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 I. Prerequisites: for INDO 203, INDO 123; for INDO 204, INDO 203 or permission of instructor. Not offered 2003-2004. T. Savella and staff.
JAPAN 101-102 Elementary Japanese
101, fall; 102, spring. 6 credits each term.
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.

A thorough grounding in all four language skills—speaking, hearing, reading, writing—at the beginning level, 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 in the language lab with tapes or CD-ROM. 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 for the course is largely written exercises. Fewer class sessions than JAPAN 101-102; the course meets five hours per week (MTWRF).

Materials covered are not the same as JAPAN 101-102.

JAPAN 201-202 Intermediate Japanese Conversion
201, fall and summer; 202, spring and summer. 4 credits each term. JAPAN 201 provides language proficiency and satisfies Option I. Prerequisites: for JAPAN 201, JAPAN 102 or placement by the instructor during registration; for JAPAN 202, JAPAN 201 and 205 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 205.

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
203, fall; 204, spring. 2 or 3 credits each term. JAPAN 203 provides language proficiency and satisfies Option I.

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. Y. Kawasaki.

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 I. Prerequisites: for JAPAN 241, JAPAN 142 or placement by instructor during registration; for JAPAN 242, JAPAN 241 or placement by instructor. Y. Kawasaki.

Training in listening, 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.
Prerequisites: 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 I. 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.

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
303, fall; 304, spring. 4 credits each term. JAPAN 303 satisfies Option I. 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 conference participants. Conducted entirely in Japanese, using Japanese audiovisual and written materials.

JAPAN 403-404 Advanced Japanese
403, fall; 404, spring. 4 credits each term. Prerequisite: JAPAN 304 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. 3 credits. Prerequisite: permission of instructor. Not offered 2003-2004. 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 (Full-year Asian Language Concentration)

Director: R. Sukle, 388 Rockefeller Hall;
FALCON 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 which begins at the absolute beginning level, in speaking as well as in 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 rjs1@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, JAPAN 160, 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 one 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 2003-2004. N. Sakai.

**JPLIT 614 Seminar in Modern Japanese Literature: Reading "Japan" in a Digital Age (also COM L 695)**

Spring. 4 credits. Prerequisite: permission of instructor. B. de Bary.

How might postmodern debates on language and difference transform our understanding of the project of cross-cultural learning institutionalized in postwar America area studies? Intended as an introductory course for graduate students, this class emphasizes weekly close readings of important primary texts which have grappled with, or attempted to challenge, epistemological assumptions, categories, and processes which have informed modern disciplinary knowledge of cultural others. Readings will include texts by Rey Chow, James Clifford, Jacques Derrida, Gayatri Spivak, and others.

**JPLIT 617 Modern Japanese Philosophy**


**JPLIT 618 Japanese Philosophical Discourse II**

Fall. 4 credits. Prerequisites: reading knowledge of Japanese. N. Sakai.

Students will read, analyze, and evaluate the philosophical discourse of modern Japan in conjunction with contemporary European and American developments. The main concern of this course is the operation of "comparison." The seminar is neither a search for the national (or oriental) character of Japanese philosophy nor a project of explaining national (or oriental) character of Japanese philosophy nor a project of explaining national character of Japanese philosophy nor a project of explaining national character of Japanese philosophy nor a project of explaining national character of Japanese. Readings will include texts by Gayatri Spivak, and others.

**JPLIT 624 Advanced Readings in Modern Japanese Literature**

Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. 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**

700, fall; 701, spring. 4 credits. Not offered 2003-2004. N. Sakai.

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**KHMER 121-122-123 Elementary Khmer**

Fall, 122, spring. 123 fall; 4 credits each term. **Completion of KHMER 123 provides language qualification.** Prerequisite: for KHMER 122, KHMER 121; 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 201 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 2003-2004. 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. 4 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 2003-2004. Staff.

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**KOREAN**

**KOREA 101-102 Elementary Korean**

101, fall, 102, spring. 6 credits each term. **KOREA 102 provides language qualification.** H. Diffoth 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. Diffoth and staff.

This course is for students who have spoken some Korean in the 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.

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)]


J. Whitman.

See description under LING 430.

Literature in Korean

[KRLIT 305 Modern Korean Literature in Translation (IV)]

Spring. 4 credits. Prerequisite: ASIAN 218 or its equivalent. Not offered 2003–2004.

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.

Reading of a variety of prose works in modern Korean. Assignments are chosen from newspapers, magazines, short stories, novels, and academic texts.

[KRLIT 432 Middle Korean (also LING 432) (VI) (LA)]

Spring. 4 credits. Prerequisite: KOREA 301 for beginners. J. Whitman.

For description, see LING 432.

KRLIT 617 Colonial Modernity in Korea

Spring. 4 credits. Prerequisites: fluency in Korean and permission of instructor. M. Shin.

This course examines the nature of colonial modernity in Korea, its effects on the economy, society and resistance movements, and intellectual responses to it. The objective is to analyze the relation between colonialism and capitalist development and the roots of Korea’s division. Readings will involve theoretical works, contemporary scholarship, and primary source materials.

Nepali

The Cornell Nepal Study Program

Cornell and the central campus of Tribhuvan National University (in Kritipur, Kathmandu) cosponsor a semester or year in Nepal at the Cornell Nepal Study Program for both undergraduate and graduate students. North American students live and study with Nepali students at the Cornell program houses near the university, taking courses taught in English by faculty from Tribhuvan University. After an intensive orientation, semester courses include intensive spoken and written Nepali language, contemporary issues in Nepal, and Research Design and Methods in a wide variety of fields in the social and natural sciences and the humanities. (Language instruction in Tibetan and Newari may also be arranged.) There is a ten-day study tour and field trip during the term, and students execute their research proposal during four weeks of guided field research, writing up their findings for presentation at the end of the term.

Juniors, seniors, and graduate students from any field may apply. Students should have a desire to participate in a program featuring relatively intense cultural immersion and to undertake rigorous field research. Instruction is in English, but prior study of Nepali language is strongly recommended for Cornell students. Those interested in the program should consult Cornell Abroad (cubroad@cornell.edu).

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.

This language series cannot be used to satisfy the language requirement. Not offered 2003–2004.

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 needs. Reading and writing practice use both colloquial and scholarly materials in the Nepali (Devanagari) script.

NEPAL 201-202 Intermediate Nepali

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. A. Blackburn.

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

[PAI 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 2003–2004. Staff.

Pali 151 Accelerated Elementary Pali

Spring. 3 credits. Prerequisites: prior background in Sanskrit or permission of the instructor. A. Blackburn.

An accelerated one-semester introduction to Pali that assumes prior study of Sanskrit (normally at least one year). Readings include textbook sections and original texts, beginning with simple prose.

Pali 300 Directed Studies

Fall or spring. 1–4 credits variable.

Prerequisite: PALI 152, PALI 131 or two years of Sanskrit. D. Boucher or 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)

131, fall; 132, spring. 4 credits each term.

SANSK 132 provides language qualification. Offered alternate years. Staff.

An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.

[SANSK 251-252 Intermediate Sanskrit (also CLASS 291-292 and LING 251-252) © IV]

251, fall; 252, spring. 3 credits each term.

**Literature in Sanskrit**

[SNILIT 467-468 Reading in Sanskrit Literature: The Vedas @]

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**Sinhala (Sinhalese)**

**SINHA 101-102 Elementary Sinhala**
101, fall; 102, spring: 6 credits each term.
SINHA 102 provides language qualification. Prerequisite: for SINHA 102, SINHA 101 or equivalent. Staff.
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.
Emphasis is on the spoken (colloquial) language, the writing system is introduced and used to present all Sinhala materials, with additional reading practice with colloquial materials. A foundation is laid for later study of the written language (literary Sinhala).

**SINHA 201-202 Intermediate Sinhala**
201, fall; 202, spring: 3 credits each term.
SINHA 201 provides language proficiency and satisfies Option I. Prerequisites: for SINHA 201, SINHA 102; for SINHA 202, SINHA 201 or equivalent. Staff.

**[SINHA 203-204 Intermediate Composition and Conversation @]**
203, fall; 204, spring: 3 credits each term.
SINHA 203 provides language proficiency and satisfies Option I. Prerequisites: for SINHA 203, SINHA 102 or permission of instructor; for SINHA 204, SINHA 203 or equivalent. Not offered 2003-2004. Staff.

**SINHA 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.

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**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 I. 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.

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**Thai**

**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. Intended for beginners or students placed by examination.
N. Jagacinski.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

**THAI 201-202 Intermediate Thai Reading @**
201, fall; 202, spring: 3 credits each term.
THAI 201 provides language proficiency and satisfies Option I. Prerequisites: for THAI 201, THAI 102; for THAI 202, THAI 201 or equivalent. N. Jagacinski.
Continuing instruction in spoken and written Thai.

**THAI 203-204 Intermediate Composition and Conversation @**
203, fall; 204, spring: 3 credits each term.
THAI 203 provides language proficiency and satisfies Option I. 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. Staff. Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**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 I. Prerequisites: for VIET 201, VIET 102 or equivalent; for VIET 202, VIET 201. T. Tranviet.
Continuing instruction in spoken and written Vietnamese.

**VIET 301-302 Intermediate Vietnamese Composition and Reading @**
203, fall; 204, spring: 3 credits each term.
VIET 203 provides language proficiency and satisfies Option I. Prerequisite: permission of instructor only. T. Tranviet.
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.

**URDU 125 Introduction to the Urdu Script (also ASIAN 125)**
Spring: 1 credit. Prerequisite: HINDI 101 or permission of instructor. Satisfactory completion of URDU 125 fulfills the qualification portion of the language requirement. 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.

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**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 I. Prerequisites: for VIET 201, VIET 102 or equivalent; for VIET 202, VIET 201. 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 I. Prerequisite: permission of instructor only. T. Tranviet.
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.

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**ASIAN STUDIES 461**

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**Urdu**

See also listings under HINDI/ASIAN 125.

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**URDU 125 Introduction to the Urdu Script (also ASIAN 125)**
Spring: 1 credit. Prerequisite: HINDI 101 or permission of instructor. Satisfactory completion of URDU 125 fulfills the qualification portion of the language requirement. 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 Literature**

**VTLIT 222-223 Introduction to Classical Vietnamese @**
222, fall, 223, spring. 3 credits. **VTLIT 222 provides language proficiency and satisfies Option 1.** Prerequisite: qualification in Vietnamese or permission of instructor. K. Taylor.

This is a two-semester sequence of courses introducing students to Han (Classical Chinese as used in the Vietnamese language) and Nom (vernacular Vietnamese character writing). Students learn to read Han and Nom texts, mostly from the seventeenth through nineteenth centuries, including historical records, prose writings, and poetry.

**VTLIT 224 Continuing Classical Vietnamese @**

**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**

ANTHR 374 Human Palaeontology
AEM 464 Economics of Agricultural Development (also ECON 464)
AEM 667 Topics in Economic Development (also ECON 770)
COMM 424/624 Communication in the Developing Nations
ECON 473 Economics of Export-Led Development
GOVT 674 Theory and Practice of Nationalism
HIST 190 Introduction to Asian Civilization
HIST 495 Kings and States: Asian Models
ART H 280 Introduction to Art History: Approaches to Asian Art
ILRIC 637 Labor Relations in Asia
R 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 339 Elements, Principles, and Theories in Japanese Architecture
GOVT 642 Comparative Political Economy: East and Southeast Asia
[HIST 230 Japan and the Pacific War]
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 798 Seminar in Japanese Thought
ILRHR 656 International Human Resource Management
[MUSIC 481 Japanese Music: Style and Tradition]

**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 673)]
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 335 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 Special Problems
GOVT 642 Comparative Political Economy: East and Southeast Asia
HIST 244 History of Slam and Thailand
HIST 395 Southeast Asian History from the Eighteenth Century
HIST 695 Early Southeast Asia: Graduate Proseminar
HIST 696 Modern Southeast Asia: Graduate Proseminar
HIST 795-796 Seminar in Southeast Asian History
ART H 490 Art and Collecting: East and West
MUSIC 245 Gamelan in Indonesian History and Cultures
MUSIC 445-446 Cornell Gamelan Ensemble
MUSIC 604 Ethnomusicology

**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, periodicals, and newspapers; a current news clipping file; a comprehensive data base of publications on Asian Americans since 1977; and a sizable collection of videocassettes as well as music CDs on the Asian American experience.

Research
The program encourages faculty and student research on Asian Americans by sponsoring guest lectures, conferences, film festivals, readings, and exhibits. It also funds research projects and student travel to conferences and research sites. The Asian American Studies Workshop is the program's principal research initiative, engaging Cornell's faculty and students with invited faculty from other universities in a year-long intensive study of selected themes.

Core Faculty
D. Chang, V. Munasinghe, S. Wong

Advisory Board
T. Chaloeitiarana (Southeast Asia Program), B. de Bary (Asian studies), S. Han (sociology), V. P. Kayastha (Asian studies), 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), 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. 4 credits. This course can be used to satisfy either a social science or humanities distribution requirement. D. Chang.

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, Brunei, 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 1930s 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 Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. 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)
Fall. 4 credits. Enrollment is limited to 15 students. S. Wong.

This course will introduce students to the work of twentieth-century African American and Asian American writers who are based, or whose writings are based, in San Francisco and New York City. Students will also be introduced to a range of historical, geographical, sociological, and philosophical literature that addresses the ways in which space enters into the constitution and conduct of social life in urban contexts. How do societies organize space, and whose interests are served by particular spatial configurations? In what ways, and by what means, are spaces gendered or racialized? In this course, we will look at how power and difference interplay in apparently neutral spatial organization of our lives as social beings. We will examine the genealogy of the racialization of space that goes variously by the names of "Chinatown," "barrio," or "ghetto." We will ask how race configures the urban environment and how the urban environment configures race. How do spatial relations generate racial meanings and racial formations? What is the role of spatial organization in the production of racial categories, and how do writers articulate this process? The readings for the course will draw on literature, city planning, cultural geography, history, and sociology. Imaginative writing will make up approximately 60 to 70 percent of the readings.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15.

Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

AAS 212 American Diversity in the 20th Century (also HIST 213, AM ST 211)
Fall. 4 credits. D. Chang.

For course description, see HIST 213.

AAS 213 Asian American History (also HIST 263)

For description, see HIST 263.
A study of the ways in which Asian American writers have constructed discourses of self and nation. In our reading of selected works of prose, poetry, and drama by Chinese American, Filipino American, Japanese American, and Korean American writers, we ask questions about the relation of these works to the moment of their production and reception, and the manner in which these textual representations engage with shifting cultural logics. Writers under discussion may include: Carlos Bulosan, Theresa Hak Kyung Cha, Frank Chin, Jessica Hagedorn, and David Henry Hwang, Maxine Hong Kingston, Joy Kogawa, and David Mura.


**AAS 479 Ethnicity and Identity Politics: An Anthropological Perspective (also ANTHRO 479)** Spring. 4 credits. V. Munasinghe. The most baffling aspect of ethnicity is that, while ethnic sentiments and movements gain ground rapidly within the international arena, the claim that ethnicity does not exist in any objective sense is also receiving increasing credence within the academic community. How can something thought "not to exist" have such profound consequences in the real world? In lay understandings, ethnicity is believed to be a "natural" disposition of humanity. If so, why does ethnicity have different meanings in different places? Anthropology has much to contribute to a greater understanding of this perplexing phenomenon. After all, the defining criterion for ethnic groups is that of cultural distinctiveness. Through ethnographic case studies, this course will examine some of the key anthropological approaches to ethnicity. We will explore the relationship of ethnicity to culture, ethnicity to nation, and ethnicity to state to better understand the role ethnicity plays in the identity politics of today.

**AAS 495 Independent Study** Fall or spring. 1–4 credits. Staff. Topic and credit hours to be mutually arranged between faculty and student. Independent Study Forms must be approved by Asian American Studies Program Office.

**ASTRONOMY**


Cornell's astronomy faculty, research staff, graduate, and undergraduate students are active in the forefront 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. 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 nonscience 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 interested in an astronomy but no scientific background: they are topical rather than course descriptions. Students interested in the 200 and 300 levels may appeal to students of various backgrounds and interests, as indicated in the 200- and 300-level 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 on campus and conducts regular observing and astrophotography sessions. All students are invited to visit the Space Sciences Building, see the exhibits on display there, and consult faculty members about career plans or choice of courses.

**The Major**
The purpose of the major in astronomy is to provide in-depth knowledge and education about the nature of the universe. Astronomy relies heavily on a strong foundation 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 pathway in mathematics, MATH 111–122–221–222 or 191–192–293–294 (or equivalent). Students who anticipate, and astrophysics for prospective majors, but is not required of students who elect to major in astronomy after the sophomore year. Students are also urged to acquire computer literacy. ASTRO 234 is designed to give students hands-on experience with the methods of analysis, visualization, and simulation needed in astrophysical research. Acceptance to the major is first considered after completion of three semesters of introductory physics and mathematics and in general requires a GPA of 3.2 in physics and mathematics courses.

The major requirements stress the importance of building a strong preparation in physical science. The following upper level courses are normally required:

- PHYS 314 or 318, 316, 323 or 327, 341 and 443
- A&EP 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 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 234 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; discussions limited to 30 students each. T. Herter, labs: G. Stacey.

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 our 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. J. Burns. Laboratories; F. G. Stacey. The past few decades have seen incredible advances in the exploration of our solar system. In this course students learn about the current state and past evolution of the Sun and its family of planets, moons, asteroids, and comets. The course emphasizes images and other data obtained from current and past NASA space missions and how these data provide insights about the important processes that have shaped the evolution of solar system objects. General astronomical concepts relevant to the study of the solar system are also discussed. Critical focus is on developing an understanding of the Earth as a planetary body and discovering how studies of other planets and satellites influence models of the climatic, geologic, and biologic history of our home world. Other topics covered include impact hazards, the search for life in the solar system, and future missions.

ASTRO 103  The Nature of the Universe (I) (PBS)
Fall. 3 credits. T. Heter. Identical to ASTRO 101 except for omission of the laboratory (see description above).

ASTRO 104  Our Solar System (II) (PBS)
Spring. 3 credits. J. Burns. 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. J. Harrington, L. Keller. 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 ever cataclysmically meet an intergalactic object? Does life exist elsewhere in the universe? How can we find it? 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 of concepts with, common sense. Applications to various areas in special relativity space travel, the equivalence of mass and energy, nuclear fission and fusion, and thermonuclear procedural devices. 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) (PBS)
Summer. 4 credits. J. Harrington, L. Keller. Identical to ASTRO 105 except for the addition of the 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 (star gazing with binoculars and small telescopes, telescopic observations and CCD imaging of star clusters, nebulae, and the planets, solar observations, radio observations of the Milky Way Galaxy, radio data on the number of stars, etc.). In addition to reading from 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. R. Giovannelli, M. Haynes. A general discussion of our relation to the physical universe and how we view 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 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. Hornack. 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 of the 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 physics freshmen and sophomores. Prerequisite: introductory calculus or coregistration in MATH 111 or 191 or consent of instructor. J. Houck. 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 engineers, geology, and physical sciences students. Prerequisite: introductory calculus or coregistration in MATH 111 or 191; some knowledge of classical physics (mechanics and thermodynamics). D. Campbell, staff. An introduction to the study of our planet, with emphasis on the application of simple physical principles. Topics include: the Sun, nuclear synthesis of the elements, radioactive dating, seismology and planetary interiors, stellar planes and atmospheres bolding greenhouse models, orbital mechanics and resonances, interrelations between meteorites, asteroids and comets, the Jovian planets, icy moons and ring systems, and the search for extra-solar planets.

ASTRO 233  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 or permission of instructor. Enrollment is limited to 15 students. Intended for sophomores planning to major in astronomy or related fields. M. Haynes, D. Campbell. Topics may change yearly. The fall 2003 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 understanding both the context and the methodology of such issues as the search for extrasolar planets, interstellar chemistry, the role of supermassive black holes in galaxy formation, and the influence of environment on galaxy evolution.

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ASTRO 234  Modern Astrophysical Techniques
Spring. 2 credits. Prerequisites: 2 semesters of introductory physics and 2 semesters of calculus plus ASTRO 233 or permission of instructor. Some experience with computer programming expected. Intended for sophomores majoring or concentrating in astronomy or related fields. J. Harrington, staff. The course reviews the basic techniques employed in astrophysical research, both observational and theoretical, to explore the universe. Basic methods and strategies of data acquisition and image and signal processing are discussed. Students gain hands-on experience with visualization techniques and methods of error analysis, data fitting, and numerical simulation. Exercises address the processes by which astrophysicists piece together observations made with today’s...
foremost astronomical instruments to solve questions concerning the origin of planets, stars, galaxies, and the universe itself.

**ASTRO 280 Space Exploration (I) (PBS)**
Fall. 3 credits. Staff.
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 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. No special background in physical sciences, math, or engineering is assumed.

**ASTRO 290 Relativity and Astrophysics (I)**
I. 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 gravitation; the physics of white dwarfs, neutron stars, and black holes; 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 associated 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 some experience with computer programming expected. Intended for sophomores or juniors majoring or concentrating in astronomy or related fields. Not offered 2003–2004.
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 include 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 on 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. K. Cook, P. 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.

**ASTRO 332 Elements of Astrophysics (I)**
Spring. 4 credits. Prerequisites: MATH 112, 122, 192, or equivalent. PHYS 213 or 217.
P. Goldsmith, P. Nicholson.
An introduction to astronomy, with emphasis on the application of physics to the study of the universe. Covers physical laws of radiation; distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis; supernovae, pulsars, and black holes; galaxies and quasars.
Introduction to cosmology. Mainly intended for students of science, engineering, and science education interested in astronomy and astrophysics.

**ASTRO 342 Atmospheric Dynamics (also EAS 342) (I) (PBS)**
Spring. 3 credits. Prerequisites: one year each of calculus and physics. K. H. Cook, P. J. Gierasch.
An introduction to the basic equations and techniques used to understand motion in the atmosphere, with 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.

**ASTRO 410 Experimental Astronomy (I) (PBS)**
Fall or spring. 2-4 credits. Prerequisite: physics 112.
J. Bell.
This course is divided into two broad topics; first, astronomical instrumentation and data reduction, second, applications of astronomical knowledge. 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 490 Senior Seminar Critical Thinking (I) (PBS)**
Fall. 3 credits. No prerequisites. Course is open to ALL students. Y. Terzian.
Critical thinking in scientific and non-scientific contexts. Topics include elements of classical logic, including standards of evidence and paradoxes. Case studies include examples of competing hypotheses in the history of science, as well as examples from border-line sciences. Stress will be put on creative generation of alternative hypotheses and their winnowing by critical scrutiny. Topics include the nature and history of the universe, the nature of time, the nature of reality, the possibilities of life on other planets, and artificial intelligence. 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. Not offered 2003–2004.
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, and selected topics in the presence of gravitational fields, GR as a dynamical theory, experimental tests of GR. At the level of Gravitation by Misner, Horne, and Wheeler.
**ASTRO 510 Applications to General Relativity (also PHYS 554)**
A continuation of ASTRO 509 that emphasizes applications to astrophysics and cosmology. Topics include: relativistic 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 528)**
Spring. 4 credits. The minimum prerequisites for this course are all of the physics at the upper division undergraduate level. Not offered 2003-2004.

Compact objects (neutron stars, black holes and white dwarfs) are the endpoints of stellar evolution. They are responsible for some of the most exotic phenomena in the universe including: supernova explosion, radio pulsars, bright X-ray binaries, magnetars, gamma-ray bursts, and so on. Supermassive black holes also lie at the heart of the violent processes in active galactic nuclei and quasars. The study of compact objects allows one to probe physics under extreme conditions (high densities, strong magnetic fields, and gravity). This course surveys the astrophysics of compact stars and related subjects. Emphasis is on the application of diverse theoretical physics tools to various observations of compact stars. There are no astronomy or general relativity prerequisites. At the level of Physics of Black Holes, White Dwarfs, and Neutron Stars by Shapiro and Teukolsky.

**ASTRO 516 Galactic Structure and Stellar Dynamics**
Fall. 3 credits. D. Chernoff.
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, shapes and properties of stellar orbits, N-body problem, collisional relaxation in stellar systems, spiral structure, galaxy classification and evolution, and cosmological results in galaxy formation.

**ASTRO 520 Radio Astronomy**
Fall. 4 credits. D. Campbell, J. Cordes.
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**

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, or object filtering; and pattern recognition; spectral analysis; Karhunen-Loeve analysis; wavelets; parameter estimation; optimization techniques; Bayesian statistical inference; deterministic, chaotic, and stochastic processes; image formation and analysis; maximum entropy techniques. Specific applications are chosen from current areas of interest in astronomy, where large-scale surveys through the electromagnetic spectrum and the non-electromagnetic signals (e.g., neutrinos and gravitational waves) are of major interest. Applications are also available 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. T. Herter, G. Stacey.
Optical/infrared and submillimeter telescopes and instrumentation are presented and related to current research in these fields. The course includes telescope design and general optical design (ray tracing). CCD, photoconductor, photovoltaic, bolometer, impurity band conduction, and heterodoue detection systems are presented. The instrumentation discussion also includes general instrument design and specific applications to cameras, spectrographs, 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 530 Astrophysical Processes**
Spring. 4 credits. D. Lai.
Thermal and nonthermal radiation processes encountered in studies of stars, the interstellar and intergalactic media, galaxies, and quasars. Fundamentals of radiative transfer, bremsstrahlung, synchrotron radiation, and Compton scattering are covered, as well as spectral line transfer, gas heating and cooling, and topics in atomic and molecular spectroscopy. These topics are discussed within the framework of astrophysical situations, such as star formation, interstellar gas and dust clouds, jets, active galactic nuclei, clusters of galaxies and cosmology.

**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)**
This course is intended to provide a systematic development of stellar astrophysics, both theory and observations. Topics include: hydrostatic equilibrium, equations 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**
Fall. 4 credits. P. Nicholson.
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&AM 673)**

**ASTRO 579 Celestial Mechanics**
Fall. 5 credits. Not offered 2003-2004. For description, See T&AM 672.

**ASTRO 590 Galaxies and the Universe**

**ASTRO 599 Cosmology (also PHYS 599)**
Spring. 4 credits. Prerequisites: statistical physics, quantum mechanics and electromagnetic theory. E. Wasserman.
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, recombination, nucleosynthesis; very early universe, symmetry breaking, inflationary scenarios. At the level of Peebles, Principles of Physical Cosmology.

**ASTRO 620 Seminar: Advanced Radio Astronomy**
Spring. 2 credits. Prerequisites: some background in astronomical spectroscopy is suggested. Open to advanced undergraduates by permission of instructor. J. Cordes, R. Giovanelli, M. Haynes.
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, 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, exclusion of artificial and natural interferences, and management of extremely large data bases, 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 Radar Astronomy]**

Spring. 3 credits. Prerequisites: intended for graduate students and upper-level undergraduates in astronomy, engineering, and geology. A good background in undergraduate mathematics and physics is required. Not offered 2003–2004.

D. Campbell

The application of radar to the study of the surfaces of planets, planetary satellites, asteroids, and comets. Topics covered target detectability and the specification of the needed equipment; interferometer techniques, and receiving systems; data processing techniques; imaging techniques including delay-Doppler imaging, synthetic aperture radar (SAR) and interferometric SAR; target characterization from cross sections, directivity 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]**

Fall or spring. Credit TBA. Guided reading and seminars on topics not currently covered in regular courses.

**[ASTRO 651 Atmospheric Physics (also EAS 651)]**


K. Cook, S. Colucci, P. Gierasch.

For description, see SCAS 651.

**[ASTRO 652 Advanced Atmospheric Dynamics (also SCAS 652)]**


S. Colucci, K. Cook, P. Gierasch.

For description, see SCAS 652.

**[ASTRO 660 Cosmic Electrodynamics (also A&EP 608)]**

Spring. 2 credits. R. Lovelace.

Selected topics discussed in detail: the solar wind, stellar winds, Bondi accretion, Bondi-Hoyle accretion, accretion disks with B fields, magneto-rotational instability, magneto-centrifugal winds and jets from disks, Poynting jets, funnel flows, the propeller stage of accretion, advection and convection dominated accretion flows, fast dynamo processes in astrophysics.

**[ASTRO 671 Seminar: Mars]**

Fall. 3 credits. J. Veverka, I. Bell.

This course will review our current knowledge of the surface and atmosphere of Mars, as revealed by telescopic observation and flyby, orbital, and landed spacecraft measurements, especially focusing on data from Viking, Mars Global Surveyor, Mars Pathfinder, Mars Odyssey, and the Hubble Space Telescope. The class will emphasize key outstanding issues in martian geology, geophysics, surface composition, atmospheric studies, and climate evolution, and will also discuss how competing hypotheses regarding these issues will be tested by new missions (Mars Exploration Rovers, Mars Express, Mars Reconnaissance Orbiter) during the next few years.

**[ASTRO 673 Seminar: Planetary Atmospheres]**


P. Gierasch.

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 on 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)]**

Fall. 2 credits. D. Lai.

An informal seminar that explores current research problems in astrophysics, with a 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]**

Fall. 2 credits. ASTRO 511 (PHYS 525) is strongly recommended as a co- or prerequisite. Not offered 2003–2004. Staff.

**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 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. Students 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 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 animal physiology, biochemistry, computational biology, ecology, evolutional biology, general biology, genetics and development, insect biology, microbiology, molecular and cell biology, neurobiology and behavior, nutrition, plant biology, and vertebrate diversity. Students interested in the marine sciences may consult the Cornell Marine Programs Office (G14 Stimson Hall, 255–3717) for academic and career advising. For more details about the biology curriculum, see the section in this catalog on Biological Sciences or visit the Office of Undergraduate Biology website, www.bio.cornell.edu.

**BIOLOGY AND SOCIETY MAJOR**

B. Chabot, acting director of undergraduate studies (fall 2003), colleges of Arts and Sciences and Agriculture and Life Sciences and Human Ecology. N. Breen, advising coordinator, College of Human Ecology.


The Biology & Society major is suited for students who wish to combine training in biology with perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern biology. In addition to providing a foundation in biology, Biology & Society students obtain 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. The College of Arts and Sciences, the College of Human Ecology, and the College of Agriculture and Life Sciences are eligible for the major. The major is coordinated for students in all colleges through the Biology & Society Office. Students can get information, specific course requirements, and application procedures for the major from the Biology & Society office in 306 Rockefeller Hall, 255–6047.

Because the major is multidisciplinary, students must attain a basic understanding of the several disciplines and receive appropriate training. The curriculum includes courses in ethics, statistics, history, philosophy, and social studies of science and biology; and basic biology (e.g., genetics and development, biochemistry and molecules, 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 the major, 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 and 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.

There are student advisers and faculty 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 final acceptance is granted upon 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 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 Reen, 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 105, 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 broad 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 246).**
   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 three of the following subject areas: Ecology (BIO EE 261); Evolutionary Biology (BIO EE 278); Biochemistry, Molecular and Cell Biology (BIO BM, 330 or 331 or 333 or NS 262 or NS 320); Microbiology (BIO MI 290); Genetics and Development (BIO GD 281 or 282); Neurobiology and Behavior (BIO NB 221 or 222); Plant Biology (BIO PI 241); and Anatomy and Physiology (BIO AP 311 or NS 341 but NOT BIO AP 212).
   D. Biology foundation (Depth requirement): one biology course for which one of the above (2G) is a prerequisite.
   E. Statistics: one course selected from MATH 171, ILRST 210, BTRY 301, AEM 210, SOC 301, PSYCH 350, ECON 319, CRP 225, PAM 210.

3. **Core Courses****: (one course). Should be completed by end of junior year.
   B&SOC 301 Life Sciences and Society (also S&TS 301); or S&TS 286: Science and Human Nature (also PHIL 286).

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 approved Natural Science Issues courses or choose course(s) with introductory biology as a prerequisite from: ALS, AN SC, BIOSCI, ENTERM, FOOD, HD, NS, NTRES, PL BR, PL PA, PSYCH, VTSMT electives.
   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 adviser.
   C. Senior Seminar** (One course taken senior year). Courses change yearly.

* Students may petition to take a second statistics course (an advanced course, in sequence with the statistics course taken in the foundation) in place of the calculus requirement.

** Among the courses taken to meet the social sciences and humanities requirements (2.A, 2.B, 3, 4.B, and 4.C), 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.

**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 375 (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&SOC). 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 advisors. At least one of these must be a member of the Biology & Society major. Applications will be reviewed by a committee headed by the director of undergraduate studies, who will notify students directly of the outcome. Students will be permitted to register for the honors program only by permission of the
department. Students must enroll for two semesters and may take three to five credits per semester up to a maximum of eight credits in B&SOC 498 and 499. 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 (255-6047).

People to contact for Biology & Society Honors Information:
- In Arts & Sciences: Brian Chabot, Acting Director of Undergraduate Studies, bch18@cornell.edu
- In Agriculture & Life Sciences: David Pimentel, Faculty Representative to CALS Honors Committee, dp18@cornell.edu
- In Human Ecology: Nancy Breen, Advising Coordinator, CHE, neb5@cornell.edu

Further Information
- Professor Brian Chabot, Acting Director of Undergraduate Studies, bch18@cornell.edu
- Professor Douglas Gurak, Advising Coordinator, College of Agriculture & Life Sciences, dtg2@cornell.edu
- Dr. Nancy Breen, Advising Coordinator, College of Human Ecology, neb5@cornell.edu
- Biology & Society Advising Office, 306 Rockefeller Hall; (607) 255-6047
- Website: http://www.sts.cornell.edu

I. First-Year Writing Seminars and Introductory Course
Consult the John S. Knight Institute brochure for times, instructors, and descriptions.

S&T 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. T. Gillespie.
For description, see S&T listings, S&T 101.

II. Foundation Courses
A. Ethics (one course)

B&SOC 205 Ethics in Health and Medicine (also S&T 205) (IV) (KCM)
Fall. 4 credits. Limited to 150 students. Not open to freshmen. E. McLeary.
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 are used to 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&SOC 206 Ethics and the Environment (also S&T 206, PHIL 246) (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 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.

B. Social Sciences/Humanities Foundation (two courses, one from any two areas)

1. History of Science

S&T 233 Agriculture, History, and Society: From Squanto to Biotechnology
Fall. 3 credits. M. Rossiter.
For description, see S&T listings, S&T 233.

S&T 282 Science in Western Civilization (also HIST 282)
Spring. 4 credits. P. Dear.
For description, see HIST 282.

[S&T 283 The Sciences in the Twentieth Century (also HIST 280)
Fall. 4 credits. Staff.
For description, see S&T listings, S&T 283.]

S&T 287 Evolution (also BIOEE 207, HIST 287)
Fall or summer. 3 credits. May not be taken for credit after BIOEE 278. W. Provine.
For description, see BIOEE 207.

S&T 355 Computers: From Babbage to Gates
Fall. 4 credits. T. Gillespie.
For description, see S&T listings, S&T 355.

[S&T 390 Science in the American Polity: 1800-1960 (also GOVT 308, AM ST 388)
For description, see S&T listings, S&T 390.]

[S&T 433 Comparative History of Science
For description, see S&T listings, S&T 433.]

[S&T 444 Historical Issues of Gender and Science (also FGSS 444)
Spring. 4 credits. M. Rossiter.
For description, see S&T listings, S&T 444.]

[S&T 447 Seminar in the History of Biology: Why Is Evolutionary Biology So Controversial (also BIO EE 467, B&SOC 447, HIST 415)
Fall. 4 credits. W. Provine.
For description, see BIOEE 467.

2. Philosophy of Science

S&T 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&T listings, S&T 201.

S&T 286 Science and Human Nature (also PHIL 286)
Fall. 4 credits. May be used to meet the philosophy of science requirement if not used to meet the core course requirement. R. M. Lynch.
For description, see PHIL 286.

[S&T 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&SOC 301 Life Sciences and Society (also S&T 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&SOC 442 Sociology of Science (also S&T 442, SOC 442, CRP 442)
Fall. 4 credits. Staff.
For description, see S&T listings, S&T 442.

HD 452 Culture and Human Development
Fall. 3 credits. J. Sobal.
For description, see HD 452.

NS 245 Social Science Perspectives on Food and Nutrition
Fall. 3 credits. J. Sobal.
For description, see NS 245.

[R SOC 208 Technology and Society
Fall. 3 credits. Not offered 2003-2004. C. Geisler.
For description, see R SOC 208.]

R SOC 220 Sociology of Health and Ethnic Minorities (also LSP 220)
Fall. 3 credits. P. Parra.
For description, see R SOC 220.

S&T 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&T listings, S&T 201.

[S&T 311 The Sociology of Medicine
Spring. 4 credits. Staff.
For description, see S&T 311.]

[S&T 411 Knowledge, Technology, and Property
For description, see S&T 411.]

4. Politics of Science

[B&SOC 406 Biotechnology and Law (also S&T 406)
For description, see S&T 406.]

B&SOC 407 Law, Science, and Public Values (also S&T 407)
Spring. 4 credits. M. Lynch.
For description, see S&T listings, S&T 407.
CRP 380 Environmental Politics
Fall. 4 credits. R. Booth.
For description, see CRP 380.

PAM 230 Introduction to Policy Analysis
Spring. 3 credits. J. Gerner.
For description, see PAM 230.

S&TS 324 Environment & Society (also RSOC 324, SOC 324)
Fall. 3 credits. C. Geisler.
For description, see R SOC 324.

S&TS 391 Science in the American Polity: 1960–Now (also GOVT 309, AM ST 389)
Spring. 4 credits. J. Reppy.
For description, see S&TS 391.

[S&TS 427 Politics of Environmental Protection (also GOVT 420)
S. Yearley.
For description, see S&TS listings, S&TS 427.]

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 285)
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.
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

BIOM 330 Principles of Biochemistry, Individual Instruction
Fall and spring. 4 credits. J. Blankenship, P. Hinkle, staff.
For description and prerequisites, see BIOM 330.

BIOM 331 Principles of Biochemistry: Proteins and Metabolism
Fall. 3 credits. May not be taken for credit after BIOM 330 or 333. G. Feigenson.
For description and prerequisites, see BIOM 331.

BIOM 333 Principles of Biochemistry, Lectures
Summer. 4 credits. H. Nivison.
For description and prerequisites, see BIOM 333.

NS 320 Introduction to Human Biochemistry
Fall. 4 credits. W. Arion, P. Stover.
For description and prerequisites, see NS 320.

2. Ecology

BIOEE 261 Ecology and the Environment
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

BIOG 281 Genetics
Fall, spring, and summer. 5 credits. Not open to freshmen fall semester. Limited to 200 students.
M. Goldberg.
For description and prerequisites, see BIOG 281.

BIOG 282 Human Genetics
Spring. 2 or 3 credits (2 cr. if taken after BIOG 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 BIOG 282.

4. Evolutionary Biology

BIOG 278 Evolutionary Biology
Fall and spring. 3 or 4 credits. M. Geber, M. Shulman, staff.
For description, see BIOG 278.

5. Microbiology

BIOM 290 General Microbiology
Lectures
Fall, spring, and summer. 2 or 3 credits. Must be taken for 3 credits to fulfill major requirement.
B. Batzing, staff.
For description and prerequisites, see BIOM 290.

6. Neurobiology and Behavior

BION 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3, 4, or 5 credits. T. Seeley.
For description and prerequisites, see BION 221.

BION 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits. Staff.
For description and prerequisites, see BION 222.

7. Plant Biology

BIOPL 241 Introductory Botany
Fall. 3 credits. K. Nindas.
For description, see BIOPL 241.

8. Physiology and Anatomy

BIOAP 311 Introductory Animal Physiology, Lectures (also VET MED 348)
Fall. 3 credits. E. Loew, staff.
For description and prerequisites, see BIOAP 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.

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
Fall. 4 credits. C. VanEs.
For description and prerequisites, see AEM 210.

BTRY 301 Statistical Methods I
Fall. 4 credits. P. Sullivan.
For description and prerequisites, see BTRY 301.

[CRP 223 Introduction to Statistical Reasoning for Urban and Regional Analysis
Staff.
For description, see CRP 223.]

ECON 319 Introduction to Statistics and Probability
Fall. 4 credits. Y. Hong.
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. H. White.
For description, see MATH 171.

PAM 210 Introduction to Statistics
Fall and spring. 4 credits. K. Joyner, staff.
For description, see PAM 210.

PSYCH 350 Statistics and Research Design
Fall. 4 credits. T. Gilovich.
For description, see PSYCH 350.

SOC 301 Evaluating Statistical Evidence (also RSOC 302)
Fall. 4 credits. M. Clarkberg.
For description, see SOC 301.

III. Core Courses

B&SOC 301 Life Sciences and Society (also S&TS 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 75 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.
A. Natural Science Issues/Biology
For description, see PHIL 286.

S&TS 286 Science and Human Nature
For description, see HD 220.

B&SOC 347 Human Growth and Development: Biological and Behavioral Interactions (also HD 347, NS 347)
For description and prerequisites, see HD 347.

BIOEE 275 Human Biology and Evolution (also ANTHR 275 and NS 275)
For description, see BIOEE 275.

BIOEE 474 Laboratory and Field Methods in Human Biology (also ANTHR 474)
For description, see BIOEE 474.

BIOEE 673 Human Evolution: Concepts, History, and Theory (also ANTHR 673)
For description, see BIOEE 673.

BIOL 247 Ethnobiology
For description, see BIOL 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 BIONB 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 20. 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.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 4 credits.
For description, see NS 331.

B. Humanities/Social Science elective (two courses)
Courses listed earlier as social science/humanities foundation courses (2B) are particularly appropriate as social science/humanities electives. However, a single course cannot be used to meet both requirements. Examples of recommended social science or humanities electives are listed below. A more complete list is available in 306 Rockefeller Hall.

Examples of social science electives
AEM 464 Economics of Agricultural Development
Spring. 3 credits. R. Christy.
For description, see AEM 464.

[ANTHRO 211 Nature and Culture
For description, see ANTHRO 211.

B&SOC 314 Environmental Governance (also S&TS 314 and NTRES 314)
Spring. 3 credits. S. Wolf.
For description, see NTRES 314.

R. Geddes

For description, see HD 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)
For description, see PHIL 481.

C. Senior Seminars.

B&SOC 406 Biotechnology and the Law (also S&TS 406)
For description, see S&TS 406.

B&SOC 414 Population Policy (also R SOC 418)
Spring. 3 credits. Staff. Prerequisite: population course or permission of instructor. Not offered 2003-2004.

B&SOC 427 Politics of Environmental Protection (also S&TS 427 and GOVT 420)
For description, see S&TS 427.
[S&TS 446 Biomedical Ethics] Spring. 4 credits. Staff. 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.

[S&TS 461 Environmental Policy (also BIOEE 661, ALS 661)] Fall and spring. Year-long course, must be started in the fall. 3 credits each term. Limited to 12 students. D. Pimentel. For description, 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. Cassasola. 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 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.

NTRES 411 Seminar in Environmental Ethics Fall. 3 credits. R. Baer. For description, see NTRES 411.

PAM 552 Health Care Services: Consumer and Ethical Perspectives Fall. 3 credits. A. Parrot. If using this course as a senior seminar, B&SOC majors must take it for four credits. For description, see PAM 552.

PAM 556 Managed Care] Spring. 3 credits. For undergraduate seniors only by permission of instructor. 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.


[R SOC 438 Population and Development (also S&TS 437)] Fall. 3 credits. D. Gurak. For description, see R SOC 438.


[S&TS 438 Minds, Machines, and Intelligence (also COGST 438)] Spring. 4 credits. Staff. For description, see S&TS listings, S&TS 438.

[S&TS 466 Public Communication of Science and Technology (also COMM 466)] Fall. 3 credits. B. Lewenstein. For description and prerequisites, see COMM 466.


[S&TS 491 Disease and Culture] Fall. 4 credits. Staff. For description, see S&TS listings, S&TS 491.


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. Projects under the direction of a 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. 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 advance of, 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. For description, see S&TS listings, S&TS 375.

[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 projects 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. Minimally, 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 final term whether or not they complete a thesis and whether or not they are recommended for honors.

Applications and information are available in the Biology & Society Office, 306 Rockefeller Hall.

BURMESE
See Department of Asian Studies.

CAMBODIAN
See Department of Asian Studies.

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

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

A listing of selected graduate courses in applied mathematics can be found in the description of the center in "Interdisciplinary Centers, Programs, and Studies."

CENTER FOR INTERNATIONAL STUDIES
See Interdisciplinary Centers, Programs, and Studies.

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 subject; it ensures that students will be provided with the most advanced information and perspectives, and affords opportunities for students to participate in research.

The Standard Major
The chemistry major at Cornell provides a great deal of flexibility and prepares students for a large variety of career options. In recent years, chemistry majors have gone on to graduate study in chemistry, medicine, law, and business management, as well as directly into positions with chemical, pharmaceutical, and other industrial companies. A major in chemistry can also provide the basis for work in related areas such as molecular biology, polymer science, chemical physics, geochemistry, chemical engineering, materials science, solid state physics, and secondary education. Nearly all of the required courses for the major can be completed in three years, leaving the senior year open for independent research under the supervision of a professor. Advanced courses in chemistry or courses that will enable the individual to pursue interests in related fields.

The courses are arranged as a progression, with some (including mathematics and physics) prerequisite to those that are more advanced. During the first year, a student should normally register for general chemistry (preferably CHEM 215-216 although CHEM 207-208 or 206-208 is acceptable), mathematics, a freshman writing seminar, a foreign language if necessary, or physics. (CHEM 215-216 with biology or physics). Students will be admitted to the program by invitation of the department, with selection based on a superior cumulative average, including chemistry grades, and good performance in at least four credits of research at Cornell.

Prospective candidates should discuss their plans with advisers during their junior year; participants are notified by early January of their senior year. To be awarded honors, candidates must show outstanding performance in at least eight credits of undergraduate research such as is offered in CHEM 421, 433, 461, or 477. In addition, the writing of a thesis in the honors seminar (CHEM 498) is expected.

The Alternative Major
The alternative major is a flexible program that provides core coverage of chemistry around which students can design a program to meet their own career goals. Requirements consist of a core program along with four additional courses chosen by the student. One of the four must be in chemistry at the 300 level or above; the other three may be in another field but should represent a cohesive plan should not be at the introductory level, and must be approved by a departmental committee. The prerequisites for admission to the alternative major are the same as those for the standard major.

The Core Program for the Alternative Major
1) CHEM 215-216, 300 (or 207-208, 300; or 211, 208, 300; or 206, 208, 300; or CHEM 357-358 can be substituted for CHEM 211, 208, or 206-208)
2) PHYS 207 or 112; or MATH 111 or 191
3) MATH 287, 289, and 410 (CHEM 357-358 or 359-360 can be substituted for CHEM 257, or CHEM 389-390 can be substituted for CHEM 287, thereby fulfilling the requirement for an additional 300-level chemistry course)
4) CHEM 498

Additional Courses for the Alternative Major
Possible plans for the remaining three courses might include programs in Biochemistry, Biology, Physics, Computer Science, Polymers, Materials Science, Science, Technology, and Society, History and Philosophy of Science and Technology; Business and Management; Economics; Education; and others.

Preliminary research courses that are pursued by students who wish to become teachers will be interested to know that Cornell University offers certification program for teachers of secondary (grades 7-12) science. Interested students apply to the program during their sophomore or junior year. 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 Susie Slack, 424 Kennedy Hall, 255-9255 or Prof. Deborah Trumbull, 426 Kennedy Hall, 255-3108.

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 chemistry laboratories. Close­-toed footwear is required. 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 are required to pay for glassware and any other items broken or missing from their laboratory. Charges for any breakage.

Students who fail to inventory their desks at the appointed time in the presence of their instructor are charged a $10 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 2003-2004. 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 all 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, bipyrimidyl, 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 no required laboratory 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 9, April 8. R. Hoffmann.

Chemistry is the art, craft, business, and science of substances and their transformations. Since we've learned to look inside we know that with the 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. The teaching is open, there are many demonstrations, as well as excerpts from books, plays, and films.

Chem 206 Introduction to General Chemistry (I) (PBS)

Fall or summer. 4 credits. Enrollment limited. Recommended for students who have not had high school chemistry and for those needing a less intensive course than CHEM 207. Lecs, M W F; lab, T R or F, or M W or F. Prelims: Oct. 9, Nov. 13. R. Hoffmann.

An introduction to chemistry, both quantitative and qualitative, this course covers much of the same material as CHEM 207, but does so at a slightly slower pace.

Chem 207-208 General Chemistry (I) (PBS)

Fall or summer, 207; spring or summer, 208. 4 credits each term. Recommended for those students who will take further courses in chemistry. Prerequisite for CHEM 207: high school chemistry. Prerequisite for CHEM 208: CHEM 206 or 207. Lecs, T R lab, T R F M T W R F. Prelims: Oct. 9, Nov. 13, Mar. 2, April 13.

Fall: J. E. McMurry; spring, M. A. Hines. Fundamental chemical principles and descriptive facts 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.

Chem 216 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. 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. Lecs, M W F, lab, M T W R or F. Prelims: Oct. 9, Nov. 13, Mar. 2, Apr. 13. Fall: R. Fay; spring: B. S. Crane.

An intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on qualitative aspects. Second term includes systemsatics 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 2003-2004.

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 are emphasized. 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 F; spring, R, lab, M T W R or F or T or R. Prelims: fall: Nov. 13; spring: Apr. 25-29. S. Russo.

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

Spring. 2 credits. Recommended for non-chemistry majors. Prerequisite: CHEM 251. Lec, F; lab, T, W. Prelims: Apr. 29. S. Russo.

A continuation of CHEM 251.
ARTS AND SCIENCES - 2003-2004

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. Lect, M W F; Prelims: Feb. 19, Mar. 16, April 13; 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) (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 287 or 389. Lects, M W F; 287: rec, M or W, T; 288: rec, M or W. Prelims: 287: Oct. 9, Nov. 25, 288: Mar. 11, Apr. 20. Fall: H. D. Abrufa; spring: J. A. Maragoni. 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, and molecular spectroscopy. CHEM 287 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

CHEM 289-290 Introductory Physical Chemistry Laboratory (I, II) (PBS)
Fall, 289, spring, 290. 2 credits each term. Lect: fall, R; spring, R Lab: fall, M; T; spring, M T W R, T. McCarrick. 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 204, or CHEM 216 or advanced placement in chemistry. Lect, R; Lab, M T W R or T. Prelim: Oct. 23, Nov. 25; J. M. Buritch. 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 Experimental Chemistry I (I) (PBS)
Spring. 4 credits. Prerequisite: CHEM 300, and 357 or 359. Lect, M W F, 2 labs, M W or T R; J. M. Buritch. 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 Experimental Chemistry II (I) (PBS)
Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisite: CHEM 301. Lects, M W F, 2 labs, M W or T R; T. F. J. DiSalvo. Instrumental methods of analysis, including chemical microscopy, visible and infra-red spectroscopy, and gas chromatography. Basic concepts of interfacing will be covered.

CHEM 303 Experimental Chemistry III (I) (PBS)
Spring. 4 credits. Each lab limited to 10 students. Prerequisites: CHEM 302, 389, 390; coregistration in CHEM 251 or 300. Prerequisite for CHEM 358: CHEM 357 or permission of the instructor. Lects, M W F, optional rec may be offered. Prelims: Sep. 25, Oct. 21, Nov. 18, Feb. 19, Mar. 16, Apr. 15. Fall: B. Ganem; spring: G. W. Coates. 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. Prerequisite for CHEM 358: CHEM 357 or permission of the instructor. Lects, M W F; optional rec can be offered. Prelims: Sep. 25, Oct. 21, Nov. 18, Feb. 19, Mar. 16, Apr. 15. Fall: B. Ganem; spring: G. W. Coates. 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 Organic Chemistry I and II (I) (PBS)
Fall, 359; spring, 360. 4 credits each term. Recommended for students who intend to specialize in 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: concurrent registration in CHEM 300–301–302. Lects, M W F; dis sec, W; prelims, Sept. 17, Oct. 15, Nov. 12; Spring: Feb. 11, Mar. 3, Apr. 17. 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.

CHEM 385-390 Physical Chemistry I and II (I) (PBS)
Fall, 389, spring, 390. 4 credits each term. Prerequisites: MATH 215 or, ideally, 221–222, PHYS 208; CHEM 208 or 216 or permission of instructor. Prerequisite for CHEM 390: CHEM 389. Lects, M W F; rec, M or W or T. Lects, 390; M W F; prelims: 389: Sept. 30, Oct. 28, Nov. 25, 390: Feb. 19, Mar. 16, Apr. 15. Fall: H. F. Davis; spring: 390: R. F. Loring. The principles of physical chemistry are studied from the standpoint 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 208 or 216 or permission of instructor. Corequisites: MATH 294. Prerequisite for CHEM 391: CHEM 389. Lects, M W F; rec, M or T. M. Duncan. (1) Classical thermodynamics—empirical laws that convert measurable quantities of pressure, temperature, volume, and composition into abstract quantities of enthalpy, entropy and Gibbs energy to describe chemical systems, and (2) chemical kinetics—reaction rate laws from experimental data and reaction mechanisms; approximation methods and applications to photolithography, polymerization, and catalysis.

CHEM 404 Entrepreneurship in Chemical Enterprise
Spring. 1 credit. Lects, T. B. Ganem. Designed to acquaint students with the problems of planning, starting, and managing a new scientically 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 Synthetic Chemistry (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. 6 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 1:25).

CHEM 430 Chemistry Research
Fall or spring. 1-4 credits. Prerequisites: CHEM 303 and 390 or CHEM 287-288, and CHEM 289-290 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 431 Introduction to Inorganic Chemistry Research
Fall or spring. 2-4 credits. Prerequisites: CHEM 303 and 390, or CHEM 287-288, and CHEM 289-290 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 303 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)
Fall. 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 and synthetic compounds, design strategies, 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 to standard chemistry majors only by departmental invitation. Additional prerequisites or corequisites: outstanding performance in either (1) two coherent 4-credit units of research in a course such as CHEM 421, 433, 461, or 477, or (2) one 4-credit unit in a course such as CHEM 421, 433, 461, or 477 and summer research equivalent to at least 4 credits in the same subject. W. R. F. Loring.
Informal presentations and discussions of selected topics to 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. Individual research on advanced problems in chemistry or a related subject under the guidance of a faculty member, culminating in a written report.

CHEM 600-601 General Chemistry Colloquium
Fall. 600, spring. 601. No credit. R. Staff.
A series of talks representative 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 and seniors. Lecs, T. L. Solla.
An introduction to physical science information research methods, with hands-on exploration of traditional and electronic resources. Much important information can be missed, and valuable time wasted without efficient research strategies. Topics include finding chemical and physical properties, reaction and analytical information, patents, web resources; using specialized resources in chemistry, physics, biochemistry, and materials science; and managing citations.

CHEM 605 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity
Fall. 4 credits. Prerequisite: CHEM 389-390 or equivalent or permission of instructor. Lecs, M W F. P. J. Chirik.
Introduction to chemical bonding and applications of group theory including: hybrid orbitals, molecular orbitals, valence bond theory, molecular vibrations and spectroscopy. Application of these models to modern coordination compounds and organometallic complexes. Readings at the level of Bishop's "Group Theory and Chemistry."

CHEM 606 Advanced Inorganic Chemistry II: Solid-State Chemistry and Reactivity of Coordination Compounds, and Bioinorganic Chemistry
Spring. 4 credits. Prerequisite: CHEM 605 or permission of instructor. Lecs, M W F. P. J. Lee.

CHEM 608 Organometallic Chemistry Seminar
Spring. 4 credits. M W F P. T. Wolczanski.
Synthesis, structure, and reactivity of organotransition metal complexes. Current literature is emphasized, and background readings are at the level of Collman, Hefedus, Finke, and Norton's Principles and Applications of Organotransition Metal Chemistry.

CHEM 622 Chemical Communication
For description, see BIONB 623.

CHEM 625 Advanced Analytical Chemistry I
Spring. 4 credits. Prerequisite: CHEM 288 or 390 or equivalent. Lecs, M W F; occasional prelins W. D. B. Zax.
The application of high-resolution NMR spectroscopy to chemical problems. Some practical experience will be offered.

CHEM 627 Advanced Analytical Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: CHEM 793 or equivalent is preferable. Lecs, M W F. Not offered 2003-2004, next offered spring 2004. 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 302, or CHEM 208 and PHYS 208, or permission of instructor. Lecs T R. Offered alternate years. J. T. Brenna.
Survey course in modern high precision isotope ratio mass spectrometry (IRMS) techniques and trace/surface methods of analysis. Topics include dual inlet and continuous flow IRMS, thermal ionization MS, inductively coupled plasma MS, atomic mass spectroscopy, ion and X-ray spectrometry, 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). Lecs, T R. H. D. Abruña.
Fundamentals and applications of electrochemistry. Topics include the fundamentals of electrode kinetics, electron transfer theory, the electrical double layer, diffusion, and other mechanisms 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 350 or equivalents or permission of instructor. Lecs, 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 pulling 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. Lecs, T R. D. B. Collum.
Modern techniques of organic synthesis, applications of organic reaction mechanisms and retrosynthetic analysis to the problems
en countered in rational multistep 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. Lecs, T. R. T. P. Begley. A representative selection of the most important concepts in synthetic polymer chemistry and polymer stereochemistry and topology, and methods of polymer synthesis, the control of polymer architecture. Emphasis is on modern methods to the development of new relationships. 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 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 2003–2004. 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 396/390 and Organic Chemistry 359/360 or equivalent or by permission of the instructor. Primarily for graduate students and advanced undergraduates. No previous knowledge of polymers is required. Lecs, 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 characteristics (gel permeation chromatography), light scattering, osmometry, bulk properties—thermal and mechanical properties, and structure-property relationships.

CHEM 671 Synthetic Polymer Chemistry (also MS&E 671 and CHEM 675)
Spring. 4 credits. Prerequisites: a minimum of organic chemistry at the level of CHEM 359/360 or equivalent. 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 material covered in CHEM 670 or MS&E 452 will be helpful. Lecs, T. R. 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, BIOBM 331, or equivalents or permission of instructor. Lecs, M W F. Not offered 2003–2004. 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; cooperativity and regulation; and the role of cell membrane receptors in regulating cellular activities.

CHEM 677 Chemistry of Nucleic Acids
Fall. 4 credits. Primarily for graduate students. Prerequisites: CHEM 358 or 360, and 390 or equivalents. Lecs, M W. Not offered 2003–2004. D. A. Usher. Structure, properties, synthesis, and reactions of nucleic acids from a chemical point of view. Special topics include antisense and antigene [Blank space]

CHEM 678 Statistical Thermodynamics
Fall. 4 credits. Primarily for graduate students. Prerequisite: CHEM 390 or equivalent. Lecs, M W. B. Widom. Course covers the principles of statistical thermodynamics and how they lead to classical thermodynamic topics. Topics include: ensembles and partition functions; ideal gases and crystals; thermodynamic properties from spectroscopic and structural data; chemical equilibrium; statistical mechanics of surfaces and solutions; Bose-Einstein and Fermi-Dirac statistics and phases. Examples from biology materials and chemistry, at the level of the first twelve chapters of Statistical Mechanics by McQuarrie.

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 T. R. G. S. Ezra. 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, chemistry 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 685 Physical Organic Chemistry I
Fall. 4 credits. Primarily for graduate students. Prerequisite: CHEM 665 or permission of instructor. Lecs, M W F. G. F. Wilcox. Exploration of contemporary tools for calculating molecular structures and energies of species of all sizes. The course uses computers extensively, but requires only a limited knowledge of mathematics (mainly linear algebra).

CHEM 686 Physical Organic Chemistry II
Fall. 4 credits. Primarily for graduate students. Prerequisite: CHEM 665 or permission of instructor. Lecs, M W F. T. P. Begley. Distinguished scientists who have made significant contributions to chemistry present lectures for approximately six weeks.

CHEM 700 Baker Lectures
Fall. On dates TBA. No credit. Lecs, T. R. Not offered 2003–2004. Distinguished scientists who have made significant contributions to chemistry present lectures for approximately six weeks.

CHEM 701 Introductory Graduate Seminar
Fall. No credit. Highly recommended for all senior graduate students, in any field of chemistry. Lecs, W. Not offered 2003–2004. R. Hoffmann. A discussion of professional issues facing young chemists as well as life skills: academic and industrial trends, presentations, employment, immigration, publication, research funding, and ethics.

CHEM 716 Introduction to Solid State Organic Chemistry
Spring. 3 credits. Prerequisite: CHEM 607 is recommended or some exposure to (or a course in) solid state chemistry and quantum mechanics. A good undergraduate physical chemistry course may be sufficient for quantum theory, while PHYS 443 or CHEM 793 or CHEM 794 are at a substantially higher level than what is needed. Lecs, M W F. S. Lee. This course examines some principles of crystallography and also electronic structure theory of solids. We then consider properties such as conduction, superconductivity, ferroelectricity and ferromagnetism. The final portion of this course is concerned with structure-property relations.

CHEM 765 Physical Organic Chemistry
Fall. 4 credits. Primarily for graduate students. Prerequisite: CHEM 665 or permission of instructor. Lecs, M W F. C. F. Wilcox. Exploration of contemporary tools for calculating molecular structures and energies of species of all sizes. The course uses computers extensively, but requires only a limited knowledge of mathematics (mainly linear algebra).

CHEM 774 Chemistry of Natural Products: Combinatorial Chemistry
Spring. 3 credits. Prerequisites: CHEM 360 and BIOBM 330 or equivalents. Lecs, M W F. Not offered 2003–2004. T. P. Begley. Combinatorial chemistry has revolutionized the way organic chemists think about structure function studies on biological systems and the design of inhibitors. This course explores the design, synthesis, screening, and use of natural (i.e., peptide, protein, nucleic acid, carbohydrate) and unnatural (i.e., totally synthetic) libraries.

CHEM 780 Chemical Kinetics and Molecular Reaction Dynamics
Fall. 4 credits. Prerequisite: CHEM 681 or permission of instructor. Lecs, T. R. Not offered 2003–2004. P. L. Houston. Principles and theories of chemical kinetics and molecular reaction dynamics. Topics
include potential energy surfaces, transition state theory, and statistical theories of unimolecular decomposition. Depending on class interest, the course also includes special topics such as surface reactions and photochemistry.

CHEM 787 Modern Methods of Physical Chemistry
Fall. 4 credits. Prerequisites: 1 year of undergraduate physical chemistry, 3 semesters of calculus, 1 year of college physics, (same as for CHEM 681). Lecs, T R. J. H. Freed.

This course provides the methodological background for graduate courses in chemical thermodynamics, kinetics, statistical mechanics, and quantum chemistry. It includes the methods of solution of relevant differential equations; the eigenvalue problem and linear algebra; special functions; partial differential equations for diffusion and wave mechanics; integral transforms; functions of a complex variable. At the level of Mathematical Methods in the Physical Sciences, 2nd Edition, by Boas. There is a midterm and a final exam, and 12 problem sets.

CHEM 788 Macromolecular Crystallography (also BIOC 738)
Fall. 3 credits. Prerequisite: permission of instructor. Lecs, T R. S. E. Ellick. Lectures cover the fundamentals of x-ray crystallography and focus on methods for determining the three-dimensional structures of macromolecules. Topics include crystalization, data collection, phasing methods, model building, refinement, structure validation and structure interpretation.

CHEM 791 Spectroscopy
Spring. 4 credits. Prerequisite: CHEM 793 or PHYS 443 or equivalent. Lecs, M W F. Not offered 2003–2004. 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 792 Molecular Collision Theory
Spring. 4 credits. Prerequisite: CHEM 793 or PHYS 443 or equivalent. Lecs, T R. Not offered 2003–2004. G. S. Ezra.

The concepts and methods of scattering theory are described with particular emphasis on applications to problems of chemical interest. At the level of Child's Molecular Collision Theory and Taylor's Scattering Theory.

CHEM 793 Quantum Mechanics I
Fall. 4 credits. Prerequisites: CHEM 390, coexistence in A&PE 321, or CHEM 787 or equivalents or permission of instructor. Lecs, M W F. D. B. Zax.

Course topics include: Schroedinger's equation, wave packets, uncertainty principle, matrix mechanics, orbital and spin angular momentum, exclusion principle, perturbation theory, and the variational principle. At the level of Liboff's Quantum Mechanics.

CHEM 794 Quantum Mechanics II
Spring. 4 credits. Prerequisites: CHEM 793 or equivalents or coexistence in A&PE 322, or permission of instructor. Lecs, M W F. G. S. Ezra.

Topics include: WKB theory; density matrix; time-dependent perturbation theory; molecular-field interaction and spectroscopy; group theory; angular momentum theory; scattering theory; Born-Oppenheimer approximation and molecular vibrations; molecular electronic structure.

CHEM 796 Statistical Mechanics
Spring. 4 credits. Prerequisite: CHEM 678 and 793 or equivalent. Lecs, T R. B. Widom.


CHEM 798 Bonding in Molecules
Fall. 4 credits. Prerequisite: some exposure to quantum mechanics; a good undergraduate physical chemistry course may be sufficient, or CHEM 681. Physics 433 or CHEM 793–794 are at a substantially higher level than what is needed. Consults instructor if in doubt. Lecs, T R. Not offered 2003–2004. 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 physical chemists, engineers and physicists as well.

CHINESE
FALCON Program (Chinese)
See Department of Asian Studies.

CLASSICS

The Classics department at Cornell is one of the oldest and largest in the country. The range of instruction is broad and includes courses offered by professors with related interests in the departments of History, Philosophy, Comparative Literature, History of Art, Modern Languages, Linguistics, and Near Eastern Studies, and in the Archaeology, Medieval Studies, and Religious Studies programs. The department embraces both the traditional core studies of the languages, literature, philosophy, art, and history of ancient Greece and Rome, and the different approaches to its material yielded by comparative study of Mediterranean civilizations, peace studies, and feminist and literary theory.

The department offers a wide variety of Classical Civilization courses and seminars in English on such subjects as Greek mythology, ancient mystery religions, early Christianity, and Greek and Roman society; ancient epic, lyric, tragedy, comedy, satire, novels, and love-poetry; Periclean Athens, Republican Rome, the Hellenistic worlds; Scholasticism, Goths and Huns, and Byzantine history, and Platonic, Aristotelian, and Hellenistic philosophy. These courses are designed to introduce aspects of Classical antiquity to the students with very divergent primary interests. Other Classical civilization courses with the widest appeal are those on art and archaeology, and dendrochronology (the study of tree-rings to determine the date of ancient artifacts). These courses make use of the university's large collections of ancient coins, and of reproductions of sculptures, inscriptions, and other ancient objects. Students who wish to gain first-hand archeological experience may also join one of several summer Cornell-sponsored field-projects in Greece and Turkey.

The study of language is a vital part of Classics. The department offers courses ranging from 100-level classes designed to further the understanding of English through the study of the Latin and Greek sources of much of its vocabulary, to courses in linguistics on the morphology and syntax of the ancient languages, comparative grammar, and Indo-European (the reconstructed source of the family of languages that includes Greek, Latin, Sanskrit and most modern European languages). The core function of the department is the study of ancient Greek and Latin. Elementary Greek and Latin are taught in both two-semester courses and intensive summer or one-semester courses. (For students whose Latin is a bit rusty, the department also offers a rapid, one-semester review class.) Students with a more advanced knowledge of Greek or Latin can take advantage of a wide selection of courses, from intermediate language classes at the 200-level, which brush up and broaden knowledge of syntax and vocabulary, to graduate and faculty reading groups. All of these courses use exciting literary texts, whether the poems of Catullus and Virgil, or the dialogues of Plato and Xenophon, at the 200-level, or, in the reading groups, the latest papyrological discoveries, such as the 'new' fragments of Empedocles' cosmic poem or the 'new' epigrams of Pseudo-Apollodorus.

The primary purpose of language-instruction is to enable the study at first-hand of the extraordinary range of powerful and challenging texts in Greek and Latin. The department offers undergraduate and graduate seminars on literary, linguistic, historical, and philosophical topics, studied through the Greek and Latin works of authors from Homer (probably from the 8th Century BCE) to Boethius (6th Century CE), and occasionally from later writers such as Dante, Petrarch, or Milton. The department strives to adapt its program to the needs of individual students from all disciplines. If you are interested in studying a Classical text or period that is not offered in the Courses of Study, please contact the directors of graduate or undergraduate studies.
Majors in Classics

The Department of Classics offers majors in Classics, Greek, Latin, and Classical Civilization.

The following are the requirements for students declaring their majors after spring 2003. (Students who declared their majors prior to fall 2003 should follow the requirements set out in the course catalog for the year in which they declared. They should use the course numbers in square brackets in this catalog to determine their major requirements.)

Classics

The Classics major has two requirements: (i) six courses in Greek and Latin numbered 201 or above; and (ii) 3 courses in related subjects selected in consultation with the student’s departmental advisor (see below). Classics majors are required to take a minimum of one 300-level course in one language and two 300-level courses in the other.

Students who are considering graduate study in Classics are strongly advised to complete the Classics major.

Greek

The Greek major has three requirements: (i) CLASS 104 [201]; (ii) 5 courses in Greek numbered 201 [203] or above; and (iii) 3 courses in related subjects selected in consultation with the student’s departmental advisor (see below). The courses in Greek must include at least 3 at the 300-level.

Latin

The Latin major has three requirements: (i) CLASS 109 or 205; (ii) 5 courses in Latin numbered 206 or above; and (iii) 3 courses in related subjects selected in consultation with the student’s departmental advisor (see below). The courses in Latin must include at least 3 at the 300-level.

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 221 or HIST 266, 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 projects in Cornell. (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 B+, and an average of B+ 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 advisors 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.

Independent Study

Independent study at the 300 level may be undertaken by undergraduates upon completion of one semester of work at the 300 level 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 year-long study abroad in Greece and Italy. The American School of Classical Studies at Athens offers a Summer Program for graduate students and qualified undergraduates; Summer Year in Athens offers semester-long courses (consult Cornell Abroad for details). The Intercolligate 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 Classics Department awards several travel grants each year for graduate students from the Townsend Memorial Fund; undergraduates are eligible for the Caplan Fellowships (see ‘awards’ below). Detailed information on these programs is available in the Classics Office, 120 Goldwin Smith Hall.

Summer Support for Language Study

The Department of Classics has at its disposal a number of endowments established to assist with the tuition of 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 Classics undergraduate majors and other students needing Latin or Greek for completion of their majors; dyslexic students are accorded additional preference. Applications are due to the chair of the Department of Classics by March 31st. See also under “Awards” 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 study of Intensive Greek or Latin at Cornell and provide tuition and possibly a stipend to cover living expenses. The Harry Caplan 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.

Freshman Writing Seminars

The department offers freshman writing seminars on a wide range of Classical and Medieval topics. Consult John S. Knight Writing Seminar Program brochures for times, instructors, and descriptions.

Awards

Departmental majors are eligible for several awards administered by the Classics department. The Kanders-Townsend Prize Fellowships are awarded annually to three or four freshmen or sophomores for summer study of Intensive Greek or Latin at Cornell and provide tuition and possibly a stipend to cover living expenses. The Harry Caplan 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.

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 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 Mysteries (also LING 109) # (III) (IA)


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 ancient citizens, supplemented by slides of ancient art and architecture.

**CLASS 212 The Roman Experience # (IV) (CA)**
Spring. 3 credits. D. Mankin.

An introduction to the civilization 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. This course is intended especially for freshmen. Apply in writing to the Chair, Department of Classics, 120 Goldwin Smith Hall.


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 did the first historians, using literary and philosophical discourse, create space for their own inquiry, and how do 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 2003-2004.

**CLASS 223 The Comic Theater (also COM L 223 and THETR 223) # (IV) (LA)**
Spring. 3 credits. J. Rusten.

The origins of comic drama in ancient Greece and Rome, and its subsequent incarnations especially in the Italian renaissance (Commedia erudita 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 (trickster, parody, farce, caricature); and the role of comedy in society. All readings are 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) (KCM)**
Fall. 4 credits. Staff.

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: the structure and language of reports; the representation of the self; the use of myths and the use of knowledge for our understanding of Greek literature, religion, and moral and political concepts.

**CLASS 236 Greek Mythology (also COM L 236) # (IV) (LA)**
Fall 2003 and summer 2004. 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 uses of myths for our understanding of Greek literature, religion, and moral and political concepts.

**CLASS 237 Greek Religion and Mystery Cults (also RELST 237) # (IV) (CA)**
Spring. 3 credits. K. Clinton.

Greek religion constitutes one of the essential features of ancient Greek culture, and distinguishes it from later Western civilization. Since religion permeates 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.

**CLASS 238 The Ancient Epic and Beyond # (IV) (LA)**

We move, Odysseus-like, to the West, beginning with Homer's Iliad and Odyssey, we continue in the Hellenistic and Augustan eras with Apollonius's Argonautica and Virgil's Aeneid. A shift in space and time has us conclude with two New World maritime epics: Herman Melville's Moby Dick and Derek Walcott's Omero.

**CLASS 244 Sophomore Seminar: Psyche, Ego, and Self # (IV) (KCM)**

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. BCE) to St. Augustine's 4th- to 5th C. CE, and end with early modern (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 Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing skills, and to interaction with top university professors.

**CLASS 255 Periclean Athens # (IV) (HA)**
Spring. 4 credits. 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.—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 Peloponnesian War to its end; readings from Thucydides are interwoven with contemporary texts composed by the dramatists (Sophocles, Euripides, and Aristophanes) and the sophists (supplemental readings from Plato). The remaining classes 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 ungualt. There are weekly discussion sections.

**CLASS 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 2003-2004. C. Brittain.

The idea of a person or a 'self' seems to be something determined by nature: 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 beliefs about human nature, rationality, freedom, luck, and society. This course examines a variety of very different conceptions of the self from the period 700 BCE to 400 CE, using a range of texts from Greek and Roman literature (including epic and tragedy), medical theory, and philosophy (both pagan and Christian).

**CLASS 265 Ancient Greece from Homer to Alexander the Great (also HIST 265) # (III)**

For description, see HIST 265.

**CLASS 268 A History of Rome from Republic to Principate (also HIST 268) # (III)**

For description, see HIST 268.

**CLASS 293 Classical Indian Narrative (also ASIAN 291) # (IV)**
[CLASS 331] Goths, Vandals, Franks, and Romans # (IV) (CA)
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 Vandalian 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.

[CLASS 333] Greek and Roman Mystery Cults and Early Christianity (also RELST 373) # (IV) (CA)
Fall. 4 credits. A previous course in Classics ( civilization or language) or Religious Studies 101 is recommended. Not offered 2003–2004. 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 such Hellenistic and Roman cults as the mystery cults of Isis, Bacchus, Mithras, and Isis 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.

CLASS 334 Christianity and Classical Culture # (IV) (HA)
Spring. 4 credits. D. Shanzer.
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.

CLASS 339 Plato (also PHIL 309) # (IV) (KCM)
Fall. 4 credits. Prerequisite: at least 1 previous course in philosophy. G. Fine.
For description, see PHIL 309.

[CLASS 340] Aristotle (also PHIL 310) # (IV) (KCM)
Aristotle's practical and productive works (his Ethics, Politics, Rhetoric, and Poetics), with attention to their grounding in his theoretical works.

CLASS 341 Hellenistic Philosophy (also PHIL 308) # (IV) (KCM)
Fall. 4 credits. Pre-requisite: CLASS 251 or one philosophy course. C. Brittain.
Studying 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 Sceptics' 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 content, determinism and responsibility, personal identity, virtue ethics, 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 THETR 345) # (IV) (LA)
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, Iphigenia in Aulis, Orestes, Seneca's Thyestes, Trojan Women; Shakespeare's Julius Caesar, Titus Andronicus, Othello, Strindberg's The Father, D'yrenmann's The Visit, Bergman's Seventh Seal, Ceyzanne's Iphigenie.

[CLASS 346] Art of Subversive Writing (also COM L 349) # (IV) (LA)
Spring. 3 credits. F. Ahl.
For description, see COM L 346.

[CLASS 382] Greeks, Romans, and Victorians (also COM L 382) # (IV) (LA)
This course explores how nineteenth-century (and especially Victorian English and Irish) poets, dramatists, and to a lesser extent, novelists, present Greco-Roman antiquity. The varied influences of Vergil and Homer, Seneca and Sophocles, Plautus and Aristophanes, Horace, and Greek lyric poetry are discussed in selected works of Thomas More, Shelley, Byron, Swinburne, W. S. Gilbert, Oscar Wilde, and the pre-Raphaelites and Victorian poets.

CLASS 387 Independent Study in Classical Civilization, Undergraduate Level
Fall and spring. Up to 4 credits.

[CLASS 395] Classical Indian Philosophical Schools (also ASIAN 395 and RELST 395) # (IV) (KCM)

CLASS 442 Topics in Ancient Philosophy (also PHIL 413) # (IV) (KCM)
Mind, self, and psychopathology in ancient philosophy.

CLASS 445 Classic Modern Historiography of Ancient Greece (also HIST 438) (III)
Fall. 4 credits. Prerequisite: an introductory course in ancient Greek history or civilization or permission of the instructor.
This upper-level seminar introduces students 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 centuries, including such authors as Grote, Burckhardt, Comford, Glotz, Momigliano, 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 2003–2004. B. Strauss.
For description, see HIST 450.

CLASS 461 Sacred Fictions
Fall. 4 credits. K. Haines-Eitzen.
For description see S HUM 411.

CLASS 463 Gender and Politics in the Roman World (also HIST 463 and FGGS 464) # (III or IV) (HA)
An undergraduate seminar examining the relationship between gender and politics in the late Roman Republic and early Empire. Among the questions this course addresses are: was politics the exclusive domain of men in Roman society (as is generally assumed) or does a broader definition of politics and an understanding of the various forms of political activity in ancient Rome might have taken place for women in Roman political life? What role did gender have in Roman political discourse and ideology? Why did issues such as family, marriage, and sexuality become subjects of political debate and legislation?

CLASS 469 Equality and Inequality in Ancient Greece (also HIST 469) # (III or IV)
Fall. 4 credits. Prerequisite: HIST 265, CLASS 211 or 217, or written permission of the instructor. Not offered 2003–2004. B. Strauss.
For description, see HIST 469.

CLASS 480 Roman Society and Politics under the Julio-Claudians (also HIST 473) # (III or IV) (HA)
Spring. 4 credits. Prerequisite: CLASS 212, HIST 268, or permission of instructor. Not offered 2003–2004. Staff.
This course examines several of the important social and political changes in Roman society under Augustus and his successors, the Julio-Claudians. Topics to be investigated include Augustus's consolidation of power through political and social revolution, the Augustan attempt to regulate family life and social relations by legislation, the relation of the emperor Tiberius with the members of the old ruling class, the growth of the imperial bureaucracy and the new opportunities for social mobility, the political opposition to Claudius and Nero, Nero's cultural and provincial policy, and the manipulation of the imperial cult. All readings will be in English.

CLASS 700 Doctoral Dissertation Research
Fall, spring. Letter grade only (0 credit). 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. C. Sogno.
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. Prerequisite: 101 or equivalent. Was CLASS 103. Staff.
A continuation of CLASS 101, prepares students for CLASS 104.

CLASS 103 Intensive Greek
Summer. 6 credits. 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 for 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. K. Clinton.
Introduces students to reading a literary Greek text (Xenophon's Anabasis). The course covers complex syntax and reviews the grammar presented in CLASS 102 or 103.

CLASS 201 Greek Prose # (IV) (LA)

CLASS 203 Homer # (IV) (LA)
Spring. 3 credits. Satisfies Option I. Prerequisite: CLASS 104. J. Coleman.
Readings in the Homic epic.

CLASS 302 Undergraduate Seminar: Greek Historiography and Oratory (LA)
Spring. 3 credits. Satisfies Option I. L. Abel.
Topic: The historiography and oratory of fifth century Athenian democracy and imperialism. Reading in English: Aristocles' Constitution of the Athenians; in Greek: sections from Herodotus and Thucydidies and a speech of Lysias.

CLASS 303 Undergraduate Seminar: Greek Drama (LA)
Fall. 3 credits. Satisfies Option I. K. Clinton.
Topic: Sophocles.

CLASS 310 Special Topics in Greek Literature # (IV)
Fall and spring. 4 credits. Satisfies Option I. Prerequisite: two 200-level courses in Greek or permission of instructor. Not offered 2003-2004.

CLASS 316 Greek Prose Composition (LA)
Fall. 4 credits. Satisfies Option I. Prerequisite: CLASS 104 or permission of instructor. Was CLASS 342. Not offered 2003-2004. A. Nussbaum.

CLASS 319 The Greek New Testament and Early Christian Literature # (IV) (LA)
Fall. 4 credits. Satisfies Option I. Prerequisite: CLASS 104 or equivalent, or permission of instructor. Was CLASS 305. Not offered 2003-2004. D. Shanzer.
More advanced readings from the Acts of the Apocalypse 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 385 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 (also ENGL 417, ENGL 617) # (IV) (LA)
Fall. 4 credits. F. Ahl.
Topic: Euripides.

CLASS 418 Advanced Readings in Greek # (IV) (LA)
Spring. 4 credits. Prerequisites: one 200-level Greek class. H. Rawlings III.
Topic: Fourth century orators.

CLASS 421 Greek Comparative Grammar (also LING 451) (III) (KCM)
A. Nussbaum.
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)
A. Nussbaum.
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 545 Graduate TA Training
Fall and spring. 1 credit. D. Shanzer.
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. Not offered 2003-2004.
A survey of Greek literature in two semesters. CLASS 605: Greek literature from Homer to the middle-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 632 Topics in Ancient History (also CLASS 450 and HIST 450/630)
B. Strauss.
For description, see HIST 630.

CLASS 671 Graduate Seminar in Greek
Fall. 4 credits. F. Pucci.
Topic: Epic and Elegy.

CLASS 672 Graduate Seminar in Greek
Spring. 4 credits. K. Clinton.
Topic: Greek religion and epigraphy.

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. Students should be ready for CLASS 205 by the end of the course.

CLASS 107 Intensive Latin
Spring and summer. 6 credits.
A. Nussbaum.
An intensive introduction that lays down the essentials of Latin grammar before progressing rapidly to readings from selected authors in the original Latin. Prepares students in a single semester for CLASS 109.

CLASS 108 Latin in Review
Fall. 4 credits. Provides language qualification. Prerequisite: placement by departmental examination. D. Shanzer.
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 qualification. Prerequisites: CLASS 106, 107, 108 or placement by departmental exam.
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 205 Latin Prose
Fall. 3 credits. Satisfies Option I.
Prerequisite: CLASS 106, 107, 108 or placement by departmental exam.
C. Brittain.
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 (Philippica).
CLASS 206 Ovid: Erotic Poetry # (IV) (LA)
Spring. 3 credits. Satisfies Option I. Prerequisite: CLASS 109, 205 or placement by department exam. D. Mankin. Ovid's erotic poetry is relatively easy to translate, but rich in its literary structure and influence.

CLASS 207 Catullus # (IV) (LA)

CLASS 208 Roman Drama # (IV) (LA)

CLASS 209 Vergil # (IV) (LA)

CLASS 306 Undergraduate Latin Seminar: Roman Epic
Spring. 3 credits. Satisfies Option I. Prerequisite: one 200-level Latin class. H. Pellucia.

CLASS 307 Roman Historiography # (III or IV) (CA)
4 credits. Satisfies Option I. Prerequisite: 1 term of 300-level Latin or permission of instructor. Not offered 2003-2004. Was CLASS 317. Staff.

CLASS 309 Undergraduate Latin Seminar: Roman Prose
Fall. 3 credits. Satisfies Option I. Prerequisite: one 200-level Latin class. D. Mankin. Topic yet to be determined.

CLASS 312 Latin Undergraduate Seminar # (IV) (LA)

CLASS 317 Latin Prose Composition
Fall. 4 credits. Satisfies Option I. Prerequisite: 1 term of 200-level Latin or permission of instructor. Was CLASS 341. P. Pucci.

CLASS 369 Intensive Medieval Latin Reading # (IV) (LA)

CLASS 386 Independent Study in Latin, Undergraduate Level
Fall and spring. Up to 4 credits. Only by permission of the DUS in the case of documented schedule conflict. Was CLASS 227-228. Staff.

CLASS 411 Advanced Readings in Latin Literature # (IV) (LA)
Fall. 4 credits. Staff.

CLASS 412 Advanced Readings in Latin Literature # (IV) (LA)
Spring. 4 credits. C. Sogno.

CLASS 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 441. F. Ahl.

CLASS 555 Graduate Proseminar
Fall. 1 credit. Not offered 2003-2004. Staff. Graduate students are introduced to the tools, techniques, and methods of Classical scholarship.

CLASS 603 Later Latin Literature: Late Antique and Medieval Hagiology

CLASS 625-626 Graduate Survey of Latin Literature
625 fall; 626 spring. 4 credits each term. Prerequisite: linguistic proficiency to be determined by instructor. Not offered 2003-2004. Fall, C. Sogno; spring, F. Ahl. A survey of Latin literature in two semesters.

CLASS 679 Graduate Seminar in Latin: The Flavians
Fall. 4 credits. D. Shanzer.

CLASS 680 Graduate Seminar in Latin
Spring. 4 credits. M. Pincus.

CLASS 702 Independent Study for Graduate Students in Latin
Fall and spring. Up to 4 credits. Was CLASS 751-752. Staff.

CLASS 751-752. Staff.

Classical Art and Archaeology

CLASS 220 Introduction to Art History: The Classical World (also ART H 220) # (IV) (HA)

CLASS 221 Minoan-Mycenaean Art and Archaeology (also ARKEO 221 and ART H 221) # (IV) (CA)
Fall. 3 credits. Not offered 2003-2004. 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.

CLASS 222 Archaeology in Action I (also ARKEO 222 and ART H 222) # (IV)

CLASS 223 Archaeology in Action II (also ARKEO 223 and ART H 223) # (IV)

CLASS 240 Greek Art and Archaeology # (IV) (CA)
Spring. 3 credits. J. Coleman. Introduction to the material culture of Greece from the Early Iron Age to the coming of the Romans (ca. 1000 BC to 31 BC). The course focuses not only on famous monuments such as the Parthenon, but also on the evidence for daily life and for contact with other civilizations of the Mediterranean. A critical attitude is encouraged toward the interpretation of archeological remains and toward contemporary uses (and misuses) of the past.

CLASS 255 Practical Archaeology (also ARKEO 255) # (III or IV) (HA)
Spring. 3 credits. Not offered 2003-2004. J. Coleman. 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, etc.; 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. 

CLASS 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. 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.

CLASS 322 Greeks and Their Neighbors (also ART H 328) # (IV) (HA)
Fall. 4 credits. Prerequisite: CLASS 220 or 221, or permission of instructor. Not offered 2003-2004. J. Coleman. 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)
Spring. 4 credits. Was CLASS 319. A. Ramage. For description, see ART H 319.

CLASS 325 Greek Vase Painting (also ART H 325) # (IV) (LA)
Fall. 4 credits. Not offered 2003-2004. A. Ramage. For description, see ART H 325.

CLASS 327 Greek and Roman Coins (also ART H 327) # (IV) (LA)
4 credits. Not offered 2003-2004. J. Coleman. 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) (HA)
For description, see ART H 425.

**CLASS 431** Ceramics (also ARKEO 423 and ART H 423) (IV) (CA)
For description, see ARKEO 423.

**CLASS 434** The Rise of Classical Greece (also ARKEO 434 and ART H 434) (IV) (HA)
Spring. 4 credits. Recommended: CLASS 420 or 421, ART H 220 or 221, or permission of instructor. Not offered 2003-2004. 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)
For description, see ART H 427.

**CLASS 629** The Prehistoric Aegean (also ARKEO 629)
Fall. 4 credits. J. Coleman.
Seminar with focus on the Aegean and neighboring regions in the Neolithic and Early Bronze Ages.

**CLASS 630** Seminar in Classical Archaeology (also ARKEO 520 and ART H 520)
Spring. 4 credits. P. Kuniholm.
For description, see ARKEO 520.

**CLASS 705** Independent Study for Graduate Students in Classical Archaeology
Fall and spring. Up to 4 credits. Was CLASS 721-722. Staff.

**Greek and Latin Linguistics**

**CLASS 421** Greek Comparative Grammar (also LING 451) (III) (KCM)
Spring. 4 credits. Prerequisite: thorough familiarity with the morphology of classical Greek. Not offered 2003-2004. A. Nussbaum.
The prehistory and evolution 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)
The prehistory and evolution of the sounds and forms of Classical Latin as reconstructed by comparison with the other Indo-European languages.

**CLASS 425** Greek Dialects (also LING 455) (III) (KCM)
Fall. 4 credits. A. Nussbaum.
A survey of the dialects of ancient Greek through the reading and analysis of representative epigraphical and literary texts.

**CLASS 426** Archaic Latin (also LING 456) (III) (LA)
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.

**CLASS 427** Homeric Philology (also LING 457) (III) (LA)
Spring. 4 credits. Prerequisite: ability to read Homeric Greek. Not offered 2003-2004. A. Nussbaum.
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.

**CLASS 429** Mycenaean Greek (also LING 459) (III) (LA)
Spring. 4 credits. Prerequisite: thorough familiarity with the morphology of Classical Greek. Not offered 2003-2004. A. Nussbaum.

**Sanskrit**

**CLASS 191-192** Elementary Sanskrit (also LING 131-132 and SANSK 131-132)
191, fall; 192, spring. 4 credits each term. CLASS 192 provides language qualification. Was CLASS 131-132. A. Nussbaum.
An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.

**CLASS 201-202** Intermediate Sanskrit (also LING 251-252 and SANSK 251-252) (IV)
201, fall; 202, spring. 3 credits each term. CLASS 202 satisfies Option 1 and provides language proficiency. Prerequisite: CLASS 192 or equivalent. Was CLASS 251-252. Not offered 2003-2004. 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 704. Staff.
Also see CLASS 293, 390, and 395 (Classical Civilization listings).

**Honor 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. Halpern, D. Henninger, L. Lee, B. Selman, R. Zabih (computer science); A. Hedge (design and environmental analysis); K. Basu, L. Blume, D. Easley (economics); J. Dunn, R. Ripple, D. Schrader (education); S. Wicker (electrical and computer engineering); M. Cassarosa, S. Ceci, B. Kooloos, B. Lust, S. Robertson, E. Temple, Q. Wang, E. Wethington, W. Williams (human development); K. O'Connor, J. Russo (Johnson Graduate School of Management); J. Bowers, A. Cohn, C. Collins, M. Diesing, J. Gair, W. Harbert, S. McConnell-Ginet, A. Miller-Ockhuizen, C. Rosen, M. Rooth, Y. Shirai, J. Whitman, D. Zec (linguistics); A. Nerode, R. Shore (mathematics); F. Valero-Cuevas (mechanical and aerospace engineering); C. Linster, R. Harris-Warrick, H. Howland, R. Hoy, H. K. Reeve (neurobiology and behavior); R. Boyd, C. Ginet, D. Graff, B. Hellie, H. Hodes, S. Shoemaker, Z. Szabo, J. Whiting (philosophy); M. Christiansen, J. Cutting, R. Darlington, T. DeVoogd, D. Dunning, S. Edelman, M. Ferguson, D. Field, B. Finlay, T. Gilovich, B. Halpern, A. Iser, R. Johnston, C. Krumhansl, U. Neisser, M. Owen, E. Adkins-Began, M. Spivey (psychology); H. Maiet (science and technology studies); M. Macy (sociology).
R. Canfield, S. Hertz (associate members).
Cognitive studies is comprised of a number of disciplines that are linked by a major concern with fundamental capacities of the mind, such as perception, reasoning, language, the organization of motor action, and their neural correlates. In the College of Arts and Sciences these disciplines are represented in the departments of Computer Science, Economics, Linguistics, Mathematics, Neurobiology and Behavior, Philosophy, Psychology, Science & Technology Studies, and Sociology. Elsewhere in the university they are represented in the Departments of Computer Science, Mechanical and Computer Engineering 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 level are problems of characterizing such basic notions as "mind," "knowledge," "information," and "meaning." At a more specific level are questions regarding the abstract operating principles of individual components of the mind, such as those underlying visual perception, language ability, and understanding of concepts. These principles concern the organization and behavior of the components and how they are biologically represented in the brain. At the most specific level are questions about the properties of the elementary computational structures and processes that constitute these components. Important insights into issues of these kinds have been achieved in recent years as a result of the various cognitive 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 possibilities 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 complements to coursework in a single discipline presented by an individual department. It is considered crucial that students gain a strong background in their major, independent of their work in the concentration. Independent majors 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 subject to approval by their concentration 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 such aspects of our everyday 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 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

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 theory and research on the mind can help us better understand how we use information in such aspects of our everyday 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 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

3. Language and Cognition

This track focuses on the representation, processing, and acquisition and learning of language, as well as its role in cognition and culture. Students will acquire skills and knowledge in formal and applied linguistic theory, psycholinguistic experimentation, and computational modeling techniques.

- COGST 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 215/LING 215/PSYCH 215, Psychology of Language
- COGST 270/LING 270/PHIL 270, Truth and Interpretation
- COGST 416/PSYCH 416, Modeling Perception and Cognition
- COGST 427/PSYCH 427, Evolution of Language
- COGST 428/LING 428/PSYCH 428, Connectionist Psycholinguistics
- COGST 436/HD 436/LING 436/PSYCH 436, Language Development
- COGST 450/LING 450/PSYCH 450, Lab Course: Language Development
- COM S 411, Programming Languages and Logics
- LING 203, Introduction to Syntax and Semantics
- LING 301-302, Phonology I & II
- LING 303-304, Syntax I & II
- LING 309, Morphology
- LING 319-320, Phonetics I & II
- LING 325, Pragmatics
- LING 403, Introduction to Applied Linguistics
- LING 421-422, Semantics I & II
- PHIL 332, Philosophy of Language
- PSYCH 415, Concepts, Categories, and Word Meanings

4. Cognition and Information Processing

This track focuses on how the mind (or a computer) can encode, represent, and...
store information. Students will develop an understanding of concepts, categories, memory, and the nature of information itself.

COGST 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 414/PSYCH 414, Comparative Cognition

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 240, Philosophy of Mind

PHIL 562, Philosophy of Mind

PSYCH 311, 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 computer-based approaches to understanding how perception and cognition emerge in the human brain. Students will acquire knowledge of what neural structures subserve what perceptual/cognitive processes, and how they interact.

COGST 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 330/BION 330/PSYCH 330, Introduction to Computational Neuroscience

COGST 416/PSYCH 416, Modeling Perception and Cognition

COM S 401, Programming Languages and Software Engineering

PSYCH 352/BION 328, Biopsychology of Learning and Memory

PSYCH 390/BION 390, Introduction to Sensory Systems

PSYCH 419, Neural Networks Laboratory

PSYCH 425, Cognitive Neuroscience

PSYCH 440, The Brain and Sleep

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 providing 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 very substantial progress towards 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 adviser 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 adviser (one of the program faculty). The courses selected must form a coherent cluster that makes sense to both the adviser 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 assisting in and approving the student’s selection of courses, the concentration adviser serves as a general source of information about the field of cognitive studies, relevant resources around the university, and job and graduate school opportunities. Often, the adviser can help the student develop independent research experience.

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, 414 Upson Hall, selman@cs.cornell.edu; Draga Zec, linguistics, 5-0728, 217 Morrill Hall, dz7@cornell.edu; Zoltán Szabó, philosophy, 5-6824, 218 Goldwin Smith, zs15@cornell.edu; Michael Owren, psychology, 5-3835, 224 Uris Hall, mowren@cornell.edu. The current Director of Undergraduate Studies is Draga Zec.

Graduate Minor

Entering graduate students, as well as advanced undergraduates, who are interested in cognition and in the cognitive sciences are advised to take the 4-credit course COGST 501, Cognition, in Fall semester. To obtain the full four credits, a student will have to enroll concurrently in PSYCH 214/COGST 214 or in COGST 101; alternatively, COGST 101 may be taken earlier as a prerequisite.

Graduate students minor 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, 255-6465, se37@cornell.edu.

Courses

Cognitive Studies

COGST 101 Introduction to Cognitive Science (also COM 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 the 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.

COGST 111 Brain, Mind, and Behavior (also BION 111 and PSYCH 111) (II) (PBS)

Spring. 3 credits. Letter grade only. Intended for freshman 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. R. Hoy and E. Adkin-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 172 Computation, Information, and Intelligence (also COM S 172 and ENGR 172) (II) (MGR)

Fall. 3 credits. Prerequisite: some knowledge of calculus. L. Lee.

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. Not open to students who have completed the equivalent of COM S 100.

COGST 201 Cognitive Science in Context Laboratory (also COM S 201 and PSYCH 201) (III) (KCM)

Spring. 4 credits. Prerequisite: "Introduction to Cognitive Science." COGST
tools essential for following the current course' provides an introduction to the computational, approaches to solving these problems, are covered: the formal representation of linguistic theory, including the nature of linguistic data, poverty of stimulus, autonomy of syntax, different frameworks (including functional linguistics), and the history of linguistics.

COGST 300 Foundations of Linguistics (also LING 332) Fall. 4 credits. Prerequisites: LING 101 plus one other linguistics course, or two similar courses in another area of cognitive studies. C. Collins.

This course will cover foundational issues in linguistics theory, including the nature of linguistic data, poverty of stimulus, autonomy of syntax, different frameworks (including functional linguistics), and the history of linguistics.

COGST 330 Introduction to Computational Neuroscience (also BIOL 330 and PSYCH 330) (I) (PBS) Fall. 3 credits. Limited to 25 students. Prerequisites: BIONB 222 or permission of instructor. Offered alternate years. Not offered 2003–2004. 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) (III or IV) (KCM) Spring. 4 credits. Prerequisites: a previous course in formal semantics (e.g., LING 421) or logic (e.g., PHIL 231) or permission of instructor. Not offered 2003–2004. 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 342 and 642) (III) Fall. 3 or 4 credits. The 4-credit option 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 systems, 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 creative project. Prerequisites: PSYCH 205, 209, 214, 223, 292, or permission of instructor. M. Orenwen.
This course examines some of the conceptual and empirical work resulting from and fueling the current 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.

COGST 416 Modeling Perception and Cognition (also PSYCH 416 and 616) (III)
Spring. 4 credits. Prerequisites: PSYCH 205, 209, 214, or 245, 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. M. Roeth.
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 which combine linguistic knowledge with powerful computational formalisms. Topics include: computational grammars, parsing, representation of syntactic analyses, finite state morphology, weighted grammars, constraint formalisms for syntax; treebank and other markup methodology. robust low-level syntax and semantics; and experimental-modeling methodology using large data samples.

COGST 427 Evolution of Language (also PSYCH 427/627)
Fall. 3 credits. Prerequisite: senior status or permission of instructor. Limited to 20 students. Offered alternate years.
M. Christiansen.
Fueled by theoretical constraints derived from recent advances in the brain and 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 research pertaining to the origin and evolution of language. We consider evidence from psychology, the cognitive neurosciences, comparative psychology, and computational modeling of evolutionary processes. Topics for discussion may include: What does the fossil record tell us about language evolution? What can we learn from comparative perspectives on neurobiology and behavior? Can apes really "learn language?" Did language come about through natural selection? What are the potential preadaptations for language? What is the relationship between phylogeny and ontogeny?

COGST 428 Connectionist Psycholinguistics (also LING 428 and PSYCH 428/628) (III)
Fall. 3 credits. Prerequisite: senior standing or permission of instructor. Not offered 2003–2004. M. Christiansen.
Connectionist psycholinguistics involves using (artificial) neural networks, which are inspired by brain mechanisms, 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 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. Enrollment limit of 25 E. Tempel.
What are the brain mechanisms underlying human behavior? How do those underlying brain mechanisms develop? These are the 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 neuroanatomy 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 lecture and discussion of current research papers. Each week we will focus on a particular cognitive ability like language, memory, attention, inhibition, control, etc. For each topic we will explore what is known about the brain mechanisms that underlie that particular function, how those brain mechanisms develop over the life span, and where possible brain mechanisms underlying disorders of that particular cognitive function.

COGST 435 Mind, Self, and Emotion: Research Seminar (also HD 435)
Fall. 3 credits. Offered to upperclass undergraduate and graduate students. Limited to 20 students. Offered alternate years. Not offered 2003–2004. O. 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 three fields of inquiry. A special emphasis is given to cross-cultural studies on memory development, self-construal, and conception 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 633, LING 700, or PSYCH 600, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. Not offered 2003–2004. B. Lust.
This course surveys basic issues, methods, and research in the study of first-language acquisition. Major theoretical foundations 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 underpinnings of 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/HD 437/LING 450/PSYCH 437).

COGST 437 Minds, Machines, and Intelligence (also HD 438)
Fall. 3 credits. Prerequisite: HD 115 or PSYCH 101. Not offered 2003–2004. B. Koslovski.
The course examines problem solving and transfer, pre-causal thinking, logical thinking, practical syllogisms, causal reasoning, scientific reasoning, theories of evidence, expert vs. novice differences, and nonrational reasoning. Two general issues run through the course: the extent to which children and adults approximate the sorts of reasoning that are described by various types of models, and the extent to which various models accurately describe the kind of thinking that is required by the types of problems and issues that arise and must be dealt with in the real world.

COGST 438 Minds, Machines, and Intelligence (also S&TS 438) (III) (KCM)
Do machines think? Do they have minds? Are they intelligent? What can humans do that machines can't do and vice versa? How do humans use machines and how do machines use humans? In this course we will discuss how philosophers such as Turing, Searle, Dreyfus etc. have dealt with these questions. At the same time, however, we are also concerned with trying to rethink the themes raised by these thinkers in light of social scientists who have studied how people and machines interact in specific (local) contexts, as for example, in a plane's cockpit or on the Internet. Topics may also include virtual
surgery, speech recognition, and expert systems in medicine.

[COGST 439] Cognitive Development: Infancy through Adolescence (also HD 439)


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 450, LING 450, and PSYCH 437)


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 difference, experience, and complexity. Empirical reflections are taken upon major developmental topics such as cultural aspects of physical growth and development; culture and cognition; culture and language; culture, self, self-regulation; 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 465/665) (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 inherently 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 bi-weekly 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 adviser, writing permission of Cognitive Studies faculty member who will supervise the research and assign the grade. Cognitive Studies faculty.

Experience in planning, 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. Prerequisites: 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 undergraduate students who are engaged in research in a particular area relevant to cognitive science can meet across disciplines to learn and practice the essentials of research, using interdisciplinary approaches. In this workshop, students critique and discuss the existing literature in a field of inquiry, individual students present their research designs, methods, and results from their independent research studies, debate the interpretation of their research results, and participate in the generation of new research hypotheses and designs, in a peer group of other undergraduate students involved in related research.

[COGST 474] Introduction to Natural Language Processing (also COM S 474 and LING 474) (III)


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 use (a 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 676/677) (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 will be required to complete several problem sets and there will a final exam. In the spring semester there will be 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 will be required to complete a research project. Not offered 2003–2004. 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 will be taught jointly by two economists/game theorists and a computer scientist. The course has several objectives. First, we will 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 will 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 will cover new 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)

Spring. 4 credits. Enrollment limited to 15 students. Recommended: permission of instructor, PSYCH 350, experience in upper-division psychology courses, or graduate standing in non-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)

Fall. 3 credits. L. Lee.

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)

Fall. 4 credits. M. Rooth.

COM S 381 Introduction to Theory of Computing

Fall, summer. 4 credits.
COM S 392 Topics in High-Level Vision (also COGST 465 and PSYCH 465/665)
Spring. 4 credits. Offered alternate years.
S. Edelman.

COM S 411 Programming Languages and Logics
Fall. 4 credits. Not offered every year.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits.

COM S 474 Introduction to Natural Language Processing (also COGST 474 and LING 474)

COGST 436, LING 436, and PSYCH 436 (also COGST 450, HD 436, and PSYCH 436)

[HD 437 Lab Course: Language Development (also COGST 450, LING 450, and PSYCH 437)
B. Lust.]

[HD 438 Thinking and Reasoning (also COGST 437)
Fall. 3 credits. Not offered 2003–2004. B. Koslowski.]

[HD 439 Cognitive Development: Infancy through Adolescence (also COGST 439)

[HD 452 Culture and Human Development (also COGST 452)
Fall. 3 credits. Not offered 2003–2004. Q. Wang.]

Linguistics

LING 101 Introduction to Linguistics
Fall or spring. 4 credits. Fall. J. Whitman; spring. M. Diesing.

LING 170 Introduction to Cognitive Science (also COGST 101, COM S 101, PHIL 191, and PSYCH 102)
Fall. 3 or 4 credits. M. Spivey.

LING 215 Psychology of Language (also COGST 215, LING 715, and PSYCH 215/715)
Spring. 3 credits. M. Christiansen.

LING 264 Language, Mind, and Brain (also COGST 264)

LING 270 Truth and Interpretation (also COGST 270 and PHIL 270)

LING 301 Introduction to Phonetics
Fall. 4 credits. A. Miller-Ockhuizen.

LING 302 Introduction to Phonology
Spring. 4 credits. D. Zec.

LING 303 Introduction to Syntax
Fall. 4 credits. J. Bowers.

LING 304 Introduction to Semantics and Pragmatics
Spring. 4 credits. M. Diesing.

LING 305 Foundations of Linguistics (also COGST 305)
Fall. 4 credits. C. Collins.

LING 400 Language Typology
Fall. 4 credits. 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. M. Diesing; spring. C. Collins.

LING 414 Second Language Acquisition I (also ASIAN 414)
Spring. 4 credits. Y. Shirai.

LING 415 Second Language Acquisition II (also ASIAN 417)
Y. Shirai.

LING 419 Phonetics I
Fall. 4 credits. Staff.

LING 420 Phonetics II
Spring. 4 credits. A. Miller-Ockhuizen.

LING 421 Semantics I
Spring. 4 credits.

LING 422 Semantics II
Fall. 4 credits.

LING 423 Morphology
Spring. 4 credits. J. Bowers.

LING 424 Computational Linguistics (also COGST 424 and COM S 324)
Fall. 4 credits. M. Rooth.

LING 425 Pragmatics
Fall. 4 credits.

LING 428 Connectionist Psycholinguistics (also COGST 428 and PSYCH 428/628)
Fall. 3 credits. Offered alternate years. Not offered 2003–2004.
M. Christiansen.

LING 436 Language Development (also COGST 436, HD 437, and PSYCH 437)

LING 450 Lab Course: Language Development (also COGST 450, HD 437, and PSYCH 437)

LING 474 Introduction to Natural Language Processing (also COGST 474 and COM S 474)

Mathematics

MATH 281 Deductive Logic (also PHIL 331)
Fall. 4 credits.

MATH 481 Mathematical Logic (also PHIL 431)

MATH 482 Topics in Logic (also PHIL 432)
H. Hodes.

MATH 483 Intensional Logic (also PHIL 436)

MATH 486 Applied Logic (also COM S 486)
Spring. 4 credits.

Neurobiology and Behavior

BIONB 111 Brain, Mind, and Behavior (also COGST 111 and PSYCH 111)
Spring. 3 credits. B. Hey and E. Atkins Regan.

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  
Spring. 4 credits. H. Howland.

BIONB 328  Biopsychology of Learning  
and Memory (also PSYCH 332)  
Spring. 3 credits. T. DeVoogd.

BIONB 330  Introduction to  
Computational Neuroscience (also  
COGST 330 and PSYCH 330)  
C. Linster.

BIONB 392  Drugs and the Brain  
Spring. 4 credits. R. Harris-Warrick and  
L. M. Nowak.

BIONB 396  Introduction to Sensory  
Systems (also PSYCH 396)  
Spring. 3 or 4 credits. Not offered  

BIONB 421  Effects of Aging on  
Sensory and Perceptual Systems (also  
PSYCH 431 and 631)  
Fall. 3 or 4 credits. B. Halpern.

BIONB 424  Neuroethology (also PSYCH  
424)  
Spring. 4 credits.

BIONB 426  Animal Communication  
Spring. 4 credits.

BIONB 496  Bioacoustic Signals in  
Animals and Man  
Spring. 3 credits. C. Clark and R. Hoy.

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. H. Hodes.

PHIL 261  Knowledge and Reality  
Spring. 4 credits.

PHIL 262  Philosophy of Mind  
Fall. 4 credits. B. Hellie.

PHIL 270  Truth and Interpretation  
(also COGST 270 and LING 270)  

PHIL 286  Science and Human Nature  
(also S&TS 286)  
Fall. 4 credits. R. Boyd.

PHIL 318  Twentieth-Century Philosophy  
B. Hellie.

PHIL 331  Deductive Logic (also MATH  
281)  
Fall. 4 credits.

PHIL 332  Philosophy of Language  
Fall. 4 credits. H. Hodes.

PHIL 333  Problems in Semantics—  
Quantification in Natural Language  
(also COGST 333 and LING 333)  
Fall. 3 or 4 credits. Not offered 2003–2004.  
S. McConnell-Ginet and Z. Szabo.

PHIL 361  Epistemology  

PHIL 362  Philosophy of Mind  
S. Shoemaker.

PHIL 381  Philosophy of Science:  
Knowledge and Objectivity (also  
S&TS 381)  
R. Boyd.

PHIL 382  Philosophy and Psychology  

PHIL 383  Choice, Chance, and Reason  
H. Hodes.

PHIL 389  Philosophy of Science:  
Evidence and Explanation  

PHIL 431  Mathematical Logic (also  
MATH 481)  

PHIL 432  Topics in Logic (also MATH  
482)  
H. Hodes.

PHIL 433  Philosophy of Logic  
Spring. 4 credits. H. Hodes.

PHIL 434  Foundations of Mathematics  
H. Hodes.

PHIL 436  Intensional Logic (also MATH  
483)  

PHIL 437  Problems in the Philosophy of  
Language  
Spring. 4 credits. H. Hodes.

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)  
Spring. 3 credits. R. Hoy and E. Adkins  
Regan.

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.

PSYCH 214  Cognitive Psychology (also  
COGST 214 and PSYCH 614)  
Fall. 3 or 4 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  
Fall. 3 credits. M. Owen.

PSYCH 305  Visual Perception  
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 628)  
Spring. 4 credits. R. Johnston.

PSYCH 330  Introduction to  
Computational Neuroscience (also  
BIONB 330 and COGST 330)  
C. Linster.

PSYCH 332  Biopsychology of Learning  
and Memory (also BIONB 328 and  
PSYCH 632)  
Spring. 3 credits. T. DeVoogd.

PSYCH 342  Human Perception:  
Applications to Computer Graphics,  
Art, and Visual Display (also COGST  
342 and PSYCH 642)  
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)  
Spring. 3 or 4 credits. Not offered  

PSYCH 412  Laboratory in Cognition and  
Perception (also PSYCH 612)  
D. Field.

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 618)  

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)  

PSYCH 418  Psychology of Music (also  
PSYCH 618)  
Spring. 3 or 4 credits. C. Krumhansl.

PSYCH 424  Neuroethology (also BIONB  
424)  
Spring. 4 credits.
backed by an in-depth understanding of the development of skills required for critical relevant concepts and theories.

The course focuses on the examples from the material covered in COGST 214 (also PSYCH 214) and PSYCH 212. The material from those courses includes perception, attention and advanced-level discussions of selected topics in perception and cognitive science. 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.

**PSYCH 425 Cognitive Neuroscience**
- Fall. 4 credits. B. Finlay.

**PSYCH 427 Evolution of Language**
- Fall. 3 credits. M. Christiansen.

**[PSYCH 428 Connectionist Psycholinguistics]**

**PSYCH 431 Effects of Aging on Sensory and Perceptual Systems**
- Fall. 3 or 4 credits. B. Halpern.

**PSYCH 436 Language Development**

**[PSYCH 437 Lab Course: Language Development]**

**PSYCH 465 Topics in High-Level Vision**
- Spring. 4 credits. Offered alternate years. S. Edelman.

**PSYCH 491 Research Methods in Psychology**
- Spring. 4 credits. D. Dunning.

**[PSYCH 492 Sensory Function]**

**Graduate Courses and Seminars**

The following courses and seminars are generally for graduate students only. However, some may be appropriate for advanced undergraduates. The director of the concentration must approve an undergraduate student for any of these for satisfying the concentration requirements.

**COGST 501 Cognition**
- Fall. 4 credits. Concurrent or prior registration in COGST 101 (also COM S 101, LING 170, PHIL 191, and PSYCH 102) and COGST 212. Introduction to Cognitive Science, or COGST/PSYCH 214, Cognitive Psychology, is required. G-2. Students with PSYCH 614, Cognitive Psychology. 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 Vision and Language**
- Spring. 4 credits. Graduate seminar. Enrollment limited to 20 graduate students (or undergraduates with permission of instructor). Prerequisites: a course each in cognitive psychology, linguistics, and computer science, or permission of instructor. Offered alternate years.

The seminar concentrates on the nature of the representation of visual objects and scenes in the brain and compares it with the structural framework that serves as the main explanatory tool in current theories of language-processing. Data and ideas are drawn from visual psychophysics, neuropsychology, 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: Neuroscience as the Quest for Perfect Self-Knowledge**
- Spring. 4 credits. Prerequisite: COGST 501, PSYCH 614, or permission of instructor. Open to current graduate students, sophomores given priority in enrollment. S. Edelman.

In 1936 Jorge Luis Borges published a review of a nonexistent book by its fictional author, Mir Bahadur Ali, documents the search, by an unnamed hero, for Al-Mu'tasim, the enigmatic embodiment of moral and intellectual perfection in humankind. This seminar surveys the state of the art in theoretical neuroscience, whose ultimate goal—finding the mind in the brain—is considered by some to be no less elusive than Ali's imagined quest. Our journey through the literature on minds and brains—factual, fictional, and fantastic—will begin and end with the short story by Borges, "The Approach to Al-Mu'tasim." For more information, see http://kybele.psych.cornell.edu/~edelman/Cog-531-Spring-2004.

**COGST 550 Special Topics in Cognitive Science**
- 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 633 Language Acquisition**
- Fall. 1-4 credits. Prerequisites: 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 671 Introduction to Automated Reasoning**
- 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 HOQ, Nuprl, and PVS. Special emphasis is on type theory and logic and on tactic-oriented theorem proving.

**[COGST 676-677 Decision Theory]**
- Fall and spring. 4 credits each semester. This is a two-semester course. In the fall semester the course is lecture based. Students will be required to complete several problem sets and there will be a final exam. In the spring semester there will be 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 will be required to complete a research project. Not offered 2003-2004. B. Lust.

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 will 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 will 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 will cover new 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 691 Research Methods in Psychology**
- 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 tests 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**
- 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 2003-2004.
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 600/700 Graduate Seminars
LING 501 Cognition (also COGST 501)
Fall. 4 credits. S. Edelman.

LING 530 Representation of Structure in Vision and Language (also COGST 530 and PSYCH 530)
Spring. 4 credits. Offered alternate years. S. Edelman.

LING 531 Topics in Cognitive Studies: Neuroscience as the Quest for Perfect Self-Knowledge (also COGST 531 and PSYCH 531)
Spring. 4 credits. S. Edelman.

LING 509 Second Language Acquisition and the Asian Languages (also ASIAN 610)

LING 633 Language Acquisition Seminar (also COGST 633 and HD 633)
Fall. 1-4 credits. Prerequisite: COGST/HD/LING/PSYCH 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 788 Topics in Applied Logic

NBA 663 Managerial Decision Making
Fall. 3 credits. J. Russo.

PHIL 633 Philosophy of Language—Linguistic Convention

PHIL 682 Philosophy of Mind
Fall. 4 credits. B. Hellie.

PHIL 700 Graduate Seminars
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)
Spring. 4 credits. Offered alternate years. S. Edelman.

PSYCH 531 Topics in Cognitive Studies: Neuroscience as the Quest for Perfect Self-Knowledge (also COGST 531 and LING 531)
Spring. 4 credits. S. Edelman.

PSYCH 550 Special Topics in Cognitive Science (also COGST 550)
Spring. 4 credits. M. Spivey.

PSYCH 564 Cognitive Psychology (also COGST 214 and PSYCH 214)
Fall. 4 credits. Co-meets with COGST 501, Cognition. S. Edelman.

PSYCH 566 Topics in High-Level Vision (also COMS 392, COGST 465, and PSYCH 465)
Spring. 4 credits. Offered alternate years. S. Edelman.

PSYCH 569 Research Methods in Psychology (also COGST 491 and PSYCH 491)
Spring. 4 credits. D. Dunning.

PSYCH 574 Comparative Cognition (also COGST 414 and PSYCH 414)
Spring. 3 or 4 credits. M. Owen.

PSYCH 576 Auditory Perception (also PSYCH 316)
Fall. 4 credits. C. Krumhansl.

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 office.

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.

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.

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 2003-2004 COM L 304 [fall], COM L 346 [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 language course (conversation, composition, etc.) towards fulfilling this requirement.

4) An honor's essay (COM L 493) of roughly 50 pages is optional. It is to be written during the senior year under the direction of a faculty member, preferably from within the department, who has agreed to work in close cooperation with the
student. Students are urged to begin research on their thesis topic during the summer preceding their senior year. 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 broadening introductory courses in "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 students achieving grades of at least B+ on the senior essay, in course work for the major, and in their overall academic performance at Cornell.

First-Year Writing Seminars

Most 100-level courses may be used toward satisfying the freshman writing seminar requirement. See "John S. Knight Institute for Writing in the Disciplines" for a full description of the first-year seminar program.

Courses

COM L 201 Great Books # (IV) (LA)
Fall. 4 credits. COM L 201 and 202 may be taken independently of each other. 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 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. B. Maxwell.
World literature of the last 400 years, emphasizing the response to European worldwide expansion first in the colonizing countries, then in the colonized. Themes such as slavery, monstrosity, coercion, eloquence, solidarity, and emancipation will be central, as will understandings of the specific means by which writers achieve effects. Readings chosen from texts by Shakespeare, Goethe, Mary Shelley, Marx, Baudelaire, Melville, Conrad, Brecht, Woolf, Gésarre, Tutuola, Bradwraite, Naiapaul, and Armah.

COM L 203 Introduction to Comparative Literature (IV) (LA)
Fall 4 credits. M. Levine.
The course is intended to answer the question persistently asked by undergraduates: "What is Comparative Literature, anyway?" The format of the course is designed to acquaint students with the range of the field by having members of the department present those aspects which reflect their areas of expertise and their methods of teaching. Of the three meetings each week, the first generally takes the form of a lecture; the second and third will be a discussion of the assigned text. Topics to be considered include uses and methods of comparison, the role of theory in literary criticism, and connections between literary study and other disciplines, including history, law, visual and film studies, and/or political and economic theory. Authors studied range from Aeschylus to Ammons, Baudelaire to Borges, Cervantes to Gésarre. All readings in English translation. Open to majors and prospective majors as well as students intending majors other than Comparative Literature.

COM L 204 Global Fictions (IV) (CA)
Spring. 4 credits. N. Melas.
This course is an introduction and an inquiry into global perspectives on fiction. Can the reading of fiction point us towards becoming citizens of the world? How might we know this world? How might we imagine it? We consider the condition of the stranger in this global era as well as construct a geography of reading. Readings are drawn mainly but not only from the contemporary period and outside Europe. Readings change depending on instructor, but may include works of Rushdie, Marquez, Condé, Munif, Castellanos, Oe, Ngugi, Wolf, Kincaid, and Homer.

COM L 205 Introduction to Poetry (IV) (LA)
Fall. 4 credits. W. J. Kennedy.
Surveys early and modern periodical histories and poetic genres in Europe, Asia, and the Americas, from conventional "strict" genres such as songs, sonnets, and haiku to forms closely associated with our own times: free verse, "the prose poem," etc. Texts are drawn from poetry by such women and men as Sappho, Li Bai, Rumi, Shakespeare, Sor Juana, Basho, Goethe, Keats, Dickinson, Baudelaire, Böke, Akmatova, Sowol, Neruda, 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 208 Shakespeare and the Twentieth Century (also ENGL 208) (IV) (LA)
What is the relationship between the plays of Shakespeare in their own time and the various ways they have functioned in modern culture? We compare selected works of Shakespeare with their adaptations in fiction, theater, film, the educational system, government, and popular culture. The discussion of each play is organized around one or more critical approaches. The course attempts to provide a systematic introduction to the contemporary study of literature and culture.

COM L 211 Comedy and Humanism (also THE 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 its reading of key texts by Plato, Erasmus, Cervantes, Austen, Gogol, and Queneau. The philosophical dimensions of comic thought and action are explored through writings by Descartes, Vico, and several modern commentators including Freud. The course invites a speculative response to these 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)
Fall. 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 encourage thinking about and across cultural, linguistic, and national demarcations. This course proposes to read seriously words from Africa, passed on by the novelist Paule Marshall: "Once a great wrong has been done, it never dies. People speak the words of peace, but their hearts do not forgive. Generations perform ceremonies of reconciliation but there is no end." Countering the literature of amnesia and baseless optimism, the works read in the course cannot forget, and decline to forgive, the historical traumas that textually flavor them. The class is concerned largely with understanding the aesthetic strategies and innovations that these writers use to perform ceremonies not bent on reconciliation.

This is a special seminar sponsored by the John S. Knight Institute’s Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline’s outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

COM L 220 Thinking Surrealisms (IV) (LA)
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 uncondoned rebellion to the given, this course ranges over the protean expressiveness of several surreal moments of the last century. The inception of surrealist precept and practice in Paris in the mid-1920s is a consideration, perhaps only slightly more central to the course than the explicitly anti-fascist political phase of the 1930s and ‘40s; the supplementation of Parisian surrealism by Caribbean, Mexican, African American, Quebecois, and Mauritian writers and artists; the "unregulated practice" of Hans Bellmer and the unscathed surrealism 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 asks what the proliferation of "thinking surrealisms" meant to twentieth-century culture and politics. All readings in English.

COM L 225 Sophomore Seminar: Poetry and Poetics of Difference (also ENGL 225) (IV) (LA)
Fall. 4 credits. Limited to 15 students. J. Monroe.
What roles does poetry play in contemporary culture? In what ways does it engage and respond, in particular, to questions of difference and otherness? This course explores poetic practices within the United States and abroad, with particular emphasis on the period since 1989. Authors include Ashbery, Brathwaite, Fulton, Goytisolo, Mullen, Rich, Waldrop.

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**COM L 226 Sophomore Seminar: Viewing Modern Barcelona (also SPANL 230) (IV) (CA)**
Spring. 4 credits. Limited to 15 students. 
See SPANL 230 for full course description.

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, its discourse community, its modes of knowledge, and its 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 234 Arabs and Jews in Confluence and Conflict (also NES 234)**
Fall. 4 credits. R. Brann.
See NES 234 for a full description.

**COM L 256 Introduction to the Q'uran (also NES 256/656, RELST 213/656, JWST 248) @ (IV) (CA)**
Spring. 3 credits. T. Tooruwa.
See NES 256 for a full description.

**COM L 276 Desire (also ENGL 276) (IV) (LA)**
Spring. 4 credits. E. Hanson.
See ENGL 276 for full course description.

**COM L 279 Russian Connection 1830-1867 (also RUSSL 279) @ (IV) (LA)**
Fall. 4 credits. P. Garden.
See RUSSL 279 for full course description.

**COM L 293 Sophomore Seminar: Middle Eastern Cinema (also NES 293, FILM 293, VISST 293, JWST 291) (IV) (LA)**
Fall. 4 credits. Required Monday film viewing section. Limited to 15 students. D. Starr.
See NES 293 for full course description.

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, its discourse community, its modes of knowledge, and its ways of articulating that knowledge. Enrollment is limited to 15.
COM L 364 The European Novel # (IV) (LA)
Spring. 4 credits. M. Levine.
The nineteenth- and twentieth-century European novel from realism to postmodern experimentation. Discussions focus on the role of fiction in understanding, troubling, or shaping modern culture and identity, with particular attention to the ways that major novelistic themes and forms reflect and participate in modern European social and intellectual history. Authors studied could include Balzac, Dickens, Flaubert, Dostoievsky, Woolf, Kafka, Calvino, and Nabokov. 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 365.

[COM L 365 Contemporary Fiction @ (IV)
A study of European fiction and drama largely drawn 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 motive of re-enactment. Readings in translation chosen from the following: Robert Walser, Snowwhite and The Waifs; 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 Doblin, Berlin Alexanderplatz; Christa Wolf, The Quest for Christa T.; Louis Aragon, Paris Peasant; Louis-Ferdinand Céline, Death on the Installment Plan; Elsa Viterroni, In Sicily, Natalia Ginzburg, stories; and Isaac Babel, stories. Collateral theoretical readings by Georg Lukács, Ernst Bloch, Bertolt Brecht, Walter Benjamin, Siegfried Krauck, Gershom Scholem, Elias Canetti, and Christa Wolf.]

COM L 368 Visual Culture and Social Theory (also GOVT 375, ART H 370, ARCH 358, 359, 458, 658/459) # (III or IV) (CA)
Fall. 4 credits. S. Buck-Morss.
See GOVT.375 for full course description.

[COM L 382 Greeks, Romans, and Victorlians (also CLASS 382) # (IV) (LA)
See CLASS 382 for full course description.]

[COM L 387 Twentieth-Century Black Cultural Movements (also COM L 690, ARSC 332/532) # (IV)
See ARSC 332/532 for full course description.]

COM L 388 The Jews In and Out of Egypt (also NES 386, JWST 388) (III or IV) (CA)
Spring. 4 credits. D. Starr.
See NES 386 for a full course description.

COM L 398 Theorizing Gender and Race in Asian Histories and Literatures with a Particular Focus on Japanese Culture (also COM L 668, ASIAN 388/688) @ (IV) (CA)
Fall. 4 credits. N. Salai.
See ASIAN 388 for a full course description.

COM L 411 Sacred Fictions (also S HUM 411)
Fall. 4 credits. K. Haines-Eitzen.
See S HUM 411 for full course description.

COM L 412 Cultural Politics of 1968 in Paris and Mexico City (also FRLIT 427/627, ITALIA 447/647, SPANL 427/627, COM L 612) # (IV) (CA)
Spring. 4 credits. B. Rostekes.
See FRLIT 427 for full course description.

[COM L 413 Death, Culture, and the Literary Monument (IV)
Beginning with Homer's Iliad, this course inquires into the monumental transformation of death into immortality in the literary composition. How does death's negations become fiction's triumph? We pay particular attention to the fate of this procedure when its subjects are no longer heroic warriors but slaves and women. How does colonial domination and gender difference alter the aesthetic procedures and assumptions underlying commemoration and literary immortality? In addition to death and language, we consider such themes as the relation of antiquity to the present, of identity to its dissolution and of politics to culture. Readings of literary texts drawn from a variety of languages and traditions are attended by selected readings in critical theory and a glance at visual culture, particularly surrounding monuments commemorating the emancipation of slaves and the Holocaust. Authors include Homer, Derek Walcott, Simone Schwartz-Bart, Virginia Woolf, Krista Wolf, Tanya Salih, Maurice Blanchot, Hegel, Orlando Patterson, and Walter Benjamin.]

COM L 414 Theories of Spectatorship (also S HUM 427)
Fall. 4 credits. M. Harries.
See S HUM 427 for a full course description.

COM L 417 Faust (also GERST 417) # (IV) (CA)
Spring. 4 credits. H. Deinert.
See GERST 417 for full course description.

[COM L 418 Virtual Orientalisms (also ASIAN 415) # (IV)
A reading and discussion of key texts in narrative epic and chivalric romance from Italian, French, English, and other European literatures of the Renaissance.]

[COM L 419 Independent Study (also COM L 649) # (IV) (LA)
See ASIAN 415 for a full course description.]

COM L 422 New Testament Seminar (also RELST 426) # (IV) (HA)
Spring. 4 credits. Limited to 20 students. C. Carmichael.

COM L 428 Biblical Seminar (also RELST 427) @ (IV) (HA)
Fall. 4 credits. Limited to 15 students. C. Carmichael.
A study of how biblical ethical and legal rules (in Exodus, Leviticus, and Deuteronomy) comment on incidents in the biblical narratives (Genesis-2 Kings). The link between law and narrative enables us to observe in detail how ancient thinkers evaluate ethical and legal problems of perennial interest.

COM L 448 Writing the Void (also S HUM 428)
Spring. 4 credits. Limited to 15. A. Francois.
See S HUM 428 for a full course description.

COM L 450 Renaissance Poetry (also COM L 650, ENGL 622, ITALIA 450/650) # (IV) (LA)
Spring. 4 credits. W. J. Kennedy.
A reading and discussion of key texts in lyric poetry from Italian, French, English, and other European literatures of the Renaissance. Topic for spring 2004: Economic transactions and exchanges in the poetry of Petrarch, Michelangelo, Labè, Ronsard, Shakespeare, Mary Wroth, and others.

[COM L 451 Renaissance Narrative (IV)
A reading and discussion of key texts in narrative epic and chivalric romance from Italian, French, English, and other European literatures from the fourteenth to seventeenth centuries.

COM L 453 Rescreening the Holocaust (also GERST 449, FILM 450, JWST 449) (IV) (LA)
Fall. 4 credits. Limited to 30 students. D. Bathrick.
See GERST 449 for a full course description.

[COM L 457 Poetry and Rhetoric (also COM L 667, ENGL 483/683, FRLIT 437/637) (IV) (LA)
In present-day common usage, "poetry" means emotion or beauty, and "rhetoric" means deceptive, decorative language. These incompatible meanings cover over a history of close connection between poetry and rhetoric. Historically, if poetry and rhetoric at times have been seen as opposite, incompatible kinds of language, they also have been identified with each other and strongly distinguished from philosophy and science. Where rhetoric belongs turns out to raise issues of politics and philosophy, not only of literary history and language. Such questions and issues have been intently pursued in modern poetry beginning with the Romantics.

COM L 474 Topics in Modern European Intellectual and Cultural History (also HIST 474/674, JWST 474)
Spring. 4 credits. Prerequisites: permission of instructor. D. LaCapra.
Topic: Approaches to Intellectual and Cultural History. See HIST 474 for a full course description.
[COM L 480 Baudelaire in Context (also COM L 680, FRLIT 488/688) # (IV) (LA)]
A reading of Les Fleurs du Mal and Les Petits poèmes en prose, in conjunction with major twentieth-century critical treatments of them, so as to grasp what has been at stake in discussions of Baudelaire. Critics to be read include Benjamin, Bersani, de Man, Friedrich, Jakobson, Jauss, Johnson, and Sartre.

[COM L 482 Latin American Women Writers (also SPANL 492, FGSS 481) @ (IV) (LA)]
See SPANL 492 for full course description.

[COM L 487 Contemporary Poetry and Culture (also COM L 674, ENGL 488/688, GERST 674, SPANL 674) (IV) (LA)]
The reordering of cultural and political boundaries underway since the late 1980s has made it possible to conceive of the poetry of the Cold War era with a degree of closure unimaginable only a few years ago. In light of this changed situation, we focus on the second-half of the post-1945 period—the 30 years extending from 1958 to the present—with particular attention to the past two decades. Exploring issues of emerging and evolving importance for a poetry of the present moment in light of the recent past, we consider dominant modes as well as alternative practices; canon formation, gender, and multiculturalism; the roles of the publishing industry, popular culture, creative writing programs, and new computer technologies in shaping reading habits and writing communities.

[COM L 493 Senior Essay]
Fall and spring. 8 credits. Hours TBA individually in consultation with the director of the Senior Essay Colloquium. Approximately 50 pages to be written over the course of two semesters in the student's senior year under the direction of the student's adviser. An "R" grade is assigned on the basis of research and a preliminary draft completed in the first semester. A letter grade is awarded on completion of the second semester.

[COM L 495 The Cultural Theory of the Frankfurt School (also GERST 495, GOVT 471) (III or IV) (LA)]
See GERST 495 for full course description.

[COM L 496 Theorizing the Public Sphere (also GERST 496, GOVT 464) (III or IV) (LA)]
See GERST 496 for full course description.

[COM L 604 Translation and the Global Marketplace]

[COM L 609 Comparison and Cultural Difference]
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 circumstance can 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 selected poetry and film. Authors may include Lyotard, Foucault, Fanon, Tilley, Gilety, Clifford, Appadurai, Bhabha, Lassne, Kinsaid, Wallcott.

[COM L 610 Modern Japanese Studies: The Formation of the Field in History and Literature (also ASIAN 609) (IV)]

[COM L 612 Cultural Politics of 1968 in Paris and Mexico City (also FRLIT 427/627, ITALA 447/647, SPANL 427/627, COM L 412) (IV)]
Spring. 4 credits. B. Bozests.
See FRLIT 627 for full course description.

[COM L 619-620 Independent Study (also COM L 302 and ENGL 302/602) (III or IV) (LA)]
J. Culler.
See COM L 302 for full course description.

[COM L 630 Aesthetics in the Eighteenth Century (also ENGL 630) (IV)]
Fall. 4 credits. N. Saccamano.
See ENGL 630 for a full course description.

[COM L 631 Politics and the Passions: Hobbes to Rousseau (also ENGL 631) @ (IV) (LA)]
See ENGL 631 for full course description.

[COM L 633 Exile, the Third Zone of Literature]
Fall. 4 credits. R. Baraheni.
National literatures everywhere make the first set of literary zones: American, Arabic, French, German, Persian, and others. Euro-American metadiscourses of "universality" address the second literary zone, the West as a whole, in the name of the literature of the entire world. But the third zone, in this course, is made of the "conjunction of a mirror and an encyclopedia...while we sleep here, we are awake elsewhere, and in this way every man is two men" (Borges). The foreign writer-character-narrator (Sadeq Hedayat's I=eye, Camus' "stranger," and Nabokov's V in The Real Life of Sebastian Knight) "thinks he is in control, but he has been precipitated into someone else's dream" (Angela Carter). Rushdie's "elsewhere," definitely the echo of Foucault's heterotopia, could be applied to the dismembered lyricism of Toni Morrison's Beloved, where the African American exilic experience finds its forceful poetics. The third zone is Bckett's "unnamable," and Heidegger's interstitial no-man's-land, when old and new paradigms and old and new values are not in sight, where a total re-invention of memory takes place to harness language to the novel tasks of imaginative hybridities. Works by Al-ahmad, Beckett, Borges, Galvino, Cixous, Hedayat, Morrison, Nabokov, and others.

[COM L 636 Comparative Modernisms/Alternative Modernities] (IV)
The cultural movements or "style" that go under the name of modernism are international in scope. Modernism's broad comparative dimensions, however, when they are considered at all, are usually read from the centers of Western culture, especially Paris and London, out towards peripheral or marginal regions. This course reverses this critical itinerary and in the process inquire into the geographical coordinates that alternately relay and obscure the relation between modernism as an aesthetic movement and modernity as a world-historical and political-economic project. Central emphasis falls on colonialism and its particular inflection of the temporality of modernist aesthetics and on the progress of modernity in the two regions that are our focus: the French Caribbean and Mediterranean Egypt. While including canonical and critical texts on Western modernity, modernism and postcolonial theory, readings are focussed on the multiple and intersecting influences around two central figures, Martinican poet Aime Cesaire (Baudelaire, surrealism, African literature and anthropology, decolonization, Fanon, Glissant) and the modern Greek Alexandrian poet, Constantine Cavafy, (Browning, Forster, T. S. Eliot, Durrell, Tsirkas, Al-Khairat, Shaheen). All readings available in translation.

[COM L 644 Judaism and Modernism (also ENGL 683)]
Spring. 4 credits. W. Cohen.
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 Svevo, with possible attention to such writers as Borges, Celine, Doblin, Eliot, Hemingway, Mann, Nabokov, and Pound. Texts available in English.

[COM L 650 Renaissance Poetry (also COM L 450, ENGL 622, ITAL 450/650)]
Spring. 4 credits. W. J. Kennedy.
See COM L 450 for full course description.

[COM L 652 Renaissance Humanism (also COM L 452) (IV) (LA)]
See COM L 452 for full course description.

[COM L 663 Nietzsche and Heidegger (also GERST 663)]
Spring. 4 credits. G. Waite.
See GERST 663 for full course description.
COMPUTER SCIENCE

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:

- four semesters of calculus (MAT 111-112 or 114-115 or 121-122 or 191-192-295-296)
- 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, 381, 414, and 482)
- two 400+ computer science electives, totaling at least six credits
- a computer science project course (COM S 413, 415, 468, 473, 501, 514, 519, or 664)
- a mathematical elective course (ENGRL 270, MATH 300+, TAM 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. In this regard, 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 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 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 completed critical COM S courses and MATH courses
- a GPA of 2.7 or better in all completed critical COM S courses. COM S 211, 212 and 280 must be part of the GPA computation.
- a GPA of 2.7 or better in all completed critical MATH courses. MATH 192 and 293 or MATH 112/112 and 221 must be part of the GPA computation.

Critical COM S courses: COM S 211, 212, 280, 312, 314, 321, 322, 414, 421, 381, 481, and 482

Critical MATH courses: MATH 112, 122, 192, 221, 222, 223, 224, 293, 294, 336, 356, and ENGRD 270

Courses used in the affiliation GPA computations may be repeated if the original course grade was below a C. The most recent grade will be used for all repeated courses. Qualifying courses must be taken at Cornell.

Note: Students who do not meet these requirements are discouraged from attempting affiliation with the major. The COM S major can be exceptionally rigorous for students who are not suitably prepared for the academic requirements of the program and are unlikely to be admitted to the major if they do not meet the admissions standards listed above.

Honors. To qualify for departmental honors a student must have:

- maintained a cumulative GPA greater than or equal to 3.5
- completed two courses (3+ credit hours per course) of COM S course work at or above the 500 level (graded courses only; no seminars or two-credit project courses)
- completed six credit hours of COM S 490 research with a COM S faculty member, spread over at least two semesters and with grades of A- or better.
Courses

For complete course descriptions, see the computer science listing in the College of Engineering 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. Students who plan to take COM S 113 and 213 must take 113 first. S-U grades only.

**COM S 101  Introduction to Cognitive Science (also COGST 101, LING 170, and PSYCH 102 (III) (KCM)**
Fall, summer. 3 credits.

**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 Web Programming (also CIS 130)**
Fall, summer. 3 credits. No prerequisites.

**COM S 172  Computation, Information, and Intelligence (also COGST 172, ENGRD 172 (II) (MQR)**
Fall. 3 credits. Prerequisites: some knowledge of calculus.

**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 191/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.

**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. 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: S-U grade only. Prerequisite: COM S 114 or equivalent.

**COM S 215  Introduction to C #**
Fall, spring. 1 credit. Prerequisite: COM S/ENGRD 211 or equivalent experience.

**COM S 230  Intermediate Web Design (also CIS 230)**
Spring. 3 credits. Prerequisite: COM S 130.

**COM S 280  Discrete Structures (II) (MQR)**
Fall, spring. 4 credits. Prerequisite: 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 BIOGM 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 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 321, 322, or 421.

**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, or 421.

**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 CIS 330)**
Spring. 3 credits. Prerequisite: COM S 211/ENGRD 211.

**COM S 381  Introduction to Theory of Computing**
Fall, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and 481.

**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. Prerequisite: 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 421  Numerical Analysis**
Fall. 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, or 421.

**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 430  Information Discovery (also CIS 430)**
Fall. 3 credits. Prerequisite: COM S 211 or equivalent.

**COM S 431  Web Information Systems (also CIS 431; formerly CIS/COM S 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 465  Computer Graphics I (also ARCH 374)**
Fall. 3 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. Co-requisite: COM S 467.

**COM S 472  Foundations of Artificial Intelligence**
Fall. 3 credits. Prerequisites: COM S 211 and 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. 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 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. Corrections 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 or 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.

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 332, 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 I (also CEE 504, ECE 512, M&A 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 systems design component that is approved by a course instructor.

COM S 505 Applied Systems Engineering II (also CEE 505, ECE 513, M&A 592, OR&E 513, SYSEN 520)
Spring. 3 credits. Prerequisite: Applied Systems Engineering I.

COM S 513 System Security
Spring. 4 credits. Prerequisites: COM S 414 or 519 and familiarity with JAVA programming language.

COM S 514 Intermediate Computer Systems
Fall or spring. 4 credits. Prerequisites: COM S 414 or permission of instructor.

COM S 519 Computer Networks
Spring. 4 credits. Prerequisites: COM S 314 or permission of instructor. Not offered every year.

COM S 522 Computational Tools and Methods for Finance
Spring. 4 credits. Prerequisites: programming experience (e.g. C, FORTRAN, or MATLAB) and some knowledge of numerical methods, especially numerical linear algebra. Not offered every year.

COM S 572 Heuristic Methods for Optimization (also CEE 509)
Spring. 3 or 4 credits. Prerequisite: COM S 200 or ENGRD 211 or 322 or CE/ENG 241, or graduate standing, or permission of instructor. Not offered every year.

COM S 574 Language Technologies
Fall. 3 credits. Prerequisites: COM S 472 or 478 or 578 or the equivalent. Not offered every year.

COM S 578 Empirical Methods in Machine Learning and Data Mining
Fall. 4 credits. Prerequisites: COM S 280 and 312 or equivalent.

COM S 601 System Concepts
Fall. 3 credits. Prerequisite: open to students enrolled in the COM S Ph.D. program.

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 613 Concurrent Programming
Spring. 4 credits. Prerequisites: COM S 414 or permission of instructor. Not offered every year.

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.

COM S 615 Adaptive Systems
Fall. 4 credits. Prerequisites: COM S 614 recommended.

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 241 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 472 or 578 or permission of instructor.

COM S 630 Representing and Accessing Digital Information (also CIS 630)
Fall. 4 credits. Prerequisite: COM S 472 or 478 or 578 or the equivalent.

COM S 632 Advanced Database Systems
Spring. 4 credits. Prerequisite: COM S 432 or 533 or permission of instructor.

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. Offered fall 2003.

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.

COM S 671 Introduction to Automated Reasoning
Fall. 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 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 TBD.

COM S 675 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. Not offered 2003-2004.

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 Approximation and Network Algorithms
Fall. 4 credits. Prerequisites: COM S 681 or permission of instructor. Not offered every year.

COM S 685 The Structure of Information Networks (also CIS 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 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.

COM S 711 Seminar in Advanced Programming Languages
Fall or 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; semester TBA.

COM S 715 Seminar in Programming Languages
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 TBA.

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. Not offered every year; semester TBA.

COM S 726 Problems and Perspectives in Computational Molecular Biology
Fall, spring. 4 credits. Prerequisite: COM S 621 or 622 or permission of instructor. Not offered every year; semester TBA.

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 & AE 650)
Fall. 4 credits. Prerequisite: programming experience or permission of instructor. Not offered every year.

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
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 411 required; COM S 680, 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 advisor. 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 advisor. S-U grades only. Doctoral research.

CZECH
See Department of Russian.

DANCE
See under 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 also a powerful planet, with geologic 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 mineral and petroleum exploration, environmental monitoring, industry, government, 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 course work, students learn by outdoor fieldwork and involvement in the vigorous research programs of the department. 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 and physical analyses of earth materials, including instruments of the Cornell Center for Material Research, Ward Laboratory and the Cornell High Energy Synchotron Source (CHESS). Undergraduates have served as field assistants for faculty members and graduate students in Argentina, Mexico, British Columbia, the Aleutian Islands and southeastern Alaska, Scotland, Switzerland, Tibet, and the Barbados. Undergraduates are encouraged to participate in research activities, frequently as paid assistants.

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 112–213, CHEM 207 or 211. Freshmen and sophomores should take an introductory EAS course (or courses), normally EAS 101 or EAS 201, or 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 200-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 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 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 mineral and petroleum exploration, environmental monitoring, industry, government, 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 course work, students learn by outdoor fieldwork and involvement in the vigorous research programs of the department. 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 and physical analyses of earth materials, including instruments of the Cornell Center for Material Research, Ward Laboratory and the Cornell High Energy Synchotron Source (CHESS). Undergraduates have served as field assistants for faculty members and graduate students in Argentina, Mexico, British Columbia, the Aleutian Islands and southeastern Alaska, Scotland, Switzerland, Tibet, and the Barbados. Undergraduates are encouraged to participate in research activities, frequently as paid assistants.

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 112–213, CHEM 207 or 211. Freshmen and sophomores should take an introductory EAS course (or courses), normally EAS 101 or EAS 201, or 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 200-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 field work; or (d) an approved outdoor 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 R. W. Kay 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 department office in 2122 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, spring. 3 credits. Not offered fall 2003.
Staff.

Designed to enhance an appreciation of the physical world. Emphasizes natural environments, surface temperatures, and dynamic processes such as mountain belts, volcanoes, earthquakes, glaciers, and river systems. Interactions of the atmosphere, hydrosphere, biosphere, and lithosphere (Earth system science). Water, mineral, and fuel resources; environmental concerns. Field trips in the Ithaca region.

EAS 102 Evolution of the Earth and Life (also BIO Q 170) (I) (PBS)
Spring. 3 credits. J. L. Gisn.

Course topics include: Earth system and its evolution; Earth history's astronomical context; plate tectonics, continental drift, and their implications for climate and life; co-evolution of life and the atmosphere; precedents for ongoing global change; and dinosaurs, mass extinctions, and human ancestry. Includes laboratoires on reconstructing geological history and mapping ancient geography. Fossil collecting on field trips.

EAS 107 How the Earth Works
Fall. 1 credit. J. L. Gisn.
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 systems science and explores the scientific basis for informed decision making regarding many timely environmental issues, including global warming; water pollution and use; geologic hazards such as floods, earthquakes, and volcanoes; fossil fuel distribution and use; and land use.

EAS 109 Dinosaurs
Fall. 1 credit. J. L. Gisn.
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. J. M. Bird.
Acquaints the nonscientist with Earth. Course topics include: major features and how Earth has evolved; Earth system science and building a habitable planet; effects of human activity on geologic environments, mitigating environment damage, living with natural hazards; and mineral resource use in the twenty-first century and an environmentally sound fuel-minerals cycle.

EAS 122 Earthquake! (also ENGRG 122) (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 131 Basic Principles of Meteorology (I) (PBS)
Fall. 3 credits. 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. The optional one-credit laboratory for this course is offered as EAS 133.

EAS 133 Basic Meteorology Lab
Fall. 1 credit. Concurrent enrollment in EAS 131 is required. M. W. Wysocki.
Laboratory course covering topics presented in EAS 131.

EAS 150 Introduction to Fortran Programming
Fall. 3 credits. M. W. Wysocki.
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 BIOEE 154) (I) (PBS)
Spring, summer. 3 credits. Spring: 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/BIOEE 155.

EAS 155 The Sea: An Introduction to Oceanography, Laboratory (also offered as BIOEE 155)
Spring. 1 credit. Prerequisite: concurrent enrollment in EAS 154. C. H. Greene.
Laboratory course covering topics presented in EAS 154.

EAS 200 Art, Archaeology, and Analysis (also ENGRG 185, MS&E 285) (I) (PBS)
Spring. 3 credits. R. W. Kay.
An interdisciplinary course in the development 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 ENGRG 201) (I) (PBS)
Fall. 3 credits. Prerequisites: PHYS 112 or 207. L. M. 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 210 Introduction to Field Methods in Geological Sciences (I) (PBS)
Fall. 3 credits. 1 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 for analyzing the construction of geological maps and cross sections, systematic description of stratigraphic sections. There are field and laboratory sessions on Saturdays until Thanksgiving. There is 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 2003 (including tuition, room, board, and ferry transportation) is $2,120.

EAS 250 Meteorological Observations and Instruments

Spring. 3 credits. Prerequisite: EAS 131.

Lab fee $50. M. W. Wysocki.

Methods and principles of meteorological measurements and observations including field, onshore, and remote systems. Topics include: instrument siting, 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.

EAS 260 Soil Science (also CSS 260) (I)

Fall. 4 credits. S-U grades optional.

S. J. Riba.

Designed for students interested in a comprehensive introduction to soil science from both an environmental and plant management perspective, this course is divided into three units. A unit on soil information introduces students to soil characterization, testing, mapping, classification, GIS, and land evaluation. A soil management unit addresses fertility, pest management, water, and microclimate, as well as erosion, conservation, pollution, and soil health. The unit on the role of soils in ecosystems considers topics such as biodiversity, soils as sinks and sources of greenhouse gases, and the impact of soils on land use. Labs are initially field-oriented with an emphasis on practical skills needed to evaluate and manage soils. Subsequent labs focus on accessing, interpreting, and applying soil information.

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 Ni-o. 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 and CHEM 207 or equivalent.


Course covers the co-evolution of life and the earth system: Earth's early history, plate tectonics, continental drift, and climate change over 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. Isaac.

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 NTRES 321) (I) (PBS)

Fall. 4 credits. Prerequisites: CHEM 207, MATH 112, plus a course in biology and/or geology. L. A. Derry, 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, bio-active metals, the use of isotopic tools, and nutrient-limited models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.

EAS 326 Structural Geology (I) (PBS)

Spring. 4 credits. Prerequisite: MATH 112, EAS 101 or 201, or permission of instructor. One weekend field trip.

R. W. Allmendinger.

Nature and origin of deformed rocks to microscopic to macroscopic scales, with emphasis on structural geometry and kinematics. Topics include stress, strain, rheology, deformation mechanisms, minor structures, faulting, folding, and structural families.

EAS 331 Climate Dynamics (also ASTRO 331) (I) (PBS)

Fall. 4 credits. Prerequisites: two semesters of calculus and one of physics.

K. H. Cook, 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 (I) (PBS)

Spring. 3 credits. Prerequisite: a course in physics. Offered alternate years.

D. S. Wilks.

Considers the relationships of land use, 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.

M. W. Wysocki.

Introduction to the thermodynamics and hydrostatics of the atmosphere and to the methods of description and quantitative analysis used in meteorology. Topics 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 (I) (PBS)

Fall. 3 credits. Prerequisites: 1 year of calculus and a semester of oceanography (i.e., EAS 154), or instructor's permission.

C. H. Greene.

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 variability and the role of the ocean in global climate change; the El Ni-o/Southern Oscillation; ecosystem dynamics of the open ocean and coastal environments.

EAS 352 Synoptic Meteorology (I) (PBS)

Spring. 3 credits. Prerequisites: EAS 341 and concurrent enrollment in EAS 342.

M. W. Wysocki.

Weather map analysis 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 midlatitude synoptic scale weather systems, such as cyclones, anticyclones, jet streams, fronts, and waves.

EAS 355 Mineralogy (I) (PBS)

Fall. 4 credits. Prerequisites: 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. Cassetie.

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 Geotecstonics (I) (PBS)**

Spring. 4 credits. Prerequisites: MATH 192 (or 112) and PHYS 208 or 213.

B. L. Lucas.

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 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 Pampean Ranges (Piede Paio), and shallow-level silicic intrusives (Cerro Blanco-Ullun).

**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 keyed 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. S. Wilks.

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 structures; operational forecasts derived from multiple regression models, including the MRS 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.

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 447 Physical Meteorology (I) (PBS)**

Fall. 3 credits. Prerequisites: 1 year each of calculus and physics. Offered alternate years.

A. T. DeGaetano.

Primarily a survey of natural phenomena of the atmosphere, with emphasis on the 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 (I) (PBS)**

Fall. 3 credits. Prerequisites: EAS 341 and 342.

S. J. Colucci.

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 Pampean Ranges (Piede Paio), and shallow-level silicic intrusives (Cerro Blanco-Ullun).

**EAS 454 Advanced Mineralogy (I) (PBS)**

Spring. 3 credits. Prerequisite: EAS 355 or permission of instructor. Offered alternate years. Not offered 2003–2004. S. Mahlburg 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 356. Offered alternate years.

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; isotope geochemistry; geochemical thermodynamics and kinetics; chemical evolution of the crust, mantle, and core; weathering and the chemistry of natural waters; chemistry of rivers and the oceans; hydrothermal systems and ore deposition.

**EAS 456 Mesoscale Meteorology (I) (PBS)**

Spring. 3 credits. Prerequisites: EAS 341 and 342 or permission of instructor.

Offered alternate years.

S. J. Colucci.

Covers the structure and dynamics of midlatitude mesoscale weather systems such as fronts, jets, squall lines, convective complexes, precipitation bands, downslope windstorms, mountain breezes, sea breeze circulations, and lake effect snowstorms. The course also considers tropical weather systems and mesoscale modeling.

**EAS 457 Atmospheric Air Pollution (I) (PBS)**

Fall. 3 credits. Prerequisites: EAS 341 or 1 course in thermodynamics, and 1 semester of chemistry, or permission of instructor.

Offered alternate years.

W. M. Pyshocki.

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.


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 mechanisms; 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 462 Marine Ecology (also BIOEE 462) (I) (PBS)**

Spring. 3 credits. Limited to 75 students.

Prerequisite: BIOEE 261. Offered alternate years.


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 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 Mechanics (I) (PBS)
Fall. 3 credits. Prerequisite: EAS 375 or permission of instructor. Offered alternate years. Not offered 2003-2004. T. E. Jordan.
Covers subsidence of sedimentary basins from the point of view of plate tectonics and geomechanics. Topics include: interactions 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. 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 Paleobiology (also BIOEE 479) (I) (PBS)
Fall. 4 credits. Prerequisites: 1 year of introductory biology and either BIOEE 274, 373, EAS 375, or permission of instructor. Offered alternate years. W. Allm.
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)
Spring. 3 credits. Limited to seniors majoring in geological science. J. M. Bird.
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) and includes guest lectures; synthesis and review literature; scientific literature readings; discussions; student presentations.

EAS 483 Environmental Biophysics (also CSS 483) (I) (PBS)
Spring. 3 credits. Prerequisites: EAS/CSS 250 or equivalent, or permission of instructor. Offered alternate years. Not offered 2003-2004. S. J. Riha.
Introduction to basic principles of energy and mass transfer and storage in soil-plant systems. Topics include: energy budgets, soil heat and 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 throughout 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. Hyssel.
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. (R. W. Kay, 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 496 Internship experience
Fall or spring. 1-2 credits. S-U grades only.

EAS 497 Individual Study in Atmospheric Science
Fall or spring. 1-6 credits. S-U grades optional. Students must register with an Independent Study coordinator. 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. 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 ground water 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 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, 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
Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and cleavage development; and experimental deformation. Applications to deformation of unconsolidated sediments, brittle and 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, or strike-slip provinces. Techniques of balanced cross sections.

EAS 628 Geology of Organic Belts
Spring. 3 credits. Prerequisite: permission of instructor. J. M. Bird.
A seminar course in which students study specific geologic topics of an organic belt selected for study during the term. The course is intended to complement EAS 681.

EAS 641 Analysis of Biogeochemical Systems
Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years. Not offered 2003-2004. 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 Matlib; applications to current research of participants or from recent literature.

EAS 651 Atmospheric Physics (also ASTRO 651)
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. The 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 Sally.

EAS 652 Advanced Atmospheric Dynamics (also ASTRO 652)

Spring. 3 credits. Prerequisites: EAS 341 and 342 or permission of instructor. Offered alternate years. Not offered 2003–2004. S. J. Colucci, P. J. Giereach. 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. Not offered 2003–2004. W. M. White. Course topics include: petrogenesis, paleontontology, and the global carbon cycle. Topics covered include: multivariate EDA, the multivariate normal distribution, parametric approaches, and the isotopic abundances of the elements; geochronology and cosmochronology including U-Pb, RbSr, SmNd, K-Ar, U-series isotopes, and cosmogenic isotopes such as 14C and 36Cl; use of radiogenic and stable isotopes in petrology and their application to study the evolution of the crust and mantle; isotopic evidence regarding the formation of the Earth and the solar system; and stable isotopes and their use in geothermometry, ore petrogenesis, paleontology, 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. Not offered 2003–2004. D. S. Wilks. Statistical techniques for multivariate 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-Atmosphere System (also CSS 675)

Spring. 3 credits. Prerequisites: EAS/CSS 483 or equivalent. Offered alternate years. 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.

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. Isaacks. 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 Plate Tectonics and Geology

J. M. Bird.

EAS 751 Petrology and Geochemistry

R. W. Kay.

EAS 755 Advanced Topics in Petrology and Tectonics

J. M. Bird.

EAS 757 Current Research in Petrology and Geochemistry

S. Mahlburg Kay.

EAS 762 Advanced Topics in Paleobiology

W. D. Allinon.

EAS 771 Advanced Topics in Sedimentology and Stratigraphy

T. E. Jordan.

EAS 773 Paleobiology

J. L. Gisn

EAS 775 Advanced Topics in Oceanography

Spring. C. H. Greene.

EAS 780 Earthquake Record Reading

Fall. M. Barazangi.

EAS 781 Advanced Topics in Exploration Geophysics

L. D. Brown.

EAS 783 Advanced Topics in Geophysics

B. L. Isaacks.

EAS 789 Advanced Topics in Seismology

L. D. Brown.

EAS 793 Andes-Himalayas Seminar


EAS 795 Low Temperature Geochemistry

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

L. M. Cathles, T. S. Steenhuis.

EAS 850 Master-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 optional. 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.

EAST ASIA PROGRAM

140 Uris Hall


The East Asia Program draws together faculty from departments and fields throughout the university who participate in a program of research and teaching on the civilizations and cultures of East Asia. Courses are offered through departments in the humanities and social sciences, as well as in the fields of business, city and regional planning, international and comparative labor relations, and rural sociology. The Department of Asian Studies offers language courses in Mandarin, Cantonese, Korean, and Japanese, in addition to the full-year Asian language Concentration (FALCON) in Japanese and Mandarin.

Undergraduates major in the Department of Asian Studies and concentrate on the language and culture of one East Asian country, while graduate students may work toward an M.A. or Doctor of Philosophy (Ph.D.) in the discipline such as agricultural economics, anthropology, city and regional planning, government, history, history of art, linguistics, literature, rural sociology, or sociology. Graduate students concentrating on East Asia may apply for a variety of fellowships and travel grants offered by the East Asia Program. The formal program of study is enriched by numerous events and instruction.
extracurricular activities, including films, workshops, art exhibits, lectures, symposia, and cultural and artistic performances on East Asia. With over a half million holdings in Chinese, Japanese, Korean, and western languages, the Wason Collection in Kroch Library is a major national resource for research on East Asia. A 5,000 piece collection representing the full range of Chinese, Japanese, and Korean art may be seen at the George and Mary Rockwell Galleries in the Herbert F. Johnson Museum of Art.

ECONOMICS


The study of economics provides an understanding of the way economies operate and an insight into public issues. The department offers a broad range of undergraduate courses in such fields as money and banking; international and comparative economics; econometrics; theory; history, growth and development, and the organization, performance, and control of industry.

Social Science Distribution Requirement

The microeconomics distribution requirement can be fulfilled with any of the following:

ECON 101, ECON 301, or ECON 313.

The macroeconomics distribution requirement can be satisfied with any of the following:

ECON 102, ECON 302, or ECON 314.

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
(3) at least three courses from the following: 318, 320, 322-99, 431
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 (formerly ECON 467) are taken, only one can be applied to the major.

An honors program is currently being offered. Students should consult the director of undergraduate studies before May of their junior year for more information.

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 440-41, 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 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.

Prerequisites: ECON 101 and 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 required 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)

For description, see AEM 230.

ECON 301 Microeconomics (III) (SBA)

Fall. 4 credits. Prerequisite: calculus.

Students planning to attend Law School 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 440-41, 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.

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ECON 101 is required for 102.

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ECON 230 International Trade and Finance (III)

For description, see AEM 230.

ECON 301 Microeconomics (III) (SBA)

Fall. 4 credits. Prerequisite: calculus.

Students planning to attend Law School 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 440-41, Analysis of Agricultural Markets and Commodity Futures Markets.

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Courses

ECON 101 Introductory Microeconomics (III) (SBA)

Fall, spring, winter, and summer. 3 credits.

Prerequisites: ECON 101 and a prerequisite for 102.

Explanation and evaluation of how the price system operates in determining what goods are produced, how goods are produced, who
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 220 Introduction to Econometrics (II) (MQR)**

Spring. 4 credits. Prerequisites: ECON 101–102, 319, or equivalent.

Introductory 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 221 Applied Econometrics (II) (MQR)**

Fall and spring. 4 credits. Prerequisites: ECON 101–102 and calculus.

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 222 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 223 American Economic History # (III) (SBA)**

Fall. 4 credits. Prerequisites: ECON 101-102 or equivalent.

Problems in American economic history from the first settlements to early industrialization are surveyed.

**ECON 224 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 311 Money and Credit (III) (SBA)**

Fall. 4 credits. Prerequisites: ECON 101-102 and 314.

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 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 334 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 analyzed. Topics covered 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 social 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 optimally assigned to local governments? What impact does 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 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., oligopoly) 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 benefits from externality-generating activities. How the various professions (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 313.

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 details of foreign exchange markets, balance of payments accounting, and the international monetary 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 which prepares students to think strategically on social and economic issues, and to serve 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.

This course studies mathematical models of conflict and cooperation in situations of uncertainty (about nature and about decision makers).

**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.
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 vs. market debate and the role of the state in economic development, and the question of sustainable development.

ECON 404 Economics and the Law (III) with 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 408 Production Economics and Policy (III)
For description, see AEM 608.

ECON 409 Environmental Economics (III)
For description, see AEM 451.

ECON 411 Price Analysis (III)
For description, see AEM 415.

ECON 416 Intertemporal Economics (III) with SBA
Fall 4 credits. Prerequisites: ECON 313.
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)
Fall or 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 to modern economics analysis and current efforts to answer some of the questions raised in the early writings on economics.

ECON 419 Economic Decisions under Uncertainty (III)
Fall. 4 credits. Prerequisites: ECON 313 and 319. Not offered 2003-2004.
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 1 course for the Economics major.
For description, see PAM 320.

ECON 421 Economics of Family Policy—Children
ECON 420 and 421 together, count as 1 course for the Economics major.
For description, see PAM 321.

ECON 425 Economic History of Latin America @ & (III) (HA)
Spring. 4 credits. Not offered 2003-2004. A survey of changing economic institutions and policies from pre-Columbian to modern times.

ECON 430 Policy Analysis: Welfare Theory, Agriculture, and Trade (III)
For description, see AEM 630.

ECON 431 Monetary Economics (II) (MGR)
Spring. 4 credits. Prerequisites: ECON 313 and 314. Not offered 2003-2004. This is a course on one good theory, history, and policy. Topics covered include transaction costs, centralized and bilateral trading, media of exchange, international exchange and monetary arrangements, and central bank and its policy.

ECON 440 Analysis of Agricultural Markets
ECON 440 and 441 together, count as one course for the Economics major.
For description, see AEM 640.

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 445.

ECON 445 Topics in Microeconomic Analysis—Markets and Planning (III) (SBA)
Fall 4 credits. Prerequisites: ECON 313.
This is a course of economic theory designed for upperclass undergraduates. Course contents may vary from year to year. Issues that may be examined include: How can economic activities be efficiently organized through the market mechanism? Why is the presence of many traders essential to efficiency? What can be done if the indivisibility in production processes becomes an important hindrance to competitive pricing? How can economic planning be decentralized efficiently? This course serves two purposes: to introduce concepts that are novel to students; and to illustrate the deductive approach of modern economic analysis—how to define concepts unambiguously, how to form propositions in clear-cut fashion, and how to follow up logical implications sequentially to the conclusion.

ECON 446 Topics in Macroeconomic Analysis—Is Keynesianism Dead? (III)
Fall or spring. 4 credits. Prerequisites: ECON 314. Not offered 2003-2004.

ECON 447 Economics of Social Security (III)
For description, see CEH 346.

ECON 450 Resource Economics (III)
For description, see ARME 450.

ECON 451 Economic Security (III) (SBA)
For description, see ILRLE 340.

ECON 453 The Economics of Unemployment (III)
For description, see ILRLE 348.

ECON 454 Special Topics in Labor Economics
For description, see ILRLE 440.

ECON 455 Income Distribution (III)
For description, see ILRLE 441.

ECON 456 The Economics of Employee Benefits (III)
For description, see ILRLE 442.

ECON 457 Women in the Economy (III)
For description, see ILRLE 445.

ECON 458 Topics in Twentieth-Century Economic History (III)
For description, see ILRLE 448.

ECON 459 Economic History of British Labor 1750-1940 (III)
For description, see ILRLE 446.

ECON 460 Economic Analysis of the Welfare State (III)
For description, see ILRLE 642.

ECON 461 The Economics of Occupational Safety and Health (III)
For description, see AEM 646.

ECON 464 Economics of Agricultural Development (III)
For description, see AEM 645.

ECON 465 Food and Nutrition Policy (III)
For description, see AEM 665.

ECON 468 Economic Problems of Latin America @ (III) (SBA)
Spring. 4 credits. Prerequisites: ECON 101-102. Not offered 2003-2004. Current topics include: international debt, capital flight, economic integration, stabilization programs, etc.

ECON 469 China's Economy under Mao and Deng @ (III) (SBA)
Fall. 4 credits. Prerequisites: ECON 101-102 or permission of instructor. Examines the development of the Chinese economy and the evolution of China's economic system between 1949 and the early 1990s.

ECON 471 The Economies of the Former Soviet Union and of Central Europe: From Central Planning to Markets (III) (SBA)
The course introduces first the basic features of a centrally planned economy and proceeds to consider the most important example: the rise and fall of the Soviet Union. Secondly, the analysis extends to what is used to be known as “Eastern Europe” (e.g., Czechoslovakia, Hungary, Poland). From this necessary historical background, the course proceeds to current attempts to move away from Socialist central planning and its legacies to market economy, privatization, and independence.

ECON 472 Comparative Economic Systems: East and West (III) (SBA)
The course develops first a framework for studying economic systems and national economies and presents three simple stylized systemic models: capitalist market, socialist market, and central planning. Secondly, the course considers economic goals to be achieved (such as growth, stability, and productivity) and introduces quantitative measures used in the evaluation of the performance. Thirdly, comparative studies of selected national economies representing the models are carried out.

ECON 473 Economics of Export-Import Development (III) (SBA)
Spring. 4 credits. Prerequisites: ECON 313, 314, or their equivalent.
This course examines the phenomenon of export-import development from both the theoretical and empirical point of view. Concentration is on experiences within the West Pacific Rim.

ECON 474 National and International Economics (III)
For description, see NS 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 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) (II) (MQR)
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 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 and takes into account the limitations of the problems with this theory. Issues discussed here include decision theory paradoxes revealed by experiments, cognitive and knowledge limitations, and computational issues. Third, much 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. This is a two-semester course. In the fall semester the course will complete several problem sets and there will a final exam. In the spring semester there will be 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 will be required to complete a research project.

ECON 477 Decision Theory II (also ECON 677, CIS 577) (II) (MQR)
Spring. 4 credits. Prerequisite: ECON 476 or 676 or CIS 576. Not offered 2003-2004.
For description, see 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, 321 (or 319-320). Consult the Director of Undergraduate Studies for details. 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 Bertrand, Cournot, and monopolistic competition. It covers the classical sources of market failure (public goods, externalities, and natural monopoly) and discusses market failures stemming from informational asymmetries. It also provides an introduction to contract theory, bargaining theory, social choice theory, and 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 economist, equilibrium; second, we cover sequential markets and Arrow-Debreu Markets; Ricardian proposition, Modigliani-Miller theorem; asset pricing; recursive competitive equilibrium; the Neoclassical Growth Model; calibration; and introduction to dynamic programming.

ECON 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 covered may include study of dynamic systems (linear and nonlinear difference equations, differential equations, 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 319-320 or permission of instructor.
The course gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics covered include: probability theory, probability spaces, random variables, distributions, moments, transformations, conditional distributions, distribution theory, and the multivariate normal distribution, convergence concepts, laws of large numbers, central limit theorems, Monte Carlo simulation, statistics: sample statistics, sufficiency, exponential families of distributions. Further topics in statistics are considered in ECON 620.

ECON 620 Econometrics II
Spring. 4 credits. Prerequisite: ECON 619.
This course is a continuation of ECON 619 (Econometrics I) covering statistics: estimation theory utility squares methods, method of moments, theory of hypothesis testing, asymptotic test theory, and nonnested hypothesis testing; and econometrics: the general linear model, generalized least squares, specification tests, instrumental variables, dynamic regression models, linear simultaneous equation models, nonlinear models, and applications.

ECON 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-
Advanced graduate students contemplating continuous-time diffusion processes. Examples that have been useful in developing stochastic systems 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.

This course aims to orient the student in this large and variegated literature consisting of recently published articles and working papers. Understanding this literature is a sound training in the analytical methods used at the frontier of theoretical research, but it also provides a number of empirical results at the center of the economic debate.

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.

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.

mak the supply of public services and raising revenue through taxes and user-fees. Particular emphasis is placed on the intersection between fairness and efficiency in resolving conflict over public good provision, including defining jurisdictions for the provision of particular services. Examples emphasize the proper provision of infrastructure services: physical (transportation, utilities), human-capital (education and R&D); and biological (renewable resources, species diversity and the environment.

ECON 676 Decision Theory I (also CIS 576) Not offered 2003-2004. For description, see ECON 476.

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, macroeconomic processes, and general systems analysis.

ECON 710 Stochastic Economics: Concepts and Techniques Spring. 4 credits. Prerequisites: ECON 609, 610, 613, 614, 619, and 620. 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 saving 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 711 Advanced Macroeconomics I 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 add nonconvexities to models of optimal growth. These topics are intended to complement the material on overlapping generations covered elsewhere.

ECON 712 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 results that have substantially

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 results that have substantially

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. 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 saving 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 720 Advanced Topics in Econometrics II Spring. 4 credits. Prerequisites: ECON 619-620 or permission of instructor. 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 saving 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 721 Time Series Econometrics Spring. 4 credits. Prerequisites: ECON 619-620 or permission of instructor. 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 saving 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 722 Econometrics Spring. 4 credits. Prerequisites: ECON 619-620 or permission of instructor. 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 saving 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 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 Fall. 4 credits. Prerequisites: ECON 614 or permission of the instructor. Covers advanced topics in monetary economics, macroeconomics, and economic growth—such as overlapping-generations, taxes and transfers denominated in money, transactions demand for money, multi-asset accumulation, intertemporal 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—such as economic volatility, the "burden" of government debt, restrictions on government borrowing, dynamic optimization, endogenous growth theory, technological evolution, financial market frictions, and cyclical fluctuations.

ECON 735 Public Finance: Resource Allocation and Fiscal Policy (also AEM 735) Spring. 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 Fall. 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 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 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, 620.
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 address 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 746 Economics of Higher Education
For description, see ILRLE 746.

ECON 747 Economics of Higher Education
For description, see ILRLE 747.

ECON 748 Applied Econometrics I
For description, see ILRLE 741.

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 R&D/Patents. 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
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 uncertain information. Although the precise topics considered vary from year to year, subjects such as markets with asymmetric information, signalling theory, sequential choice theory, and record theory are discussed.

ECON 758 Psychology and Economic Theory
Fall, spring. 4 credits. Prerequisites: grad core or instructors 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 770 Topics in Economic Development
For description, see AEM 667.

Spring. 4 credits. Prerequisites: ECON grad 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 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 nonmarket goods. 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: some 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.
ENGL 201 and 202 are required and are strongly recommended for majors and prospective majors. ENGL 280, 281, 288, and 289 are also suitable to their second major. All English majors are urged to take courses in which they read foreign works of literature in the earlier periods of British literature and so exercise this option even if all 12 credits are applied to their second major. All English courses are also approved for the "Humanities and the Arts" distribution requirement of the College of Arts and Sciences. Many of these courses may be used to meet the college's "historical breadth" requirement as well.

Of the 40 credits required to complete the major, 8 credits (two courses) must be at the 400 level or above; 12 credits (three courses) must be from courses in which 50 percent or more of the material consists of literature originally written in English before 1800; and another 12 credits (three courses) must form an intellectually coherent "concentration." The 400-level and pre-1800 requirements may be satisfied only with ENGL courses, and ENGL 493–494, the Honors Essay Tutorial, may not be used to satisfy either one. Courses that satisfy the pre-1800 requirement are so designated in Courses of Study. Many English majors (ENGL 202) begin meeting this requirement since it provides an overview of earlier periods of British literature and so enables them to make more informed choices of additional pre-1800 courses. ENGL 202 does not qualify as a pre-1800 course. Neither do courses offered by other departments unless they are cross-listed with English. Advanced courses in foreign literature may not be used to fulfill the pre-1800 requirement, but they may be used for English major credit provided that 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 an option that 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, Africana Studies, the Society for the Humanities, American Studies, Feminist, Gender & Sexuality Studies, Religious Studies, Asian American Studies, Latino Studies, and Theatre, Film, & Television) are excluded 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, and for that reason
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, summer, and winter. 3 credits. Each section limited to 16 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 the novel. Students write critical essays on authors who flourished between 1870 and the present, such as James, Joyce, Woolf, Hurston, Lawrence, Fitzgerald, Hemingway, Faulkner, Rhys, Welsy, Salinger, and Morrison. Reading lists vary from section to section, and may include a novel from each major period, with imaginative reading and writing 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 works of poets from William Shakespeare to Sylvia Plath, John Keats to A. R. Ammons. We may read songs, sonnets, poems, novels and poems, writing frequently about them, and reading each other’s writing as collaborators and commentators. They will often “look up” from their reading to pay attention to the way writers’ original literary works are often “readings” of the work of other writers and to the way our own readings may, critically and creatively, rewrite the literary texts we read.

This is a course for English majors and non-majors who wish to extend their mastery of critical and interpretive prose and their understanding of what they do when they write it. It will be advantageous for those planning to write honors theses in English or another discipline. On the 2003 list (tentatively): Brontë’s Jane Eyre, Wordsworth’s The Prelude, Rhys’s Wide Sargasso Sea, poems and tales by Poe, Nabokov’s Lolita, Woolf’s Mrs. Dalloway and Michael Cunningham’s The Hours.

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, saires, parables, philosophical tales, and “thought-experiments.” Students will write critically about such works and the issues they raise and will experiment with writing in similar forms. The “fictions” read and written in this course are not realistic narratives of 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 Gorgias, Swift’s “Modest Proposal” and The Tale of a Tub, Voltaire’s Candide, Carroll’s Alice books, short fictions by Jorge Luis Borges and Octavia Butler, and essays by Richard Rorty and Martha Nussbaum.

ENGL 387 Autobiography: Theory and Practice (IV) (LA)
Spring. 4 credits. K. Gottschalk.

ENGL 388 The Art of the Essay (IV) (LA)
Fall. 4 credits. Limited to 15 students. By permission of instructor on the basis of writing samples. Interested students should submit one or more pieces of critical writing (prose) to the instructor before the beginning of the term, preferably at pre-enrollment. L. Fukunishi.

For both English majors and nonmajors who have done distinguished work in first-year writing seminars and in such courses as ENGL 288-289, 290-291, and who desire intensive practice in writing essays as a kind of creative
nonfiction. The course assumes a high degree of self-motivation, a capacity for independent work, and critical interest in the work of other writers; it aims for a portfolio of conceptually rich and stylistically polished writing.

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 advisor). 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. Prerequisites: completion of the Freshman Seminar requirement. Limited to 18 students.

Majors and prospective majors, please note. Although recommended for prospective English majors, ENGL 280-281 cannot be counted towards the 40 credits required for completion of the English major. It is a prerequisite for 300-level courses in creative writing, which count towards the major. ENGL 280 is not a prerequisite for ENGL 281.

An introductory course in the theory, practice, and craft of creative writing. Students are given the opportunity to try both prose and verse writing and may specialize in one or the other. Each of the class meetings are conducted as workshops.

ENGL 382-383 Narrative Writing (IV) (LA)

Fall, spring. 3 credits each term. Each section limited to 15 students. Prerequisites: ENGL 280 or 281, recommended. Prerequisite: permission of instructor, normally on the basis of a manuscript. Fall: Sec. 1, S. Vaughn; sec. 2, M. Koch; sec. 3, L. Herrin. Spring: D. McCall, J. McCoy.

The writing of fiction: study of models; analysis of students' work.

ENGL 384-385 Verse Writing (IV) (LA)

Fall or summer. 3 credits each term. Each section limited to 15 students. Prerequisites: ENGL 280 or 281, or permission of instructor. Fall: P. Janowitz, K. McClane; spring: P. Janowitz, K. Light.

The writing of poetry; study of models; analysis of students' poems; personal conferences.

ENGL 480-481 Seminar in Writing (IV) (LA)

Fall, spring. 4 credits each term. Each section limited to 15 students. Prerequisite: permission of instructor, normally on the basis of a manuscript. The manuscript should be submitted to the instructor no later than the first day of class. Previous enrollment in ENGL 280 or 281 and at least one 300-level writing course recommended. Successful completion of one half of the 480-481 sequence does not guarantee enrollment in the second half of the course. Students must receive permission of the instructor to enroll in the second course. Fall: Sec. 1, S. Vaughn, sec. 2, R. Morgan. Spring: S. Vaughn, A. Fulton.

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 a core 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 student's manuscript 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 I (IV) (LA)

Fall: 4 credits. ENGL 201 is not a prerequisite for 202. This course may be used as one of the three pre-1800 courses required of English majors. A. Galloway. An introductory survey of English literature, examining its historical development and some of its achievements from its recorded beginnings in the eighth century through the eighteenth century. Some of the works we will read: works of prose and poetry, and allied forms. Students are given the opportunity to try both prose and verse writing and may specialize in one or the other. Each of the class meetings are conducted as workshops.

ENGL 205 Introduction to American Literatures: Narrating the Nation (also AM ST 207) (IV) (LA)

Spring. 4 credits. Limited to 15 students. While not restricted to sophomores this course is intended to offer sophomores especially an opportunity to work closely with faculty in a seminar environment within a strong interdisciplinary context.

K. McCullough.

This course examines the relation between nation and narration in U.S. literature from the Civil War to the present, focusing specifically on the interplay between the juridical category of the citizen and the more broadly cultural category of the "American." What does it mean to be American? What has it meant, historically, to be a citizen? How have these two shifting categories intersected, overlapped, or been in conflict over the past two centuries? How have the stories circulated in literature and popular culture influenced legal narratives, and vice versa? We will explore these questions through a series of readings drawing on the fields of history, political science, legal studies, and literature. Reading will include works by Louise Erdrich, Pauline Hopkins, Chang Rae Lee, David Wong, Louie, Maria Amparo Ruiz de Burton, Leslie Marmon Silko, and Sui Sin Far.

ENGL 206 Introduction to World Literatures in English (IV) (LA)

Spring. 4 credits. W. Wetherbee.

The course studies a range of texts including poetry, drama, and fiction in English by writers from nations and cultures that have only recently come into their own politically. Writers studied include Chinua Achebe, Amitav

ENGL 203 Introduction to American Literatures: Land, Labor, Languages (also AM ST 206) (IV) (LA)

Fall. 4 credits. E. Benjamin.

Our goal is understanding the matrix of land, labor, and language, as the literatures of the pre-conquest, colonial, and early national periods of America present it. This perspective will involve reading widely and variously: American Indian oral and written narratives; tales of seafarers, wage laborers, sojourners, captives, indentured persons, and slaves; poems, plays, and novels that have been taken until recently as sufficient to defining "The American Literary Tradition." It will also ask for engagement with the implications of seeing American literature with new eyes and new emphases. Who lives on the land, and how; who works it; and who records and reflects on these facts in language? What differences does it make to labor and to language if land is owned by individuals as "property," rather than held in common? If people have been made into property, what part does language play in that process—or its abolition? Can mapping be considered a language? What do maps show (and hide)? What do landscape paintings have to do with literary representation? Finally, as much as the course will focus on literary representation, the question at work always will be: What do we need to read to do justice to the early literary life of America? A few of the texts will be: Roger Williams, A Key into the Language of America; Mary Rowlandson's captivity narrative, The Indian in the Forest and "An Indian's Looking Glass for the White Man"; Frederick Douglass, My Bondage and My Freedom; Herman Melville, "Bartleby, the Scrivener", and Rebecca Harding Davis, Life in the Iron-Mills.
ENGL 206 Sophomore Seminar: Introduction to Narrative: LA Close Up (also AM ST 219) (IV) (LA)
Fall. 4 credits. M. P. Brady.
This course will introduce students to the study of narrative. We will explore how narratives are produced, how they have an impact on audiences, and how narratives are productive of nations and nationalisms, of race, sexuality, and class. The focus of our narrative study will be Los Angeles, California. We will look at various eighteenth, nineteenth, twentieth, twenty-first century narrative forms (films, fiction, music, history) that take as their topic El Pueblo de Nuestra Señora la Reina de los Angeles del Rio de Porciúncula (i.e., Los Angeles).

ENGL 207 Introduction to Modern Poetry (IV) (LA)
Spring. 4 credits. No prior study of poetry necessary. D. Mao.
An introduction to the diverse shapes, purposes, and themes of poetry of the last hundred years. The course will focus on about a dozen U. S. and British poets, chosen not only for the ways in which they enliven the formal possibilities of verse but also for the subtlety or bravura with which they evoke the anxiety, perversity, joy, and complexity of modern life. Our chief focus will be on matters of form, but we also will attend to thematic issues such as the polemical side of modern poetry in other genres and arts, and poetry's changing role in the age of radio, television, and the Internet.

Assignments will include exercises in the writing of poetry and analyses of poets specific discursive and syntactic choices, as well as broader interpretive essays. Focal poets may include W. B. Yeats, Ezra Pound, H. D., T. S. Eliot, William Carlos Williams, Wallace Stevens, Langston Hughes, W. H. Auden, Elizabeth Bishop, Allen Ginsberg, Sylvia Plath, Susan Howe, Tracie Morris, and Paul Muldoon.

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 was 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 the Shakespearean legend? We will compare four or five plays with their adaptations in fiction, theater, and film and explore the uses made of Shakespeare in education, advertising, and public culture. Our discussions will try to illuminate the past differences and startling continuities among the Shakespearees handed down by earlier times and those recovered or invented in the modern era; we also will pay attention to the variety of critical approaches readers and viewers have taken to Shakespeare on the page and in performance. For spring 2004, tentatively: Taming of the Shrew, Titus Andronicus, Othello, Lear, and Tempest, together with plays by Paula Vogel and Aime Césaire, a novel by Jane Smiley, the musical comedy Kiss Me Kate, and films or stage productions directed by Julie Taymor.

ENGL 209 Sophomore Seminar: Introduction to Cultural Studies (IV)
Fall. 4 credits. B. Correll.
Advis, advice columns, reality shows, MTV, salsa, hip-hop, films and more bombard our thoughts and senses with encoded messages. This course will look 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 will come from a range of texts, both "high" and "low," visual and literary, contemporary and historical. The course will follow a lecture-discussion format. 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, its discourse community, its modes of knowledge, and its 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 227 Shakespeare # (IV) (LA)
Fall, summer and winter. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. R. Kalas.
This course is an introduction to Shakespeare's dramatic works and to the language of the plays and its uses. We will consider cultural production that results from intercultural crossings between Mexico, Cuba, Guatemala, Dominican Republic, El Salvador and Los Angeles, New York, Miami. How do Latina/o literatures converge and diverge as they explore issues of "race," ethnicity, gender, sexuality, class, nationality, and identity in general, at a time when the American profile is increasingly becoming "latinized." Authors examined may include Tomas Rivera, Cherríe Moraga, Jesús Colón, Miguel Pinero, Nicola Mohr, Cristina García, Julia Alvarez, Amézcoa Parejas, Junot Díaz, Loida Martínez Pérez, Sandra Benítez, Martín Espada, Lorna Dee Cervantes, Frances Negron-Muntaner, Luz Maria Umpierre, and Hector Tobar.

ENGL 228 African Literature @ (IV) (LA)

ENGL 260 Introduction to American Indian Literatures in the United States (also AM ST 260) (IV) (LA)
Spring. 4 credits. E. Cheyfitz.
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 transcribed in writing, we will study a variety of written genres from their beginnings in the late eighteenth century, including autobiography, the essay, poetry, and fiction. We will begin by considering how reading two translations from the oral tradition: Paul Radin's translation/compilation of Winnebago trickster narratives, and Paul Zoebro's translation of the Diné bábáhuh. The American Indian Story Project has translated a range of Native authors from the nineteenth and twentieth centuries, including Samson Occom, William Apess, Sarah Winnemucca,
ENGL 261 Race and the American City: Reading San Francisco and New York (also AAS 211) (IV) (LA)
Fall. 4 credits. S. Wong.
For full course description, see AAS 211.

ENGL 262 Asian American Literature (also AAS 262 and AM ST 252) (IV) (LA)

ENGL 274 Scottish Literature and Culture # (IV) (LA)
Fall. 3 or 4 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 non-majors are welcome. 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 will focus on important Scottish literary texts, with 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 Scots, 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 seventeenth-century writers of short stories. Students will view the film, The Prime of Miss Jean Brodie.

ENGL 275 The American Literary Tradition (also AM ST 275) (IV) (LA)

ENGL 276 Desire (also COM L 276, FGSS 276) (IV) (LA)
Spring. 4 credits. E. Hanson.
Selected 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 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 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 philosophical trends. The course is always on expanding our critical vocabulary for considering sex and sexual desire as a field of intellectual inquiry.

ENGL 278 Queer Fiction (also FGSS 278) (IV) (LA)
Fall. 4 credits. Next offered 2004-2005.

ENGL 279 Introduction to Lesbian Fiction (also FGSS 280) (IV) (LA)

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. H. Spillers.
This course will select its readings from the genres of poetry, drama, fiction, and non-fiction produced by black American writers from the period of the Harlem Renaissance, to the present. Readings will include poems by Harlem Renaissance poets, the poets of African-American modernism, i.e., Gwendolyn Brooks and Robert Hayden, and some of the poetry of the Black Arts Movement of the 60s, by way of Leroi Jones/Imamu Baraka and Larry Neal’s Black Fire, plays by Lorraine Hansberry, Ed Bullins, and August Wilson; non-fictional and fictional writings by Malcolm X, Martin Luther King, Nella Larsen, Jean Toomer, Zora Neale Hurston, Toni Morrison, and Nate Mackey. (Gane, The Autobiography of an Ex-Colored Man, Passing, The Autobiography of Malcolm X, Letter from a Birmingham Jail, Black Boy, Invisible Man, Flight to Canada, Ozzerdine Tales, Middle Passage, Jazz, and The Bedouin Hornbook will be among the selected texts.)

Special Topics

ENGL 210 Medieval Romance: Voyage to the Otherworld # (IV) (LA)

ENGL 217 History of the English Language to 1300 (also LING 217) # (III or IV) (HA)
Fall. 4 credits. W. Harbert.
See LING 217 for full course description.

ENGL 218 History of the English Language Since 1300 (also LING 218) (III or IV) (HA)
Spring. 4 credits. W. Harbert.
See LING 218 for full course description.

ENGL 220 Sophomore Seminar: The Idea of the Pet in Literature and History (IV) (LA)
Spring. 4 credits. Enrollment is limited to 15 students. While not restricted to sophomores this course is intended to offer sophomores an opportunity to work closely with faculty in a seminar environment within a strong interdisciplinary context. W. Harbert.
See COM L 225 for full course description.

ENGL 221 Sophomore Seminar: The Ethics of Imagining the Holocaust (IV) (LA)
Fall. 4 credits. Enrollment is limited to 15 students. While not restricted to sophomores this course is intended to offer sophomores an opportunity to work closely with faculty in a seminar environment within a strong interdisciplinary context. D. Schwarz.
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, its discourse community, its modes of knowledge, and its 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 225 Poetry and the Poetics of Difference (also COM L 225) (IV) (LA)
Fall. 4 credits. J. Monroe.
See COM L 225 for full course description.

ENGL 235 Rewriting the Classics: Stories of Travels and Encounters (also FGSS 235) (IV) (CA)

ENGL 263 Interpreting Hitchcock (also FILM 264) (IV) (LA)
Fall. 4 credits. For this seminar students must be free to attend Monday late-afternoon screenings of the films. $20 lab fee. Enrollment limited to 20. L. Bogel.
Before Alfred Hitchcock moved in 1939 to Hollywood, where he directed his major films, from Rebecca and Notorious to Vertigo, North by Northwest, and Psycho, he apprenticed as set designer, screen writer, and director for more than thirty English films. This course will focus on his technical and stylistic innovations during the twenties and thirties, through detailed analysis of about fifteen of his early silent experiments, such as The Lodger, The Ring, The Farmer’s Wife, and of his assured early talking films, such as Blackmail, Murder! Number Seventeen, The Thirty-Nine Steps, Secret Agent, Sabotage, Young and Innocent, and The Lady Vanishes. We will look in these films for his German and Russian influences, examine Hitchcock’s place in the early history of cinema, and consider the complex ways his films invite questions about film language, self-reflexivity, the ethics of spectating, and the nature of desire and sexuality.

ENGL 265 Culture and Politics of the 1960s (also AM ST 265) (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
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. R. Farrell.
A close reading of Beowulf. Attention is given to relevant archaeological, literary, cultural, and linguistic issues. One semester's study of Old English, or the equivalent, is recommended.

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. R. Farrell.
This course will begin with the study of the major Canterbury Tales and some of Chaucer's minor works, such as The Book of the Duchess. If time permits, we will read at least part of his great epic romance Troilus and Criseyde. All works will be read in Middle English, but ample time will be devoted to learning the language, for it is impossible to read Chaucer as a poet without Middle English. There will be lectures on Chaucer's life and society and his literary and religious content. There will be take-home, mid-, and end-of-term exams and student presentations.

ENGL 321 Spenser and Malory (also RELST 319) # (IV) (LA)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Informal lecture and discussion. C. Kaske.
Between selections covering about half of Malory's Morte d'Arthur and half of Spenser's Faerie Queene. The French Prose Arthurian Cycle, Chretien's romances, Sir Gawain and the Green Knight, and some of Spenser's minor poems will be mentioned occasionally as background. Comparisons will assess possible literary influence, the distinctive vision, style, and narrative technique of each author as a writer of romance, and the development of Arthurian romance from the Middle Ages to the Renaissance.

ENGL 328 The Bible as Literature # (IV) (LA)

ENGL 329 Milton # (IV) (LA)
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. R. Kalas.
An introduction to the poetry and prose of John Milton in light of the political, social, and religious upheavals of the seventeenth century. Rather than dividing the poetry from the prose, this course will foreground the integration of poetic and polemical concerns in Milton's work. Readings will include selected short poems, Comus, Samson Agonistes, Paradise Lost, all of Paradise Regain'd, Areopagitica, The Doctrine and Discourse of Divorce, and excerpts from Milton's other prose works.

ENGL 330 Restoration and Eighteenth-Century Literature # (IV) (LA)
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. F. Bogel.
Close reading of texts in a variety of genres (poetry, fiction, drama, autobiography) will be guided by such topics as: the nature of satire, irony, and mock-forms; the languages of the ridiculous and the sublime; the politics of gender and sexuality; the authority and fallibility of human knowledge; connections among melancholy, madness, and imagination. Works by such writers as Rochester, Behn, Finch, Dryden, Swift, Gay, Defoe, Johnson, Boswell, Sterne, and Cowper.

ENGL 333 The Eighteenth-Century English Novel # (IV) (LA)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. N. Saccamano.
A study of form and theme in the British novel tradition. The course focuses on representative novels mostly from the eighteenth century, paying close attention to language and structure but also to cultural contexts and to the development of the novel form itself. We explore such topics as truth and fiction, romance, realism, satire, and the gothic, heroic, and mock-herculean modes, sentiment, sensibility, and sexuality; race and gender; and the forms and uses of narrative. Readings may include Behn's Oroonoko, Defoe's Moll Flanders, Richardson's Clarissa, Fielding's Tom Jones, Johnson's Rasselas, Sterne's A Sentimental Journey, and Austen's Emma.

ENGL 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 are devoted to two concurrent 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 the English degenerate or become 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 forms be censored? Should the colonies be permitted to follow their own paths 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.

ENGL 348 Studies in Women's Fiction: Louise Erdrich and Leslie Marmon Silko (also FGSS 348) (IV) (LA)

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. W. Kennedy.
See COM L 348 for full course description.

ENGL 350 The Modern Tradition I: 1890-1940 (IV) (LA)
Fall. 4 credits. D. Schwartz.
Critical study of major works by Hardy, Conrad, Lawrence, Joyce, Woolf, Eliot, Yeats, Hopkins, Wilde, Wallace Stevens and others.
While the emphasis will be on close reading of individual works, lecture and discussion will place the authors and works within the context of literary, political, and intellectual history. The course will seek to define the development of literary modernism (mostly but not exclusively in England) and relate literary modernism in England to that in Europe and America as well as to other intellectual developments. Course will focus on the relationship between modern literature and modern painting and sculpture; on occasion, slides will be viewed.

**ENGL 353 The Modern Indian Novel @ (IV) (LA)**

**ENGL 355 Decadence (also COM L 355 and FGSS 355) (IV) (LA)**
Fall. 4 credits. E. Hanson.

"My existence is a scandal," Oscar Wilde once wrote, summing up in an epigram the effect of his carefully cultivated style of perversity and paradox. Through their valorization of aestheticism and all that was considered artificial, sexual, or perverse, the so-called "decadent" writers of the late-nineteenth century sought to free the pleasures of beauty, spirituality, and sexual desire from their more conventional ethical moorings. We will discuss the most important texts through which "decadence" was defined as a literary style, including works by Charles Baudelaire, J.-K. Huysmans, Leopold von Sacher-Masoch, A. C. Swinburne, and Walter Pater, with a focus on Oscar Wilde. Topics for discussion include aestheticism and the cult of "art for art's sake," theories of cultural and linguistic degeneration, homophobia and sexual encoding, androgyny and sexual inversion, hysteria, masochism, mysticism, sublimation, Catholicism, Hellenism, and dandyism. Students may read French and German texts in the original or in translation.

**ENGL 361 Early American Literature (also AM ST 361) @ (IV) (LA)**
Fall. 4 credits. J. Porte.

American literature and culture from the 1620s to the 1840s, including the following: prose and poetry of the Puritans (Winthrop, Bradford, Brasted, Rowlandson, Taylor, Cotton Mather), Edwards and Franklin; Tom Paine and Jefferson; Crevecoeur; selections from Irving's Sketchbook; the poetry of Bryant; a novel by James Fenimore Cooper; some of Hawthorne's "colonial" sketches, Emerson’s prose and poetry through the 1840s. (Since 2003 is the bicentennial of the birth of this commanding figure, we shall pay particular attention to his work.)

**ENGL 362 The Renaissance (also AM ST 362) @ (IV) (LA)**
Spring. 4 credits. D. Fried.

**ENGL 363 American Fiction at the Turn of the Twentieth Century (also AM ST 363) (IV) (LA)**
Spring. 4 credits. K. McCullough.

**ENGL 364 American Literature Between the Wars (also AM ST 364) (IV) (LA)**

**ENGL 365 American Literature Since 1945 (also AM ST 365) (IV) (LA)**
Fall. 4 credits. B. Maxwell.

**ENGL 366 Nineteenth Century American Novel (also AM ST 366) @ (IV) (LA)**

**ENGL 367 The Modern American Novel (also AM ST 367) (IV) (LA)**

**ENGL 368 American Novel Since 1950 (also AM ST 368) (IV) (LA)**

**ENGL 369 Fast Talking Dames and Sad Ladies (also FILM 367 and FGSS 369) (IV) (LA)**
Spring. 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 required.

In this seminar focusing on sassy or subdued heroines of Hollywood's films of the 1940s and current films, we will 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 will 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 "maternal," and the "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 Nineteenth Century Novel @ (IV) (LA)**

**ENGL 372 Medieval and Renaissance Drama (also ENGL 677) @ (IV) (LA)**
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Next offered 2004–2005. A. Galloway.

**ENGL 373 English Drama from 1700 to the Present (also THETR 373) @ (IV) (LA)**

**ENGL 374 Slavery in Twentieth Century American Film and Fiction (also AM ST 374) (IV) (LA)**
Fall. 4 credits. N. Wailigora-Davis.

This course explores twentieth century preoccupations and reconstructions of slavery, examining the ways slavery continues to define and impact sexuality, racial identities and their popular representations, our sense of public and private spaces, legal discourse, and our national identity. What does it mean to be a black or white man or woman in America? Who does law, history, and society concede as legitimate witness? How should we craft our histories? Who is a subject of, and who is subjected to law? How are privacy interests diffused against social interests: what are a (black) woman's reproductive rights (in the age of contraceptive options and abortion)? How do desires materialize, and how are they materially denied? Our readings will place in close proximity not only historical writings on slavery (slave history and slave narratives) and these twentieth century revisionist slave stories, but slave law and contemporary immigration, property reproduction, criminal, and privacy legislation.

**ENGL 376 Survey in African American Literature: 1918 to present (IV) (LA)**

**ENGL 378 American Poetry Since 1950 (also AM ST 372) (IV) (LA)**

**ENGL 381 Reading as Writing (IV) (LA)**
See complete course description in section headed Expository Writing.

**ENGL 382-383 Narrative Writing (IV) (LA)**
See complete course description in section headed Creative Writing.

**ENGL 384-385 Verse Writing (IV) (LA)**
See complete course description in section headed Expository Writing.

**ENGL 386 Philosophic Fictions (IV) (LA)**
See complete course description in section headed Expository Writing.

**ENGL 387 Autobiography: Theory and Practice (IV) (LA)**
See complete course description in section headed Expository Writing.

**ENGL 388 The Art of the Essay (IV) (LA)**
See complete course description in section headed Expository Writing.

**ENGL 389 Public Discourse, Political Stages: African-American Drama and Performance 1950-Present (also THETR 394) (IV) (LA)**
Fall. 4 credits. J. Frank.
For course description, see THETR 394.

**ENGL 390 Video: Art, Theory, and Politics (also THETR 395) (IV) (LA)**

**ENGL 392 Introduction to Global Women's Literature (also FGSS 396) @ (IV)**

**ENGL 397 Policing and Prisons in American Culture (also AM ST 395) (IV) (CA)**
Spring. 4 credits. B. Maxwell.
Having attained the highest number of incarcerated persons of any nation on earth, while subjecting the populace to ordeals marked by the names Rodney King, Abner Louima, and Amadou Diallo, U.S. regimes of policing and imprisonment compel historical and critical attention. This course considers policing and imprisonment in U.S. culture, stressing prisoners' writing, song, slang, and graphic art. Edgar Allan Poe wrote in 1849: "in looking back through history ... we should..."
pass over all biographies of ‘the good and great,’ while we search carefully the slight records of wretches who died in prison, in Bedlam, or upon the gallows.” These records—novels, poems, short stories, plays, rap songs, essays, autobiographies, letters, manifestoes, paintings, drawings, crafts, and tattoos—are of course less slight now than they were in Poe’s day; they will make up the greater part of our source material. In addition to work by impoverished people, readings will draw on carceral theory, activist documentation, and the history of criminal justice. Finally, we will consider questions raised by non-criminal confinement in U. S. history: slavery, indentured servitude, and criminal incarceration. We will explore and write about manuscripts, handwriting, books, printers, and take up more general thematic issues impinging on these during the formative period of modern English vernacular culture, from “late medieval” to “early modern.” We will focus on select examples of Chaucer and Shakespeare as a class, but students will develop independent projects as the term transpires. Some prior contact with Middle English (e.g., some Chaucer in the original) and Elizabethan English (e.g., some Shakespeare) is required. There will be regular work on old handwriting, editing theory, and how these matter for literature. In addition to regular exercises, both graduates and undergraduates will produce a final project involving a small edition and discussion of its/strategies and implications.

ENGL 405 The Politics of Contemporary Criticism (IV) (LA)
Fall. 4 credits. S. Mohanty.
An introduction to some of the major issues in contemporary criticism and theory, with primary focus on such questions as: What is a literate cultural text? What is interpretation, and can it ever be objective? How do cultural and social differences shape reading and interpretation? What views about knowledge, society, and politics underlie particular critical strategies and methodological choices? Drawing on representative essays and books from a variety of critical schools and traditions (from New Criticism to deconstruction, Marxism, hermeneutics, new historicism, and feminism), the class will examine the competing claims of the various positions and focus on the implications of answers to the above questions for textual analysis. Readings from Cleanth Brooks, Jacques Derrida, Michel Foucault, Hans-Georg Gadamer, Sandra Harding, Fredric Jameson, Toni Morrison, Barbara Herrnstein Smith, Charles Taylor, and Richard Borty, among others.

ENGL 411 Medieval Sin and Confession (also S HUM 410 and ENGL 614)
Fall. 4 credits. M. Raskolnikov.
For course description, see S HUM 410.

ENGL 413 Middle English (also ENGL 613) # (IV) (LA)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Next offered 2004-2005.

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 2004-2005. M. Raskolnikov.

ENGL 416 Chaucer and the Politics of Love # (IV) (LA)
Spring. 4 credits. W. Wetherbee.
This course may be used as one of the three pre-1800 courses required of English majors. This course is open to a reading of Chaucer’s great narrative poem Troilus and Criseyde, in the context of late-medieval English social and sexual politics. Readings include classical and medieval love-lyric and romance, Ovid’s Art of Love, and medieval theorists of sexual and romantic love.

ENGL 417 Early Medieval Archaeology and Literature (also ENGL 617 and ARKEO 417 and 417) # (IV) (LA)
Fall. 4 credits. Prerequisite: permission of instructor. This course may be used as one of the three pre-1800 courses required of English majors. Next offered 2004-2005. R. Farrell.

ENGL 422 From Spirituals to Swing (also S HUM 418 and ENGL 620)
Spring. 4 credits. G. Wald.
For course description, see S HUM 418.

ENGL 423 Renaissance Lyric (also ENGL 625) # (IV) (LA)

ENGL 424 Sponsor (also ENGL 624) # (IV)

ENGL 425 Writing the Voice (also S HUM 425 and ENGL 625)
Spring. 4 credits. A. Francois.
For course description, see S HUM 425.

ENGL 428 Close Reading and Critical Debate # (IV) (LA)

ENGL 429 Adam’s Rib and Other Divine Signs: Reading Biblical Narrative (also RELST 429) # (IV) (LA)

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 2004-2005. T. Murray.

ENGL 434 Electronic Art and Culture (IV) (LA)

ENGL 437 Fiction(s) of Race, Fact(s) of Racism: Perspectives from South African and Afro-American Literatures (IV) (LA)

ENGL 440 The Dandy in London and Dublin # (IV) (LA)
Spring. 4 credits. S. Siegel.
The emergence of the figure of the dandy constituted a new cultural form. This seminar will trace the transformation of that form, in and out of fiction. Our readings, drawn from novels and plays, memoirs, anecdotes, reviews, and graphic representations in the periodical press, will be guided by four...
ENGL 447 Confessing America (also S HUM 419 and ENGL 647)
Spring. 4 credits. L. Donaldson.
For course description, see S HUM 419.

ENGL 450 History of the Book (IV) (LA)
Spring. 4 credits. K. Reagan.
A study of the book as a physical and cultural artifact from the twelfth century onwards. This course will provide a historical overview of the creation, dissemination, and reception of written communication. We will examine the invention and evolution of printing and publishing and its constituent arts such as design, illustration, and binding. Other discussions and readings will focus on the history of authorship, publication, the book trade, libraries, and reading. This course meets in the Carl A. Kroch Library. Investigations and assignments will be built around close contact with examples of manuscripts, printed books, newspapers, periodicals, and ephemera from the twelfth century to the present.

ENGL 452 Wilde and Woolf (also ENGL 652) (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 2004–2005. S. Wong.

ENGL 454 American Musical Theater (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 concurrently enrolled in MUSIC 105 would be eligible. Limited to 15 students. S. McMillian.
A close reading of some seven or eight leading examples of the American musical, together with their sources, from Show Boat to Sweeney Todd. A chronological approach will give a historical basis to the course, but the primary concern will be learning how to analyze musical drama and how to handle the problems and opportunities of interpretation integral to this complex theatrical form. Readings will include Kern and Hammerstein’s Show Boat and its source, Edna Ferber’s novel of the same name; Rogers and Hammerstein’s Oklahoma! and its source, Lynn Riggs’s Green Grow the Lilacs; Loesser and Burrows’s Guys and Dolls and its source, stories by Damon Runyon; Bernstein and Sondheim’s West Side Story and its source, Shakespeare’s Romeo and Juliet; and Kander and Ebb’s Cabaret and its source, Isherwood’s Berlin Stories.

ENGL 456 Postmodern Novel (also ENGL 656) (IV) (LA)
ENGL 458 Imagining the Holocaust (also ENGL 656, JWST 456 and 658, COM L 483 and 683) (IV) (LA)
Spring. 4 credits. D. Schwartz.
What is the role of the literary imagination in keeping the memory of the Holocaust alive for our culture? We shall examine major and widely read Holocaust narratives which 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 parable? Employing both a chronological overview and a synchronic approach—which conceives of the authors having a conversation with one another—we discover recurring themes and structural patterns in the works we read.

We begin with first-person reminiscences—Wiesel’s Night, Levi’s Survival at Auschwitz, and The Diary of Anne Frank—before turning to searingly realistic fictions such as Hersey’s The Wall, Kertész’s (the 2002 Nobel Laureate) Fateless, Kosinski’s The Painted Bird, and Oszik’s The Shawl. In later weeks, we shall explore diverse kinds of fictions and discuss the mythopoetic vision of Schwarz-Bart’s The Last of the Just, the illuminating distortions of Epstein’s King of the Jews, the Kafkaesque parable of Appel’s The Tumblers, the fantastic visions of Spiegelman’s Maus books. We shall also include Knepply’s Schnitzler’s List, which was the source of Spielberg’s Academy Award-winning film, and compare the book with the film.

ENGL 459 Contemporary British Drama (IV) (LA)
Spring. 4 credits. S. McMillan.
ENGL 460 Riddles of Rhythm (IV) (LA)
ENGL 463 Black and White Modernist Poetries and the Problem of the “New” (IV) (LA)
Fall. 4 credits. J. Braddock.
In 1925, Alain Locke published an anthology of poetry, fiction, and nonfiction prose called The New Negritude, but long before this that the white American expatriate poet and critic Ezra Pound had issued the command: “Make it new!” These phrases—the first associated with the Harlem Renaissance, the second with high modernism—and identify two intellectual movements whose interrelation it is the project of this class to comprehend. In each case, the word “new” was used as a way of insisting upon a break with the past, because that past was thought to be disabling, corrupt, and nostalgic in the worst sense. And in each case the genre of poetry was thought to be a primary instrument of innovation. Because the poetry of the period often incorporates the historical awareness that seeks to revise, redress, or (sometimes) obliterate, we will focus on individual poems and verse anthologies, while using secondary texts (contemporary poetic manifesti and intellectual prose, as well as current scholarly criticism) to help situate the poets’ projects within broader historical and intellectual contexts. Even as the connections among these fields sometimes will appear striking, it will be just as important to consider the ways in which conceptualizations of the “new” circulated in contradictory ways and were employed in the service of both progressive and reactionary political agendas. Besides focusing on the agendas of Locke and Pound, we will consider the challenging periodicals Fire!! and Black and read the work of poets including Langston Hughes, Georgia Douglas Johnson, T.S. Eliot, H.D., Countee Cullen, and Mina Loy. There will be short lectures, but the class will depend largely on class discussion.

ENGL 461 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. H. Spillers.
This course will examine selected writings of William Faulkner, beginning with some of the early novels (The Sound and the Fury, Light in August, Absalom, Absalom!) and concluding with A Fable. We will consider Faulkner’s impact as a maker of myth and as one of the leading figures of a literary discourse that creates a modernist sensibility in American literature. As a southern writer, Faulkner is traditionally confined to the character study of exotic types, but his systemic fictional exploration of “violence and the sacred” provides a powerful clue to the larger issue of a national identity. Faulkner, in his own terms, dared to imagine “culture” as a problem for fiction. This course will attempt to consider the outcome.

ENGL 470 Studies in the Novel: Reading Joyce’s Ulysses (IV) (LA)
Spring. 4 credits. D. Schwartz.
A thorough episodic–by-episode study of the art and meaning of Joyce’s Ulysses. We shall place Ulysses in the context of Joyce’s canon, Irish culture, and literary modernism. We shall explore the relationship between Ulysses and other experiments in modernism—especially paintings and sculpture—and show how Ulysses redefines the concepts of epic, hero, and reader. We shall discuss how Ulysses raises major issues about the city, colonialism, and popular culture and dramatizes what it means for the central character to be a Jew and an outsider in Dublin. No previous experience with Joyce is required.

ENGL 471 Humor in Literature (IV) (LA)
through the lens of the fiction of a very limited sampling of American women labelled "ethnic." In this class we will begin by examining the historical production of the categories of race and ethnicity in an effort to understand their differences as well as their often overlapping uses in American culture and literature. We will also track some of the various histories of entry of peoples into America: histories that include the enslaved entries of the Middle Passage, voluntary entries through Ellis Island, forced detentions on Angel Island, as well the presence of those—Native American and in some cases Mexican American—who preceded the founding of "America." In our reading of the fiction, we will explore questions of cultural, family, and individual identities (and their interweavings), of communities and how they foster and constrain their members, of gender's role in ethnic and racial identity, and of the role of history (and who controls it) as a tool for cultural survival and transformation. We also will consider various strategies of assimilation, accommodation, and resistance to dominant norms and the extent to which these texts propose that interpersonal and intracultural relations are useful, or possibly, or necessary for "Americans" of all sorts. Authors under consideration may include the following: Sandra Cisneros, Tova de Rosa, Louise Erdrich, Pauline Hopkins, Gay Jones, Fae Ng, Maria Amaro Ruiz de Burton, Sui Sin Far, Ronald Takaki, and Zitkala-Sa.

Section II: Fictions of Development—

D. Mao. What does it mean to grow up? What does it mean to have a life story? Why does it seem odd to think of a life without a story? How are we shaped by the environments in which we mature? And how is our thinking about personal responsibility affected if we believe that circumstances make us the people we are? Beginning in the eighteenth century, but focusing mainly on texts from after 1800, this honors seminar will consider how writers have represented the formation of personality and the moral and legal dilemmas attending various understandings of human development. Novelist such as Fielding, Bronte, Dickens, Joyce, Wright, and Winterson will absorb much of our attention, but we also will do some significant reading in psychology, architecture, and educational theory.

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. R. Kalas.

Shakespearean Tragedomy—A study of Shakespeare's so-called "problem plays" and late romances, focusing on the question of tragicomedy. To what extent do these eccentric plays upset the classical association of tragedy and comedy with specific social classes? Do these generally anomalous plays suggest real social change and mobility, or are they set up to be magical fantasies and "phantastic" disasters? In addition to several Shakespeare plays, readings may include Aristotle's Poetics, Sidney's Defence of Poetry, plays by Plautus and Seneca, and recent criticism on tragicomedy. Assignments throughout the term will be designed to support each student's independent work towards a final research paper.
ENGL 780.01 MFA: Poetry Seminar
A. Fulton.

ENGL 780.02 MFA: Fiction Seminar
M. McCoy.

ENGL 785 Close Reading for Writers: The American Short Story: Irving to Erdrich
R. Morgan.

ENGL 622 Renaissance Poetry (also COM L 450/650 and ITALL 450/650)
W. Kennedy.

ENGL 623 Writing the Voice (also S HUM 428 and ENGL 425)
A. Francois.

ENGL 626 Studies in Victorian Literature: The Victorian Novel and the Politics of Gender
P. Sawyer.

ENGL 115-116 English for Later Bilinguals
See Department of Asian Studies.

FALCON PROGRAM (INDONESIAN)
See Department of Asian Studies.

FEMINIST, GENDER, & SEXUALITY STUDIES


ENGLISH AS A SECOND LANGUAGE
See English for Academic Purposes.

See Intensive English Program.

ENGLISH FOR ACADEMIC PURPOSES
D. Campbell, director; S. Schaffzin, I. Arnesen, D. Campbell.

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
A writing class for those who have completed ENGL 205 and need further practice, or for those who place into the course. Individual conferences are also included.

ENGL 209 English as a Second Language
Fall or spring. 1 credit. Prerequisite: permission of instructor. S. Schaffzin
Practice in classroom speaking and in informal conversation. 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 insufficient 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.

The 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, transgenders, 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 “patriarchy”—and also so as to highlight that it would be speaking from the perspective of the traditionally marginalized, other 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 FGSS’s Director of Undergraduate Studies (DUS).

The Undergraduate Major: FGSS

1. Prerequisite Courses: Before applying to the major, the student must complete any two FGSS courses with a grade of B- or better. For FGSS courses that are cross-listed with another department, students may 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 FGSS 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. A 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):
      1. LBG Studies (Students may choose from the list in the course catalog or at FGSS office)
      2. Intersecting Structures of Oppression: Race, Ethnicity, and/or Class (Students may choose from the list in the course catalog or at FGSS office)
      3. 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 coursework and a 3.3 average in all courses applying to their FGSS major. Students interested in the honors program should consult the DUS late in the spring semester of their junior year or very early in the fall semester of their senior year. 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 student’s university 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 offers as part of 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. D. Reese.
   For description, see GERST 116.
   [FGSS 130 FWS: Self-portraiture and the First Person in 20th Century Works by Women
   D. Reese.]

II. Courses

   FGSS 201 Introduction to Feminist, Gender, & Sexuality Studies (IV) (CA)
   Fall. 3 credits. K. McCullough.
   Introduction to FGSS is a multidisciplinary approach to understanding the experiences, historical conditions, and concerns of women, both in the present and the past. We will consider how large structural systems of privilege and oppression (sexism, racism, homophobia, and classism) affect individuals’ identities, experiences, and options and we will examine forms of agency and action taken by women in the face of these larger systems.
   FGSS 202 Introduction to Feminist, Gender, & 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 situation(s) of women. Particular attention will be 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 will 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)  

FGSS 206 Gender and Society (also R SOC 206)  
Spring. 3 credits. B. Weinert.  
For description, see R SOC 206.

FGSS 209 Seminar in Early America (also HIST 209)  
Fall. 4 credits. M. B. Norton.  
For description, see HIST 209.

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)  

FGSS 234 Gender in Early Modern Europe (also HIST 234)  

FGSS 235 Rewriting the Classics: Stories of Travel and Encounters (also ENGL 235)  

FGSS 238 The Historical Development of Women as Professionals, 1800–1997 (also HD 258, HIST 278, and AM ST 278)  

FGSS 241 New York Women (also HIST 241)  
Spring. 3 credits. M. Rossiter.  
For description, see HIST 241.

FGSS 244 Language and Gender Relations (also LINQ 244)  
Spring. 4 credits. S. McConnell-Ginet.  
For description, see LINQ 244.

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 American Women Writers (also ENGL 251)  

FGSS 262 Introduction to Asian American Literature (also ENGL 262, ASIAN 262, AM ST 262)  

FGSS 273 Women in American Society, Past and Present (also HIST 273)  
Spring. 4 credits. M. B. Norton.  
For description, see HIST 273.

FGSS 276 Desire (also ENGL 276 and COM L 276)  
Spring. 4 credits. E. Hanson.  
For description, see ENGL 276.

FGSS 277 Social Construction of Gender (also PSYCH 277)  

FGSS 279 Queer Fiction (also ENGL 279)  

FGSS 280 Introduction to Lesbian Fiction (also ENGL 280)  

FGSS 285 Gender and Sexual Minorities (also HD 285)  
Fall. 3 credits. R. Savin-Williams.  
For description, see HD 285.

FGSS 307 African-American Women in Slavery and Freedom (also HIST 303 and AS&RC 307)  
For description, see HIST 303.

FGSS 309/509 The Sociology of Marriage (also SOC 309/509)  
Spring. 3 credits. M. Clarkberg.  
For description, see SOC 309/509.

FGSS 316 Gender Inequality (also SOC 316)  
Fall. 3 credits. S. Szeleyi.  
For description, see SOC 316.

FGSS 320 Queer Theater (also FILM 320)  

FGSS 321/631 Sex and Gender in Cross-Cultural Perspective (also ANTHR 321/631)  
Spring. 4 credits. Staff.  
For description, see ANTHR 321/631.

FGSS 322 Women in the Hebrew Bible (also NES 320 and JWST 320)  

FGSS 326 Women in the Hebrew Bible-Seminar (also NES 326 and JWST 326)  

FGSS 327 Shakespeare and Gender and Power (also ENGL 327)  

FGSS 334 Male and Female in Chinese Culture and Society (also ANTHRO 334)  

FGSS 348 Studies in Women's Fiction (also ENGL 348)  

FGSS 353 Feminism: State and Public Policy (also GOVT 353)  

FGSS 355 Decadence (also ENGL 355 and COM L 355)  
Fall. 4 credits. E. Hanson.  
For description, see ENGL 355.

FGSS 357 American Families in Historical Perspective (also HD 359 and HIST 359)  

FGSS 360 Gender and Globalization (III) (also HD 360 and COM L 355)  
Fall. 3 credits. L. Benner.

This course will invite 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)  

FGSS 369 Studies in Film Analysis: Fast-Talking Dames and Sad Ladies (also ENGL 369 and FILM 367)  
Spring. 4 credits. L. Bogel.  
For description, see ENGL 369.

FGSS 377 Concepts of Race and Racism (also GOVT 377)  
Spring. 4 credits. A. M. Smith.  
For description, see GOVT 377.

FGSS 378 Topics in U.S. Women’s History (also HIST 378 and AM ST 378)  

FGSS 384 History of Women and Unions (also ILRCB 384)  

FGSS 394 Gender and Sexuality in Early Christianity (also NES 394 and RELST 394)  

FGSS 395 Public Discourse, Political Stages: African-American Drama and Performance (also THETR 394, ENGL 394, AM ST 394)  
Fall. 4 credits. J. Frank.  
For description, see THETR 394.

FGSS 396 Introduction to Global Women’s Literature (also ENGL 396)  
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, & Sexuality Studies
Spring. 4 credits. FGSS majors only. Required for FGSS majors. Staff. Although the topic/focus of this course will surely vary with the instructor, it will always be treated as a broad capstone course for majors.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Term</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>FGSS 402</td>
<td>Gender, Sexuality, and Incarceration (also GOVT 400.5)</td>
<td>4 credits. Not offered 2003–2004. M. Katzrinsein.</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>FGSS 404</td>
<td>Women Artists (also ART H 466)</td>
<td>Fall. 4 credits. J. Bernstock. For description, see ART H 466.</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>FGSS 405/605</td>
<td>Domestic Television (IV) (SBA)</td>
<td>4 credits. Not offered 2003–2004. A. Villarejo. This course is a seminar on television as technology and cultural form, focusing on the &quot;domestic&quot; as a synonym for gendered value-coding, as 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, Merck, 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.</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>FGSS 406</td>
<td>The Culture of Lives (also ANTHR 406)</td>
<td>4 credits. Not offered 2003–2004. K. March.</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>FGSS 408</td>
<td>Gender Symbolism (also ANTHR 408)</td>
<td>4 credits. Not offered 2003–2004. K. March.</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>FGSS 410</td>
<td>Health and Survival Inequalities (also SOC 410)</td>
<td>Fall. 4 credits. A. Basu. For description, see SOC 410.</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>FGSS 411/611</td>
<td>Seminar: Devolution and Privatization (also CRP 412/612, ARME 433/633)</td>
<td>Fall. 3 credits. M. Warner. For description, see CRP 412.</td>
<td>3</td>
<td>Fall</td>
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<tr>
<td>FGSS 412</td>
<td>Sacred Fictions (also S HUM 411)</td>
<td>Fall. 4 credits. K. Haines-Eitzen. For description, see S HUM 411.</td>
<td>4</td>
<td>Fall</td>
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<tr>
<td>FGSS 416</td>
<td>Gender and Sex in South East Asia (also HIST 416)</td>
<td>Spring. 4 credits. T. Loos. For description, see HIST 416.</td>
<td>4</td>
<td>Fall</td>
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</tbody>
</table>


FGSS 421 Theories of Reproduction (also SOC 421) Spring. 4 credits. A. Basu. For description, see SOC 421. 


FGSS 431 Gender, Power, and Authority in England 1600–1800 (also HIST 431) Spring. 4 credits. R. Weil. For description, see HIST 431. 


FGSS 444 Historical Issues of Gender and Science (also S & T 444) Spring. 4 credits. M. Rossiter. For description, see S & T 444. 

FGSS 446 Women in the Economy (also ILRLE 445 and ECON 447) Fall. 4 credits. P. Blau. For description, see ILRLE 445. 

FGSS 448 Global Perspectives on Violence against Women (also PAM 444) Spring. 4 credits. A. Parrot. For description, see PAM 444. 


FGSS 451 Women in Italian Renaissance Art (also ART H 450) Fall. 4 credits. C. Lazzaro. For description, see ART H 450. 

FGSS 452/652 Trauma and Treatment (also PSYCH 452/652) Spring. 4 credits. S. Bern. For description, see PSYCH 452. 


FGSS 455 Bad Boys: A Historical Research Seminar (also HD 455) Spring. 2 credits. J. Brumberg. For description, see HD 455. 

FGSS 456 History of Women and Gender in the Modern Middle East (also NES 456 and JWST 456) Spring. 4 credits. M. Campos. For description, see NES 456. 

FGSS 462 Employee Relations and Diversity (also ILRHR 463) Fall. 3 credits. Q. Roberson. For description, see ILRHR 463. 

FGSS 465 Feminist Theory/Lesbian Theory (also COM L 465 and GERST 465) IV 4 credits. Not offered 2003–2004. A. Villarejo. This seminar explores developments 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 467 Sexual Minorities and Human Development (also HD 464) Spring. 3 credits. R. Savin-Williams. For description, see HD 464. 

FGSS 468 Radical Democratic Feminisms (also GOVT 467) Spring. 4 credits. A. M. Smith. For description, see GOVT 467. 


FGSS 474 Exoticism and Eroticism: Figures of the Other in the French Enlightenment (also FRLEIT 475) Fall. 4 credits. A. Berger. For description, see FRLEIT 475. 


ARTS AND SCIENCES -  2003-2004

[FGSS 487 Gender, Nationalism, and Conflict (also GOVT 486)]  

[FGSS 488/688 Beliefs, Attitudes, and Ideologies (also PSYCH 489/689)]  

[FGSS 490 American Women's Writing: Ethnicity, Race (also ENGL 491)]  
Fall. 4 credits. K. McCullough.  
For description, see ENGL 491.

[FGSS 491/691 Femininity, Ethics, and Aesthetics (also FRLIT 491/691)]  

[FGSS 492 Music and Queer Identity (also MUSIC 492)]  

[FGSS 493 French Feminisms (also FRLIT 493)]  

[FGSS 494 Love, Sex, and Song in the Middle Ages (also MUSIC 494)]  

[FGSS 496 Women and Music (also MUSIC 493)]  

[FGSS 499 Senior Honors Thesis]  
Fall and spring. 1-8 credits. Staff.  
For FGSS seniors ONLY. To graduate with honors, a 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 courses applying to their FGSS major. Students interested in the honors program should consult the DUS late in the spring semester of their junior year or very early in the fall semester of their senior year.

[FGSS 610 Sexuality and the Politics of Representation]  
The seminar explores contexts for critical work on sexuality and film/video. Beginning with the texts of Foucault, Freud, Laci, Jacqueline 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. "Sexuality" is not, however, a simple abstraction, and its coherence is put to the test through the dual lenses of Marxism and poststructuralism throughout the second half of the course, with readings from Gramsci, Deleuze and Guattari, Lyotard, and others. Films include Blonde Venus, Trash, The Night Porter, Ali: Fear Eats the Soul, Written on the Wind, and others.

[FGSS 612 Population and Development In Asia (also R SOC 612)]  
Spring. 3 credits. L. Williams.  
For description, see R SOC 612.

[FGSS 613 The Political Economy of Gender and Work (also CRP 613)]  

[FGSS 614 Gender and International Development (also CRP 614)]  

[FGSS 616 Feminist Jurisprudence (also LAW 646)]  

[FGSS 624 Epistemological Development and Reflective Thought (also EDUC 614)]  
Fall. 3 credits. D. Schrader.  
For description, see EDUC 614.

[FGSS 625 Self and Interpersonal Development (also EDUC 615)]  
Spring. 4 credits. D. Schrader.  
For description, see EDUC 615.

[FGSS 626 Graduate Seminar in the History of American Women (also HIST 626)]  

[FGSS 627 Organizations and Social Inequalities (also ILR 626)]  

[FGSS 636 Comparative History of Women and Work (also ILRRCB 636)]  
Spring. 4 credits. I. DeVault.  
For description, see ILRRCB 636.

[FGSS 644 Topics in the History of Women in Science (also S&T 644)]  

[FGSS 651 The Sexual Child (also ENGL 651)]  

[FGSS 654 Queer Theory (also ENGL 654 and COM L 654)]  

[FGSS 656 Decadence (also ENGL 655 and COM L 655)]  

[FGSS 661 Cinematic Desire (also ENGL 660 and AM ST 662)]  
Spring. 4 credits. E. Hanson.  
For description, see ENGL 660.

[FGSS 671 Feminist Methods (also R SOC 671)]  

[FGSS 690 Women's Writing from the post-Colonial World: Theory and Practice (also ENGL 691)]  
Fall. 4 credits. L. Donaldson.  
For description, see ENGL 691.

[FGSS 692 Hispanic Feminisms (also SPANL 690)]  

[FGSS 699 Topics in FGSS]  
Fall and spring. Variable credits. Staff.  
Independent reading course for graduate students on topics not covered in regularly scheduled courses. Students develop a course of readings in consultation with a faculty member in the field of FGSS who has agreed to supervise the course work.

[FGSS 733 Literary Anti-Feminism (also ENGL 733)]  

[FGSS 762 Sexuality and the Law (also GOVT 762)]  
Spring. 4 credits. A. M. Smith.  
For description, see GOVT 762.

[FGSS 773 Sexuality, Gender, and Law (also LAW 773)]  

FILM

See Department of Theatre, Film and Dance.

FIRST-YEAR WRITING SEMINARS

For information about the requirements for writing seminars and descriptions of seminar offerings, consult the John S. Knight Institute brochure, available from college registrars in August for the fall term and on the web in October at www.arts.cornell.edu/knight_institute for the spring term.

FRENCH

See Romance Studies.
GERMAN STUDIES

L. Adelson, chair (spring); D. Batruch, acting chair (fall); P. Briggs (Dutch); R. Buettner, H. Deinert, I. Ezerigalis (Emerita), P. Gilgen, A. Groos, acting director of graduate studies (fall); P. U. Hohendahl, G. Lischke, acting director of undergraduate studies; B. Martin, U. Maschke, D. Reese, A. Schwarz, L. Tranczik (Swedish); G. Waite, acting director of graduate studies (spring)

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, major in German Studies, or as 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 (for credit). Subjects range from medieval to contemporary literature and from film and visual culture to intellectual history, music, history of psychology, and feminist, gender, & 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 English translation at the 300 and 400 levels explore such topics as the Faust legend, aesthetics from Kant to Heidegger, 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. Students are encouraged to discuss this possibility with instructors.

Students wishing to begin German language at Cornell enroll in GERST 121-122, 123 (elementary level language). 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 language instruction for business German leading to certification. On the advanced level (300 level or above), we offer thematically oriented courses that include intensive grammar review (301, 302); 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 at the advanced level 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 123 or 200, 205
Intermediate level: GERST 200, 202, 204, and 205-206
Advanced level: GERST 301, 302, 307, 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.

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. 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 acting director of undergraduate studies, Gunhild Lischke, G75 Goldwin Smith Hall.

German (Literature and Culture)

Although the emphasis of this track is on literature, majors may also pursue individual interests in courses on film and visual culture, theater and performing arts, music, intellectual and political history, and women's studies that have a substantial German component. 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) or the equivalent.
2. Complete six courses in German Studies 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 advisors to help formulate a coherent program of study. One of the advisors must be from the Department of German Studies.

Study Abroad in Germany

German Studies strongly supports Study Abroad as an opportunity for students to put their German to use by living and studying 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 an associate 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 center of the consortium are followed by one or two semesters of study at the university. Participants enroll in regular courses at the university. Academic-year students have been assisted in finding internships between semesters. Prerequisite for participating in the program is four semesters of German language study, of which the last course ideally should be on 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; gll5@cornell.edu) as soon as possible.

Honors

Eligibility: A student wishing to receive honors in German Studies must have a GPA of 3.9 in all courses relevant to the major.

Committee: Candidates for honors form an advisory committee consisting of an advisor 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 advisors. During the second term they complete the 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.

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 750. G. Lischke, U. Maschke and staff.

Students develop basic abilities in listening, meaningful contexts through interaction in including videos, short articles, poems, and songs and 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 quarter and may enter a 200-level course; otherwise successful completion of GERST 123 is required for qualification. G. Lischke, 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, vocabulary, reviewing major grammar topics, and thematic 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 I. Prerequisite: GERST 200 or GERST 205 or placement by examination (placement score and CASEL). Staff.

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 work. 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
Spring. 3 credits. Prerequisite: proficiency in German or language Option 1 (Gerst 200, 205, or placement by examination (placement score and CASEL). G. Lischke.

This course is a continuation of GERST 205; however, students’ business knowledge of German are welcome. This is a German language course that examines the German economic structure and its major components: industry, trade unions, the banking system, and the government. Participants learn about the business culture in Germany and how to be effective in a work environment, Germany’s role within the European Union, the role of the European Central Bank, the importance of trade and globalization, and current economic issues in Germany. The materials consist of authentic documents, the Internet, and MIT’s hypermedia program Berliner Sehen, which focuses on 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 thematic core of this course, which explores the refinement of critical reading skills in German in addition to advanced writing, reading, and 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 202 Exploring German Literature (IV) (LA)
Fall or spring. 3 credits. Satisfies language Option I. Prerequisite: GERST 200 or 205 or equivalent or permission of instructor. Taught in German. B. Buettnert.

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, Brecht, Mann, 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 207 After the Fires: Divided Germany 1945–1989 (IV)

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. B. Buettnert.

An exploration of German crime, detective, and mystery writing in texts ranging from the early nineteenth century to contemporary fiction. Authors to be studied may include: Kleist, E. T. A. Hoffmann, Dürrenmat, Schatten, Süsskind, Handke, and Oren. In addition to exercising hermeneutic skills (and, by extension, that gray matter of which Sherlock Holmes and Hercule Poirot were so fond), this course aims at improving proficiency in aural and reading comprehension, as well as speaking and writing skills, with emphasis on vocabulary expansion, advanced grammar review, and stylistic development. Recommended to students interested in a combined introduction to literature and high-level language training. This upper-level 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 I. Prerequisite: GERST 202, 204 or 206 or equivalent or permission of instructor. Taught in German. P. Gilgen.

Examination of literary 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 Horváth, Mann, Grass, Schlink. Aimed at improving students’ proficiency in aural and reading comprehension, as well as in speaking and composition skills. Focus on high-level reading and listening, enrichment of vocabulary and vocabulary expansion. Recommended for students wishing to combine intensive language training with reading and discussion of short fiction.

GERST 307 Where the Wild Things Are (IV) (CA)
Spring. 4 credits. Satisfies language Option I. Prerequisite: GERST 202, 204, 206, or 220, 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, artists and artisans, 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 overwhelmed by the historical legacy of fascism and 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 explores 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 thematic core of this course, which explores the refinement of critical reading skills in German in addition to advanced writing, reading, and 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 305 Writing America (IV) (LA)

GERST 306 German Media

GERST 307 After the Fires: Divided Germany 1945–1989 (IV)

GERST 310 Berlin: Where the Wild Things Are (IV) (CA)
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)

[GERST 406] Introduction to Medieval German Literature II # (IV)

[GERST 407] Teaching German as a Foreign Language
Fall. 4 credits. G. Lischerke.

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 student's 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 (also GERST 810)
Fall. 4 credits. Open to all students with an adequate command of German. Prerequisite: any German course at the 300-level or equivalent or permission of instructor. Readings and discussions in German. A. Groos.

Topic: Early Modern City Culture. An introduction to city culture in the fifteen and sixteenth centuries, with emphasis on the significance of Nuremberg and other early modern urban centers such as Strasbourg and Augsburg. The course covers the city's development and social structure, pre- and post-Reformation constructions of its image and history, public spectacle and imperial entries, print culture and humanism, social order and conflict (the Fastnachtsbriel, anti-Semitism). Readings will include texts/images by Hans Sachs, Conrad Celtis, Sebastian Brant, Albrecht Dürer, Hans Rosenplütt and Hans Fols. The last part of the course will deal with the reception of early modern Nuremberg from Goethe through the Romantics, including Wagner's Der Meistersinger von Nürnberg.

[GERST 412] German Literature from 1770 to 1848 # (IV)

[GERST 413] Women around Freud (also COM L 417) (IV) (CA)

Few legends have so engaged the imagination as that of the man who signed a pact with the devil to obtain pleasure, power, and knowledge. While the myth itself is timeless, the modern version takes its cue from one real Georg Faust, a figure of dubious character, half scholar, half quack, during the time of the German Reformation. The German Volksbuch depicting his adventures was almost immediately translated into English and became the inspiration for Marlowe's Tragic History of Doktor Faust. Goethe devoted some 60 years to his Faust, completing it only months before his death in 1832. While Marlowe's Faust deserves eternal damnation for his hubris, Goethe's protagonist finds favor with Goethe's contemporaries and readership. A. Schwarz.

[GERST 414] Introduction to Literary Theory (also COM L 438) (IV)

[GERST 415] Marx, Nietzsche, Freud (also COM L 409, IV)

[GERST 430] Brecht, Artaud, Müller, Wilson (also COM L 430 and FILM 420) (IV)

[GERST 435] Rescreening the Holocaust (also COM L 442) (IV) (CA)
Fall. 4 credits. Limited to 30 students.

Advanced Undergraduate and Graduate Courses

[GERST 420] The Language of German Poetry (IV) (LA)

[GERST 428] Genius and Madness in German Literature (also COM L 409) (IV)

[GERST 441] Introduction to Germanic Linguistics (also LING 441) (IV) (LA)

[GERST 446] 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)
Fall. 4 credits. Limited to 30 students.

Monday evening film screening in addition to class time. D. Bathrick

Rescreening the Holocaust will offer a survey of the major films dealing with the Holocaust beginning with Night and Fog (1955) and including such works as the television film Holocaust, Schindler's List, Shoah, Life is Beautiful, Sophie's Choice, Jacob the Liar, The Diary of Anne Frank, Kapo, My Mother's Courage and others. The course will focus on major issues of debate around the possibilities and limits of representing the Holocaust cinematically as well as questions more specifically concerning commercialization, factionalization, 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 emphasizes the notion that screenings of the Holocaust are at the same time often rescreenings, to the extent that they are built on, presuppose, or even explicitly cite or take issue with earlier cinematic renderings.

GERST 451-452 Independent Study  
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 Imaging 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 471 Poetry of the 1990s  
(also COM L 472) (IV)  

GERST 492 The Advance of Humanism: Aspects of the European Enlightenment  

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  

GERST 510 Early Modern City Culture  
(also GERST 410)  
Fall. 4 credits. A. Groos.

GERST 531-532 Academic German I and II  
631, fall; 632, spring. 3 credits each term. Limited to graduate students. Prerequisite: for GERST 632, GERST 631 or equivalent.

GERST 534 German Romanticism  
Fall. 4 credits. Most readings are in German; discussion and papers in English. Students from other disciplines are welcome. Anchor course. G. Waite.

GERST 536 Aesthetic Theory: The End of Art  
(also COM L 656, ART H 447 and VISUAL STUDIES)  

GERST 600 Special Topics in Feminist Theory  
(also ANTHR 600 and COM L 600)  

GERST 606 Topics in Historical Germanic Phonology  

GERST 607 Topics in Historical Germanic Morphology  

GERST 608 Topics in Historical Germanic Syntax  

GERST 610 Early Modern City Culture  
(also GERST 410)  
Fall. 4 credits. A. Groos.

GERST 614 Gender at the Fin-de-siècle  

GERST 615 Jews in German Culture Since 1945  
(also JWST 615)  

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 FGS 621)  

GERST 623 Aesthetic Turns: The Fin-de-siècle  

GERST 624 Seminar in Medieval German Literature  

GERST 626 Nuremberg  

GERST 627 Baroque (also COM L 626)  

GERST 629 The Enlightenment  

GERST 630 Classicism and Idealism  

GERST 631-632 Academic German I and II  
631, fall; 632, spring. 3 credits each term. Limited to graduate students. Prerequisite: for GERST 632, GERST 631 or equivalent.

GERST 634 German Romanticism  
Fall. 4 credits. Most readings are in German; discussion and papers in English. Students from other disciplines are welcome. Anchor course. G. Waite.

GERST 636 Aesthetic Theory: The End of Art  
(also COM L 656, ART H 447 and VISUAL STUDIES)  

GERST 650 Culture in the Weimar Period  

GERST 652 Culture in Germany  
1933–1945  

GERST 653 Opera (also COM L 655 and MUSIC 679)  

GERST 656 Aesthetic Theory: The End of Art  
(also COM L 656, ART H 447 and VISUAL STUDIES)  

GERST 658 Old High German/Old Saxon  
(also LING 646)  
Fall. 4 credits. W. Harbert.

GERST 660 Visual Ideology (also COM L 660 and FILM 660)  

GERST 661 After the City: From Metropolis to Electropolis (also ARCH 338/638 and COM L 661)  
GERST 663 Nietzsche and Heidegger
(also COM L 663)
Spring. 4 credits. G. Waite.

This seminar provides, primarily, a basic introduction to the thinking of Nietzsche and Heidegger, including the latter's appropriation of the former. We will also be interested in the types of argumentation and styles of writing of both philosophers, in light of the hypothesis that both were working in the long tradition of esotericism, that is, that neither wrote exactly what he thought and that they intended their impact to come beneath the level of conscious apprehension. In addition to their own work, and, secondarily, we will consider their influence in writers across the Left-Center-Right spectrum (e.g., T. W. Adorno, G. Bataille, P. Bourdieu, J. Butler, J. Derrida, G. Deleuze, M. Foucault, H.-G. Gadamer, L. Irigaray, P. Fossowski, S. Rosen, L. Strauss).

[GERST 664] Freud and the Fin de siècle

[GERST 666] Ingeborg Bachmann

[GERST 667 “Minor” German Literatures?

[GERST 668] Literature and the Uncanny
(also COM L 664)

[GERST 669] Modern Social Theory I (also GOVT 669)
Fall. 4 credits. S. Buck-Morss.

[GERST 670] Postcolonial Theory and German Literature

[GERST 672] German Opera Topics: Wagner
(also MUSIC 674)

(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 679] Bertolt Brecht in Context
(also COM L 679 and TMTR 679)

[GERST 680] Brecht, Müller, and the Avant-Garde
(also COM L 676 and FILM 680)
Fall. 4 credits. Prerequisite: permission of instructor. D. Bathrick.

This course examines Friedrich Hölderlin's philosophical, poetological, and poetic work, recognized only belatedly as among the most insistent, consequential, and haunting contributions to German letters. We will pay close attention to Hölderlin's philosophical development, in particular his critiques of Fichte's Science of Knowledge and Schiller's Aesthetic Letters. Taking their departure from these critical positions, Hölderlin's subsequent treatments of aesthetic and poetological questions became the ground of a rigorous and revolutionary philososphy-poetic practice. We will examine all of Hölderlin's major aesthetic and poetological writings (including the "Oldest System-Program," the authorship of which is still debated). These theoretical statements are enacted in such poetic texts as the Empedocles drama, the translations of Oedipus and Antigone, and Hölderlin's stunning lyric poetry. Throughout, we will read Hölderlin's philosophical positions in relation to his poetry and trace the move from philosophy to poetic theory and practice. Of particular importance for our inquiry will be the meticulous reading of Hölderlin's views on the method of poetry, the difference between poetic genres, the change of tones, and the notion of intellectual intuition. On this basis, we will also debate the claims of some of Hölderlin's most incisive readers, such as Heidegger, Henrich, Allemann, Binder, de Man, Haverkamp, Krell, Ryan, Lacoue-Labarthe, Nagele, and Sattler.

[GERST 685] Gramsci and Cultural Politics
(also COM L 688 and GOVT 675)

(also COM L 688, GOVT 679, and FRLIT 623)

[GERST 687] The Politics of Culture in the German Democratic Republic

[GERST 689] The Aesthetic Theory of Adorno
(also COM L 689 and HIST 689)
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. P. Hohendahl.

This seminar will focus on the aesthetic writings of Adorno, beginning with relevant chapters from Dialectic of Enlightenment as well as selected essays on European literature and music. The emphasis then will be placed on Adorno's major posthumous work, Aesthetic Theory (1970). The aim is a close reading of Adorno's theory in the context of the Kantian and Hegelian tradition. All readings will be in English.

[GERST 690] Feminist Criticism and Theory
(also FGSS 690)

[GERST 693] “The Sign of History”: Kant and Lyotard
(also COM L 693, GOVT 761)

[GERST 696] Conceptualizing Cultural Contact
(also COM L 696 and NES 696)

[GERST 699] German Film Theory
(also COM L 699 and FILM 699)

[GERST 752–754] Tutorial in German Literature
Fall and spring. 1–4 credits per term. Prerequisite: permission of instructor.

[GERST 757] Mozart: His Life, Works, and Times
(also MUSIC 677)
Fall. 4 credits. Prerequisite: reading knowledge of German. N. Zaslaw.

Mozart as composer, performer, historical figure, subject of research, and cultural icon.

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 204 Intermediate Composition and Conversation
Spring. 3 credits. Prerequisite: DUTCH 203 or permission of instructor. M. Briggs. This course emphasizes written and oral application of accurate, idiomatic Dutch. Reading of authentic material such as newspapers, web-based texts, literature, history and film, with emphasis on the students' interests and specializations. Taught in Dutch.

DUTCH 300 Directed Studies
Fall or 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. Topic for fall or spring: Afrikans.

Swedish

SWED 121-122 Elementary Swedish
121, fall; 122, spring. 4 credits each term. Prerequisite: for SWED 122, SWED 121 or equivalent. L. Trancik. 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 123 Continuing Swedish
Fall. 4 credits. Provides language qualification. Prerequisite: SWED 122 or equivalent. L. Trancik. Development of skills in spoken and written Swedish within Sweden's cultural context.

SWED 203 Intermediate Swedish
Fall. 3 credits. Provides language proficiency. Prerequisite: SWED 123 or permission of instructor. L. Trancik. Intermediate to advanced-level instruction using audio-visual material and text to enhance language comprehension.

SWED 204 Advanced Swedish
Spring. 3 credits. Prerequisite: SWED 203 or permission of instructor. Taught in Swedish. L. Trancik. Emphasis on improving oral and written expression of Swedish, including vocabulary, readings in contemporary prose, treatment of specific problems in grammar, and presentation of videos and films.

SWED 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. L. Trancik. Taught on a specialized basis to address particular student needs. Times will be 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 power wielders and publics in this and other societies. Government is divided into four subfields: U. S. politics, comparative politics (other nations), political theory (philosophy), and international relations (transactions between nations).

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;
(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 (12 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 to take courses and undertake a closely supervised externship during a fall or spring semester.

European Studies Concentration.
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 politicians from the members states, 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 Uris 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 session.

GOVT 111 Introduction to American Government and Politics (III) (SBA)
Fall and summer. 3 credits. T. J. Lowi. 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. J. Pontusson. 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 imprints 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 # (III) (HA)**

Spring, 3 credits. B. Hendrix.

A survey of the development of Western political theory from Plato to the present. Readings from the works of the major theorists. An examination of the relevance of their ideas to contemporary politics.

**GOVT 181 Introduction to International Relations (III) (SBA)**

Fall and summer. 3 credits. P. Katzenstein.

An introduction to the basic concepts and practices 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 course selection period the semester before the seminar is given.

The following courses are open to sophomores, juniors, and seniors without prerequisites unless otherwise indicated.

**American Government and Institutions**

**GOVT 111** is recommended.

**GOVT 215 Sophomore Seminar: Gender, Nationalism, and War (III) (CA)**

Spring. 3 credits. M. Evangelista.

What is the relevance of gender to nationalism, conflict, and war? The association of hostility, aggression, and bloodshed with masculinity—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 language, etc.), but violent defense of the nation has traditionally been undertaken by a male-dominated enterprise. 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 which draws on Tolstoy's stories, which the students will also read. Because the course emphasizes writing, students will have the opportunity to experiment with various styles and modes, 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 identifications change? What 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 context of particular episodes of violent nationalism and 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's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at bringing 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.

**GOVT 301 Public Opinion and American Democracy (III) (HA)**

Fall. 4 credits. N. Winter.

This course is organized around three broad themes: American state expansion in the late nineteenth century, the political economy of national and regional conflict 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 separatism to subsequent American political development and state formation. 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. Emphasis is given to analysis and 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. 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 their legacy in politics and in patterns of social interaction? The movements to be studied are populist; progressive; labor; socialist; women's suffrage, the contemporary gender equality movement, protest movements of the 1960s, civil rights; Students for a Democratic Society and antinuclear movement of 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 study of actual movements and the difficulties they faced.

**GOVT 303 Imagining America (also AM ST 328) (III or IV) (CA)**

Fall. 4 credits. D. Rubenstein.

This course addresses nineteenth and twentieth century European travel writing about America from Alexander von Humboldt'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 Samovar* or in Simone de Beauvoir's *A Tale of Two Richard Wights* 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 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 309 Science in the American Polity (also S&TS 391) (III) (SBA)**


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 competing claims of science as an autonomous republic and as just another special interest provide the central theme for the course. Topics addressed include: the politics of scientific discovery, technological controversies, scientific advice, citizen participation in science policy, and the use of experts in courts.

**GOVT 311 Urban Politics (III) (SBA)**

Spring. 4 credits. M. Shefter.

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 movements that preceded them. 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.

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 principles for resolving conflicts and dealing with social problems. The roles of courts, legislatures, and administrative agencies in the legal process are analyzed, considering both the constitutional limits on their power and practical limits of their effectiveness. Assigned readings consist mainly...
of judicial and administrative decisions, statutes and rules, and commentaries on the legal process. Students are expected to read assigned materials before each class and to be prepared for participation in class discussion.

**GOVT 314 Prisons (III) (SBA)**
Fall 4 credits. M. Katzenstein.
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, chaplain’s offices) which 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)**
E. Sanders.
Analysis of the politics of the presidency and the executive branch with emphasis on executive-legislative relations, executive branch policymaking, and the problems of the modern presidency.

**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 campaign survey data.

**GOVT 318 U.S. Congress (III) (SBA)**
Fall 4 credits. M. Shefter.
The role of Congress in the American political system. Topics to be discussed: the political setting within which Congress operates, the structure of Congress, the salient features of the legislative process, and recent congressional behavior in a number of policy areas.

**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 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 (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)**
Spring 4 credits. J. Rubkin.
An analysis of the 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 402 New York Politics (III) (SBA)**
Fall 4 credits. M. Luster.
New York is arguably the most politically, economically, socially, ethnically and demographically diverse state in the nation. How its government manages to operate at all is sometimes a wonder. This course examines the structure, traditions, tensions, and processes of its political institutions, with a particular focus on the legislature, in an effort to understand how a contentious, partisan, and historically brutal political climate has often produced great leaders and positive results. With the “devolution revolution” still ongoing, we want students to better understand the role of state government and how it functions in the turbulent world of New York politics.

**GOVT 403 International Environmental Policy and Law (III) (SBA)**
Fall 4 credits. A. Bretittel.
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 learn about the concepts and institutions of transnational regulation, and how they are used to coordinate responses to environmental problems. The course lays the foundation for understanding international environmental law, its concepts, sources, and applications. Students will learn how and why various coordinating mechanisms, including environmental treaties and agreements, are initiated, negotiated, and implemented. Also, students will learn about institutions such as 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 challenges and how they are addressed by institutions, such as “global governance.” Global governance is not world government nor is it simply international relations. During this course, students will learn about the concepts and institutions of transnational regulation, and how they are used to coordinate responses to environmental problems.

**GOVT 405 The Postmodern Presidency: 2004 (also AM ST 430.3) (III) (CA)**
Spring 4 credits. D. Rubenstein.
This course will examine the presidencies of Reagan, Bush, and Clinton in relation to what scholars have called “the postmodern presidency.” While this term has been utilized by institutionalist students of the presidency as a periodizing hypothesis, our emphasis will be on the role 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 theme. 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)**
Fall 4 credits. R. Bensel.
The Civil War, along with the Founding of the nation in the late eighteenth century, is one of the two most important influences on the course of American political development. Arising out of intense ideological, cultural, and economic competition between the slave South and the free labor North, the conflict created two new national states: a northern Union that replaced the loose federation of the antebellum period and a southern Confederacy that perished at Appomattox. In this course, particular attention is paid to: the political economy and culture of plantation slavery in the antebellum South; the apparent inevitability of collision between the slave and free states and their respective societies; the military, political, and economic strategies that were determined, on both sides, duration of the war; the limits and possibilities of reform of southern society during Reconstruction; and the impact of the Civil War on the subsequent development of the United States.

**GOVT 413/613 Coordination in American Politics (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. Shefter, J. Rabkin.
This seminar examines how American government and politics 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 426 Colonialism and Post Colonialism (III) (HA)**
Fall 4 credits. L. Ryter.
The age of colonialism, for the most part, came to an end after the second world war. Yet colonialism 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. Aiming to explore the various dimensions of "postcolonialism," this course will reach new ground in its interactions with real-world examples of constitutional assemblies and constitutional reforms from Africa, Latin America, Israel, the United States, and Western and Eastern Europe.

**GOVT 328 U.S. Supreme Court (III) (HA)**
Fall. 4 credits. J. Rabkin.

The course investigates the role of the Supreme Court in American politics and government. It traces the historical development and institutional role the court has played in American politics.

**GOVT 329 Comparative Politics of Latin America (III) (SBA)**
K. O'Neill.

This course probes the political implications of the economic strategies and policies of selected African states. The basic aim of this course is to comprehend the nature of the interactions between political conditions and structures, and economic choices and policies. Special attention will be devoted to the issues of rural development, mineral resources, population, multi-nationals, the impact of the structural adjustment programs on public policy, and the role of Africa in global economy.

**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. Zimmerman.

The course compares 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 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 338 Comparative Political Economy (III) (SBA)**
Spring. 4 credits. C. Way.

This course examines the juncture of politics and the economy in the advanced industrial democracies. Why do some countries have large, inclusive welfare states while others have minimal social programs? Is the welfare state in decline, and if so why? Does it really matter that one country is democratic while the other is not? Do strong unions have negative effects on the economy, or can they actually boost economic performance? What does increasing globalization of the world economy mean for the constraints and opportunities facing governments in managing the economy and providing social welfare? How will the Euro and increasing European integration change the world? Are all market economies pretty much the same, or are there varieties of capitalism that differ in important ways? We use a variety of theoretical approaches to provide some insight into these and other questions, paying particular attention to evaluating the theoretical arguments of both systematic and historical evidence.

**GOVT 341 Modern European Society and Politics (also SOC 341) (III) (SBA)**
Spring. 4 credits. V. Bunce, J. Pontusson.
Since the French and Industrial revolutions, modern Europe has been the major source of innovation, and stability. This course examines how imperialism, war and peace, capitalism and socialism, rule of law and state terror, and modernity and its critics. Even the 50-year division of the continent by the Cold War could not destroy its common, contradictory heritage. This interdisciplinary core course in Modern European Studies 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 334, The New Europe, which focuses on contemporary Europe. 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. Zimmerman.

This course explores the policies and policymaking 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 arrangements 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)
Fall. 4 credits. L. Ryter.
Contemporary politics in Southeast Asia must be understood in light of colonialism, the nationalist 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. A. Brettell.
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 course focus on the rise of the Chinese revolution, the revolutions of Mao Zedong thought, and the main political campaigns of the Mao period. Next, the course focuses on the Deng Xiaoping and Jiang Zemin era and the complex problem 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 will examine the succession of a new generation of leaders to power, a fourth generation, and the possibility of continuing economic and political reforms. Also, we will make comparisons between the People’s Republic of China and Taiwan. Throughout the course, we will explore several theories including the meaning of citizenship in a one-party dominated state, national integration, state power and regime adaptation, social control, channels 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. A. Brettell.
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 governments 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 354 Capitalism, Competition, and Conflict in the Global Economy @ (III) (SBA)
Fall. 4 credits. P. Katzlinstein.
Unemployed autoworkers in Detroit and the workers 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 their consequences for America and international politics.

GOVT 432 Model European Union II
Fall. 2 credits. J. Pontusson.
GOVT 436 Environmental Politics and Policy (III) (SBA)
Spring. 4 credits. Staff.
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 standards affecting the environment, and various models of political behavior and the translation of political movements into public law.

GOVT 437 Contemporary China: Society and Politics @ (III) (SBA)
Spring. 4 credits. Staff.
Selected reading and in-class discussion of some of the critical issues that have been posed by the rapidly escalating processes of social change taking place under conditions of continuing political authoritarianism in China today. Topics include broad changes in demography 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, of regionalism, 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 448 The Quality of Democracy in Latin America @ (III) (SBA)
Fall. 4 credits. Staff.
This course explores major issues affecting the quality of democracy in Latin America. We begin by trying to capture the many meanings of the term “democracy” and by thinking through how it is possible to measure changes in the quality of democracy over time. The course examines both institutional bases for Latin America’s level of democracy—whether the quality of democracy is affected by government institutions in the region—and also specific topics that reflect the type of democracies. These subjects include ethnic mobilization, guerrilla insurgencies, civil wars and peace processes, human rights violations, rising poverty rates, income inequality, and economic globalization.

Political Theory

GOVT 161 is recommended.
GOVT 293 Inequality, Diversity, and Justice @ (III or IV) (KCM)
Spring. 4 credits. R. Miller.
See PHIL 193 for description.

GOVT 294 Global Thinking @ (III) (KCM)
Spring. 4 credits. B. Hendrix.
Existing nation-states face many challenges that cross their borders, including environmental degradation, international terrorism, and global market forces. 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 consider 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)
Spring. 4 credits. D. Rubenstein.
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, Hebdige), structuralist/semiotic (Barthes, Eco) and psychoanalytic models (Freud, Lacan), we focus on specific ideologies of race, technology and gender. Students are required to write a 7-page take-home examination and a 10-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 363 Politics and Culture (III) (HA)
Fall. 4 credits. M. Berezin.
See SOC 248 for description.

GOVT 366 American Political Thought from Madison to Malcolm X (also HIST 316 and AM ST 366) @ (III) (HA)
Fall. 4 credits. I. Kramnick.
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 material. Historical, political, and social context is offered.

GOVT 367 Writing in the Majors
Fall. 1 credit. Staff.
This course is specifically designed for students enrolled in GOVT 366/AMST 376/HIST 316 opting to take the extra one credit.

GOVT 368 Global Justice (also PHIL 347) @ (III or IV) (KCM)
Spring. 4 credits. R. 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 oil-producers 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 is fair? How can we cooperate to deal with a common but long-term problem? 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)
Spring. 4 credits. G. Waite.
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 the context of historical and social contexts. The course deals with the intersection of art and politics in the twentieth century.
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 character of contemporary practices (feminist, modernist, conceptualist, 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)**

Spring. 4 credits. A. M. Smith.

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 role of various forms of 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; and an analysis of the 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)**

Fall. 4 credits. B. Hendrix.

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, resource, and political autonomy, as well as considering the possibility of full sovereign statehood.

**GOVT 462 Modern Political Philosophy (also PHIL 346) (III or IV) (KCM)**

Fall. 4 credits. R. Miller.

See PHIL 346 for description.

**GOVT 465 Reconciling Liberalism (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 or 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 works of such theorists as: Habermas, On African 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 467 Radical Democratic Feminisms (III)**


**GOVT 470 Contemporary Reading of the Ancients (III) (CA)**

Fall. 4 credits. Graduate students are welcome to enroll in the seminar. 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 issues of love and friendship, food and pedagogy, eros 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?

**International Relations**

GOVT 181 is recommended.

**GOVT 380 The Politics of Modern Germany (III)**


**GOVT 381 Conflict and Cooperation in Trans-Atlantic Relations (III) (SBA)**

Spring. 4 credits. E. Zimmerman.

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 examined: patterns of cooperation and conflict.

**GOVT 382 International Relations of East Asia (III)**


**GOVT 383 The Cold War (III) (HA)**

Spring. 4 credits. 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 course analyzes 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)**

Fall. 4 credits. 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)**

Fall. 4 credits. R. McDermott.

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 institutional 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 and Berlin crises; 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)**

Spring. 4 credits. 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 reward threats to use force by "rallying around the flag" in support of their governments? Does the inexorable pattern of the rise and fall of nations lead to cycles of great power wars throughout history? These and other questions 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) ideological 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 387 Political Psychology in International Relations (III)**


This course provides a survey of how social and cognitive psychology are used in the study of international relations. This course covers various methodological approaches, including psychobiography and experimental and survey research. It also covers several theoretical approaches, including recent work in neuroscience and evolutionary psychology. These theories and methods are applied to topics including risk taking, leadership, group dynamics, and the influence strategies of the media. Particular attention is placed on the interaction of emotion, cognition, and behavior in processes of judgment and decision making.
This course covers several specific aspects of public health policy. First, the effect of diseases like AIDS on the economic, political, and cultural institutions in the United States and Africa are examined. Second, the way in which the United States government has responded to various epidemics and disease outbreaks is explored. Why is it that some diseases receive more funding than others? How has the public health system responded to the outbreak of epidemics, both historically and currently? What are the policies behind the development and marketing of new drugs? In the final section of the class we discuss bioterrorism. How does it work? What responses can we put in place to defend against it?

GOVT 398 International Law (III)  
J. Rabkin.

Is international law a pious delusion, helpless in the face of real war? Or is public policy becoming so entangled in international standards that international law is now eroding national sovereignty? This course surveys the theoretical foundations and general history of international law since the 17th Century in order 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 theories of peace and war from a variety of disciplinary perspectives. The course will cover definitions of peace and war, causes of conflict, and modes of conflict prevention and resolution. The concepts will be applied to a range of historical and current conflicts. Students will prepare analyses of specific conflicts or instances of peacemaking for class presentation.

GOVT 395 New Forces (Actors and Issues) in International Politics (III)  
Spring. 4 credits. A. Carlson.

How important are regional groupings, non-governmental organizations, narco-terrorists, ethnic groups, and transnational environmental issues, within international politics? These forces seem to be occupying an increasingly central position in the international arena, yet the factors that have caused their rise, and the degree to which they have transformed the face of international politics, are still poorly understood. In this course we 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 478 The Politics of Disease (III)  
Spring. 4 credits. Enrollment limited to 15 students. R. McDermott.

This course covers several specific aspects of public health policy. First, the effect of diseases like AIDS on the economic, political, and cultural institutions in the United States and Africa are examined. Second, the way in which the United States government has responded to various epidemics and disease outbreaks is explored. Why is it that some diseases receive more funding than others? How has the public health system responded to the outbreak of epidemics, both historically and currently? What are the policies behind the development and marketing of new drugs? In the final section of the class we discuss bioterrorism. How does it work? What responses can we put in place to defend against it?

GOVT 481 Democracies in the International System (III)  
Fall. 4 credits.  
Now offered as GOVT 400.02.

GOVT 482 Unifying While Integrating: China and the World (also GOVT 682) (III) (H)  
Spring. 4 credits. A. Carlson.

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 GOVT 483) (III) (SBA)  
Spring. 4 credits. J. Reppy.

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 Seachime Gun and Steven Rosen, Winning the Next War.

GOVT 487 Asian Security (also GOVT 687)  
Fall. 4 credits. A. Carlson.

This course covers several specific aspects of public health policy. First, the effect of diseases like AIDS on the economic, political, and cultural institutions in the United States and Africa are examined. Second, the way in which the United States government has responded to various epidemics and disease outbreaks is explored. Why is it that some diseases receive more funding than others? How has the public health system responded to the outbreak of epidemics, both historically and currently? What are the policies behind the development and marketing of new drugs? In the final section of the class we discuss bioterrorism. How does it work? What responses can we put in place to defend against it?

GOVT 489 International Institutions (also GOVT 690) (III) (SBA)  
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 authoritative entities, but also "settled practices" that legitimate certain actions and de-legitimate others. We develop our theoretical understanding of international institutions by analyzing such issue areas as decolonization, human rights, the environment, and communications.

GOVT 491 Conflict, Cooperation, and Norm: Ethical Issues in International Affairs (also GOVT 691) (III) (SBA)  
M. Evangelista.

Honors Courses

GOVT 493 Studying Politics: The Junior Honors Seminar  
Fall and spring. 4 credits. M. Evangelista. The seminar meets twice weekly under the supervision of a senior faculty member with numerous classes being led by other members of the department faculty. The seminar surveys the broad range of what we mean by "the study of politics" and the various methods we enlist to carry out the study. The seminar is writing intensive, requiring at least five papers.

GOVT 494 Honors Seminar: Thesis Clarification and Research  
Fall. 4 credits. A. M. Smith. 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 which is arranged by the student with a faculty member of their 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 125 McGraw 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 504, PAM 402)  
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.
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. P. Katzenstein.
A general survey of the literature and propositions of the international relations field. Criteria are developed for judging 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

[GOVT 608 Environmental Politics]
Fall or spring. 4 credits. Not offered 2003–2004.

GOVT 609 CPAs Weekly Colloquium
Fall, spring. 1 credit. S-U only. A. Dutson.

Methodology

GOVT 601 Methods of Political Analysis I
Fall or spring. 4 credits. (GOVT 601 or 602 is offered only once an academic year. Students are allowed to take one without the other or enroll in both.) J. Pontusson, W. Mebane, K. O'Neill.
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 expected 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
Fall or spring. 4 credits. (GOVT 601 or 602 is offered only once an academic year. Students are allowed to take one without the other or enroll in both.) W. Mebane, K. O'Neill.
This course provides an introduction to some of the quantitative methods used in the social sciences. Topics we shall discuss 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. E. Sanders.
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 605 Comparative Methods
Fall. 4 credits. J. Pontusson and K. O'Neill.
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 610 Political Identity: Race, Ethnicity, and Nationalism (also LSP 610)]
The social sciences generally treat ethnicity, nationalism, and race as descriptive categories or variables, while avoiding actually defining these categories, or thinking about how they should be used. The course seeks answers to the following questions: How should we go about describing ethnicity, nationalism, and race? Should we treat them as primordial or as social constructions? Much of the recent literature suggests the latter. If constructed, by whom are they constructed (or by what)? What constrains or shapes these constructions? What purposes do these constructions serve? Whom do they serve? Are some constructions better representations of identity than others, and what does this mean? How should we go about applying these categories in political analysis?

GOVT 611 The Political Economy of American Development, 1860–1900
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 eras, and end 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 separatism; (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 remodel 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 615 State and Economy in Comparative Perspective
Spring. 4 credits. R. Bensel.
This course reviews the extensive literature on the political economy of comparative state formation, economic development, and institutional change. Among the topics covered will be war-making and state expansion, regime evolution and modernization, and market processes and class transformation. The topics will range from the micro-economic foundations of political choice through the grand historical forces that have shaped the contemporary world economy. Although much of the reading and discussion will focus on European cases, the limits of this experience as a theoretical model for the remainder of the world also will be considered.

GOVT 620 The United States Congress
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 deliberate, constructions and abstractions 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 more rich, the House of Representatives receives greater attention than the Senate.

GOVT 623 Political Economy
This course undertakes a general survey of the classical and modern theories of political economy. The works of Smith, List, Marx, Weber, Keynes, Schumpeter, 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
Fall. 4 credits. T. J. Lowi.
For description, see GOVT 428.

Comparative Government

GOVT 526 Comparative Political Economy
Spring. 4 credits. J. Pontusson, R. Herring.
Every society necessarily utilizes mechanisms to answer basic 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 nations, regions and sectors, as well as across 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 industrialized societies, we seek to understand the political economy of development.
GOVT 639 Comparative Political Participation
Spring. 4 credits. D. Moehler.
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 goal 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)
Spring. 4 credits. L. Turner.
For description, see ILRIC 632.

GOVT 642 Comparative Political Economy: East and Southeast Asia

GOVT 645 Chinese Politics
Spring. 4 credits. A. Brettell.
Review and assessment of some 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
Spring. 4 credits. L. Byer.
Criminality has been approached in the social sciences from a variety of angles. Sociologists following Durkheim have viewed crime as a social anomie. Critical theorists following Foucault have viewed criminality as an integral and functional part of the social system. Comparative politics has tended to approach criminality from above, viewing it, for instance, as an inverse measure 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 explores 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 653 The Plural Society Revisited (also ASIAN 607)

GOVT 656 Comparative Political Economy of OECD
While exploring selected topics in the comparative political economy of advanced industrial societies, this seminar seeks to delineate “political economy” as a subfield of political science. At the level of theory, our goal is to bridge two research traditions, one concerned with micro-economic issues (industrial organization, industrial policy, competitiveness) and the other concerned with macro-economic issues (wage bargaining, fiscal and monetary policy), and to explore what a synthesis of these research traditions might look like. At the level of methodology, we seek to bridge and integrate qualitative and quantitative approaches to comparative political economy. Students are expected to have some prior exposure to quantitative analysis (e.g., GOVT 601).

GOVT 657 Comparative Democratization
This course focuses on the transition from authoritarian to liberal political systems in Eastern Europe and in Latin America. Particular attention is paid to Poland, Hungary, Russia as well as Argentina, Brazil, and the not-necessarily-transitional Mexico. During the course, we will also bring in a variety of other cases of recent democratization—in particular, Spain, Portugal, Italy, and Greece. Our focus is equally divided between the empires 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 contentious politics. In the 1960s and 1970s, they converged in the work of scholars like Charles Tilly, who advanced both fields of study, which then ran along parallel but largely independent tracks. This course seeks to synthesize 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 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 will focus on the question of secession, while the second half will investigate intervention and war. Central texts include Allen Buchanan, Secession; David Miller, On Nationality; and Michael Walzer, Just and Unjust Wars.

GOVT 695 Labor in Global Cities
Fall. 4 credits. L. Turner.
See ILRCB for description.

GOVT 731 Political Ecology
Fall. 4 credits. R. Herring.
This course introduces at a graduate level what we might call the political economy of nature, or “political ecology” in shorthand. It is explicitly comparative in scope. Political ecology is at the center of the continuing struggle—at the level of meaning, politics, and policy—over “development.” Much of the contest over forms and strategies of development concerns variable appropriation of benefits—and distribution of costs—of the conquest and transformation of nature. Central to these disputes is the contested role of markets, states, and communities in driving outcomes. These matters will form the substantive core of the course. Theoretically we will be concerned with the causal connections between structures of social ecology and movements spawned within those structures—that is, the problem of structure and agency—and between political movements and state responses—that is, policy.

GOVT 669 Modern Social Theory
Fall. 4 credits. S. Buck-Morss.
Readings vary, but topics are drawn from the traditions of Marx, Weber, Durkheim, the Frankfurt School, and critical political economy. They include political economy, the transformation to “modernity,” ideology as the legitimation of power, and social institutions as social constraints. The methods of critical theory, structuralism, poststructuralism, and feminism are considered.

GOVT 760 Theoretical Approaches to Ideology
Fall. 4 credits. A. M. Smith.
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 throughout diverse social sites, the ability of political agents to interrupt institutionalized ideologies, and the processes by which ideology penetrates and reconstructs the worldviews of the dominated. We will lay the groundwork for the seminar by examining key texts on ideology by Marx. We will trace the multiple meanings of the term in his work and throughout the development of contemporary Marxism. We will then explore the ways in which the study of gendered and racial discourse has transformed our understanding of ideology. We will address the Freudsian and Lacanian interventions in ideology studies with respect to the concepts of the unconscious and misidentification. We will 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 will explore the problem of institutional analysis with reference to texts from the science and technology studies and state- theory traditions.

GOVT 752 Sexuality and the Law Seminar
Spring. 4 credits. Advanced undergraduates are welcome to apply for admission to the seminar; please contact the instructor by e-mail before classes begin. A. M. Smith. An advanced feminist theory/political theory, queer theory/legal theory seminar for graduate students and law students. The seminar will deal first with theoretical approaches to sexuality that build on and interrogate the post-structuralist approach that defines sexuality as a social construction rather than an expression of a-historical instincts. Then we will explore a series of major legal and political issues: the right to privacy with respect to contraception and abortion; the restriction of abortion rights; the exclusion of homosexual sodomy from the practices protected by the right to privacy; the racial regulation of marriage; same-sex marriage; Pinnochio's "sexual family" critique of family law; the moral regulation of poor women in early welfare law; the sexual regulation of poor single mothers in contemporary welfare law; the question of suspect class status for lesbians and gay men; and homosxuality and military service. Throughout the course, we will examine the extent to which sexuality is constructed in articulation with gender, class and race differences. Our reading list will include theoretical works (Foucault, Butler, Cohen, and Martín), Supreme Court decisions; and critical commentaries by feminist legal theorists.

International Relations
[GOVT 681 Politics of Transnationalism (also SOC 681)]
Fall. 4 credits. Not offered 2003-2004. 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
Spring. 4 credits. A. Carlson. 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 US 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 685 International Political Economy
Spring. 4 credits. C. Way. 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)
Spring. 4 credits. A. Carlson. For description, see GOVT 487.

[GOVT 691 Conflict, Cooperation, and Norm: Ethical Issues in International Affairs (also GOVT 491)]

Research

GOVT 701 Directed Research
Fall or spring. 4 credits. Staff.

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 advisor 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 chair of the student's special committee. 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 and International Baccalaureate
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 towards 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
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 Freshman Seminar (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.

Honors 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 course that permits honors candidates to conduct research and to begin writing the honors essay in a seminar environment. At the end of the first semester of the senior year, as part of the requirements for HIST 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 subject of his or her work. The oral examination includes 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**

**Comparative History**

**HIST 274 Foodways: A Social History of Food and Eating # (III)**

Fall. 4 credits. S. L. Kaplan.

An interdisciplinary examination of the validity of the adage "man is what he eats." Among the topics: food and nutrition, food and social structure, the politics of food control, food and modernization, taste making, and food in religion and literature. Cases are drawn widely from the topics: food and nutrition, food and social structure, the politics of food control, food and modernization, taste making, and food in religion and literature. Cases are drawn widely from 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 technology; the growth of science as a profession; and the development of science in non-Western cultures.

HIST 281 Science in Western Civilization (also S&TS 281) # (III) (HA)
Fall. 4 credits. HIST 281 is not a prerequisite to 282. P. R. Dear.

This course aims to make comprehensible both to science majors and to students of the humanities the historical structure and development of modern science and to show sciences as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek Antiquity to the 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&TS 282) # (III) (HA)
Spring. 4 credits. HIST 281 is not a prerequisite to 282. P. R. Dear.

This course aims to make comprehensible both to science majors and to students of the humanities the historical structure and development of modern science and to show sciences as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek Antiquity to the 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&TS 287) (I or III) (PBS)
Fall or spring. 4 credits. W. Provine.

For description, see BIO G 207.

HIST 292 Inventing an Information Society (also ENGRG 298, ECE 298, and S&TS 292) (III) (HA)
Spring. 3 credits. R. Kline.

For description, see ENGRG 298.

[HIST 415 Seminar in the History of Biology (also BIO G 447, B&SOC 447, S&TS 447) (I or III) (PBS)
Summer (6-week session) and fall. 4 credits. W. Provine.

Specific topic changes each year.

[HIST 471 Knowledge and Politics in Seventeenth Century England (also S&TS 473) # (III) (CA)

[HIST 525 Seminar in the History of Technology (also S&TS 525) Spring. 4 credits. R. Kline.

For description, see S&TS 525.

[HIST 616 Enlightened Science (also S&TS 416)
Fall. 4 credits. Not offered 2003-2004. P. R. Dear and Staff.]

[HIST 620 Intelligibility in Science (also S&TS 620)
Spring. 4 credits. Graduate seminar: P. Dear.

[HIST 680 Seminar in Historiographical Approaches to Science (also S&TS 680)
Fall. 4 credits. Not offered 2003-2004. P. R. Dear.]

[HIST 682 Topics in the Scientific Revolution (also S&TS 682)

[HIST 711 Introduction to Science and Technology Studies (also S&TS 711)
Fall. 4 credits. Staff.

For description, see S&TS 711.

[HIST 713 Issues in History of Technology

For description, see S&TS 700.3]

American History

HIST 153 Introduction to American History (also AM ST 103) # (III) (HA)
Summer and fall. 4 credits. 153 is not a prerequisite for 154. J. Parmenter.

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. 153 is not a prerequisite for 154. D. Chang.

An introductory survey of the development of the United States since the Civil War.

HIST 156 Introduction to Native American History (also AM ST 158) (III) (HA)
Spring. 4 credits. J. Parmenter.

With the abandonment of earlier perspectives grounded in romantic and evolutionary stereotypes, Native American history represents today one of the most exciting, dynamic, and contentious fields of inquiry into America's past. This course introduces students to the key themes and trends of the history of North America's indigenous peoples by taking an issues-oriented approach. We will cover material ranging from the debate over the Native American population at the time of the first European contact to contemporary social and political struggles over casino gambling and land claims. The course stresses the ongoing complexity and change in Native American societies and will emphasize the theme of Native peoples' creative adaptations to historical change.

HIST 208 Seminar: The Era of Franklin D. Roosevelt (also AM ST 208) (III)
Fall. 4 credits. Seminar designed for undergraduates but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 2003-2004. R. Polenberg.

HIST 209 Seminar in Early American History (also AM ST 209 and FGSS 209) (III) (HA)
Spring. 4 credits. Limited to 20 students. W. W. Norton.

Topic for fall 2003: The Salem Witchcraft Crisis of 1692. Even though a myriad of books have been written about this endlessly fascinating episode in American history, many aspects of it remain unexplored. After reading some of the latest scholarship on the subject and viewing contemporary depictions of it, students will focus on interpreting and analyzing original documents covering some of the lesser-known aspects of the crisis (for example, the involvement of large numbers of people from Andover, Massachusetts). Students will have opportunity to contribute their final work to the Salem Digital Archive on the web.

HIST 212 African-American Women in the Twentieth Century (also AM ST 212 and FGSS 212) (III) (HA)

HIST 213 American Diversity in the Twentieth Century (also AM ST 211 and AAS 212) (III) (HA)
Fall. 4 credits. Permission required. Preference will be given to American Studies majors. D. Chang.

This seminar offers an in-depth analysis of diversity in America during the twentieth century. It uses local case studies and examines national discourses to investigate the experiences of people from variously diverse nations. It also explores contexts over the meaning and role of "diversity" in twentieth century American politics. Course materials include some of the most significant monographs recently published as well as primary documents.

HIST 214 Seminar on American Foreign Policy (also AM ST 214) (III) (HA)
Fall. 4 credits. Prerequisite: permission of instructor. W. LaFeber.

Topic for fall 2003: U. S. Presidents and American foreign policy.

HIST 225 The U.S.-Mexico Border: History, Culture, Representation (also LSP 225) (III)

HIST 229 Jefferson and Lincoln: American Ideas about Freedom (also AM ST 229) (III) (HA)
Fall. 4 credits. Prerequisite: permission of instructor. E. Baptist.

Jefferson and Lincoln are two of the most admired—and two of the most criticized—figures in the history of the United States. The word "freedom" is probably both the most widely used and the most widely misunderstood term in American political debate. This
HIST 238 History of Women in the Professions, 1800 to the Present (also AM ST 258, FGSS 238, and HD 258) (III) (HA)
For description, see HD 258.

HIST 242 Religion and Politics in American History: From J. Winthrop to R. Reed (also AM ST 242 and RELST 242) (III) (HA)

HIST 246 New York Women (also FGSS 241) (III)

HIST 251 Black Religious Traditions from Slavery to Freedom (also AM ST 251, RELST 251) (III) (HA)

HIST 260 Latinos in the U.S.: Colonial Period to 1898 (also LSP 260 and AM ST 259) @ (III) (HA)

HIST 261 Latinos in the U.S.: 1898 to the Present (also AM ST 261 and LSP 261) (III) (HA)
Spring. 4 credits. M. C. Garcia.
This course examines the history of various Latino populations in the United States since 1898. Some of the topics we will discuss include: immigration as a product of U.S. hemispheric policies; the civil rights struggles of the twentieth century and the evolution of a distinct “Latino” identity; the “new” migration from Latin America; and the transnational influence of immigrant communities on their homelands.

HIST 264 Introduction to Asian American History (also AAS 213 and AM ST 213) (III) (HA)

HIST 272 The Atlantic World from Conquest to Revolution @ (III) (HA)

HIST 273 Women in American Society, Past and Present (also FGSS 273) @ (III)
Spring. 4 credits. M. B. Norton.
A survey of women's experiences in America from the seventeenth century to the present. Among the topics discussed are women's familial roles, the changing nature of household work, the women's rights movement, employment of women outside the home, racial and ethnic differences in women's experiences, and contemporary feminism.

HIST 303 African-American Women in Slavery and Freedom (also FGSS 307 and AM ST 303) @ (III) (HA)

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 313 U.S. Foreign Relations, 1750-1912 @ (III) (HA)

HIST 316 American Political Thought: From Madison to Malcolm X (also AM ST 376 and GOVT 366) @ (III) (HA)
Fall. 4 credits. I. Kramnick.
For description, see GOVT 366.

HIST 318 American Constitutional Development (also AM ST 317) (III) (HA)
Fall. 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 "revolution"; civil liberties and civil rights in modern America; the right of privacy; the contemporary Supreme Court.

HIST 321 Colonial North America to 1763 @ (III) (HA)
Fall. 4 credits. M. B. Norton.
A survey of European settlement in North America and the Caribbean, emphasizing the interactions of Europeans, Indians, and Africans; economic development; gender relations; religions and political change; and the impact on the colonies of internal and external conflicts.

HIST 324 Varieties of American Dissent, 1850-1900 (also AM ST 324) (III) (HA)

HIST 325 Age of the American Revolution, 1754-1815 (also AM ST 322) @ (III) (HA)

HIST 331 Causes of the American Civil War, 1815-1860 (also AM ST 331) @ (III) (HA)
Fall. 4 credits. E. Baptist.
A study of the simultaneous growth and growing-apart of the United States in the years from the end of the War of 1812 to the beginning of the Civil War. We will examine the political, social, economic, and cultural history of this era in order to understand why the United States became a vast, successful, transcontinental republic. We will also study the same history to understand why it simultaneously split apart and prepared to launch a civil-war that would ultimately cost more than 600,000 lives.

HIST 332 The Urbanization of American Society, 1600-1860 (also AM ST 332) @ (III)

HIST 333 The Urbanization of American Society, 1860-2000 (also AM ST 333) (III) (HA)

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)
Fall. 4 credits. S. Blumin.
An examination of American society in the context of capitalist development, and of capitalism as a social phenomenon. The transformation of pre-industrial colonies into an industrializing nation; the development of social classes; the emerging ethos of free enterprise.

HIST 337 Capitalism and Society in the United States, 1865 (also AM ST 337) (III)
Spring. 4 credits. S. Blumin.
An examination of American society in the context of capitalist development and of capitalism as a social phenomenon. The rise of corporate capitalism; class, "mass", and the ethos of enterprise in twentieth-century American society.

HIST 340 Recent American History, 1925-1960 (also AM ST 340) (III)

HIST 341 Recent American History, 1960 to the Present (also AM ST 341) (III) (HA)

HIST 343 American Civil War and Reconstruction, 1860-1877 (also AM ST 343) (III)
Spring. 4 credits. E. Baptist.
A survey of the turning point of U.S. history: the Civil War (1861-1865) and its aftermath, Reconstruction (1865-1877). We will look at the causes, the coming, and the conduct of the war, and the way in which it became a war for freedom. We will then follow the cause of freedom through the greatest slave rebellion in American history and the attempts by formerly enslaved people to make freedom real in Reconstruction. And we will see how Reconstruction's tragic ending left questions open that are still not answered in U.S. society and politics.

HIST 345 The Intellectual and Cultural Life of Nineteenth-Century Americans (also AM ST 345 and RELST 345) @ (III)
Fall. 4 credits. R. L. Moore.
An examination of the development of cultural and intellectual diversity in the United States. Particular emphasis is placed on religious pluralism.
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 major political and economic events and the adaptation of social ideas and values to new conditions.

HIST 359 American Families in Historical Perspective (also AM ST 359, HD 359, and FGSS 337) (III)
Spring. 3 credits. Prerequisite: HD 150 or one 200-level social science or history course. S-U grades optional. Human ecology students must register for HD 359. Not offered 2003-2004. J. Brumberg.
For description, see HD 385.1

HIST 375 The African-American Workers, 1865-1910: The Rural and Urban Experience (also ILRCB 385) (III)
Fall. 3 credits. Prerequisite: juniors and seniors, or permission of instructor. Not offered 2003-2004. N. Salvatore.
For description, see ILRCB 385.1

HIST 376 The African-American Social History, 1910-the present: Race, Work, and the City (III)
Spring. 3 credits. N. Salvatore.
For description, see ILRCB 386.

HIST 378 Topics in U.S. Women's History (also AM ST 378 and FGSS 378) (III)

HIST 411 Undergraduate Seminar in the History of the American South: Race and Sex, Men and Women: Gender in the Old South (III) (HA)
Spring. 4 credits. Limited to 15 students. E. Baptist.
This seminar will study the development of ideas about gender, family, femininity, blackness, and whiteness in the U.S. South from early settlement to the U.S. Civil War. We will discuss illicit sexuality, the origins of racism, interracial sex, violence, resistance, power, exploitation, and the ideas about the bodies and structures of power these phenomena helped generate. Shaped the everyday lives of African and European settlers and their descendants, even to the present day.

HIST 414 Motivations of American Foreign Policy (III)
Fall. 4 credits. Prerequisite: permission of instructor. W. LaPorte.
Topic for fall 2003: U. S. Foreign Policy in the "American Century."

HIST 419 Seminar in American Social History (also AM ST 419) (III) (HA)
Spring. 4 credits. S. Blumin.
Topic for 2004: 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. D. Chang.
This seminar offers in-depth analysis of Asian American communities. Beginning in the mid-nineteenth century and ending with late-twentieth century examinations, this course uses the community study as a lens to explore the development of Asian America. It focuses on themes of collective strategies of resistance to discrimination and tensions within Asian American populations. Course materials include some of the most significant monographs recently published as well as primary documents.

HIST 421 Undergraduate Seminar in Cultural History (also AM ST 421 and ART H 421) (III)
Fall. 4 credits. Limited to 15 students. M. Kammen.
Topic for fall 2003: 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 contemporary 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 Race and Ethnicity in Nineteenth-Century America (III) (HA)

HIST 430 America in the Camera's Eye (also AM ST 430.2 and ART H 430) (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 been recorded by documentary photographers who have called attention to the country's progress and its poverty. Hollywood filmmakers have also recorded endless images of the 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 is James Agee's and Walker Evans' Let Us Now Praise Famous Men. The seminar meets once each week for discussion and periodically during the semester to view films.

HIST 432 The City in History: Europe and America (III)

HIST 439 Reconstruction and the New South (also AM ST 439) (III)
Fall. 4 credits. Limited to 15 students. M. Washington.
This course focuses on the American South in the nineteenth century as it made the transition from Reconstruction to new forms of social organization and patterns of race relations. Reconstruction is considered from a sociopolitical perspective, concentrating on the experiences of the freed-people. The New South emphasis is on labor relations, economic and political changes, new cultural alliances, the rise of agrarianism, and legalisation of Jim Crow.

HIST 440 Undergraduate Seminar in Recent American History (also AM ST 440) (III) (HA)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. R. Polenberg.

HIST 448 The Rabbiner Seminar (also AM ST 430.5 and FGSS 430.5)
Spring. 4 credits. Permission of instructor. M. C. Garcia.
For description see AM ST 430.5.

HIST 455 The Four Seasons Motif in American Culture (also AM ST 430.2) (III) (CA)

HIST 458 Female Adolescence in Historical Perspective (also FGSS 438 and HD 417) (III)
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: permission of instructor. J. Brumberg.
For description, see HD 417.

HIST 466 Iroquois History (also AM ST 466) (III) (HA)
Fall. 4 credits. J. Parmenter.
This course will explore the history and culture of the Iroquois people from the era prior to their first contact with Europeans through their diaspora following the American Revolution, to their present-day struggles and achievements in Canada and the United States. Adopting an interdisciplinary perspective, students will be exposed to a variety of methodologies and approaches to reconstructing the Iroquois past. Readings and discussions will be drawn from a range of sources, including historical documents, traditional narratives, archaeological reports, ethnography, contemporary Iroquois literature, the Internet, and museum exhibits of material culture. Students will have the opportunity to compose their own interpretation of some aspect of Iroquois history in a significant research essay.

HIST 476 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 2003-2004. N. Salvatore.
For description, see ILRCB 304.

HIST 490 New World Encounters, 1500-1800 (also AM ST 490) (III)
Spring. 4 credits. Limited to 15 students. J. Parmenter.
The discovery of the Americas, wrote Francisco Lopez de Gomara in 1592, was "the greatest even 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 conceptualize early American history as the product of reciprocal cultural encounters by assessing the various experiences of Spanish, French, and English newcomers in different regions of the Americas. Critical interpretation of primary source material will be emphasized in the course, as will the development of students' ability to reflect critically on these documents, taking into account the
Prominent themes include U.S.-Latin American Relations; neocolonialism; and radicalism and revolutionary movements, explored through a variety of primary and secondary sources.

[HIST 206 Modern Mexico @ (III)]

[HIST 216 Gender and Colonization in Latin America @ (III) (HA)]

[HIST 225 Sophomore Seminar: The U.S.-Mexico Border—History, Culture, Representation (also LSP 225) (III)]

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

[HIST 245 Sophomore Seminar: Drugs: People, Policies, Politics @ (III) (HA)]
Fall. 4 credits. Previous course in Latin American history would be helpful. M. Roldan.

This seminar uses the narcotics trade to examine a variety of issues in historical perspective: migration, human rights, smuggling, international trade and foreign policy. The temporal focus is the period between the 1920s and the present.

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[HIST 272 Atlantic World: From Conquest to Revolution # (III) (HA)]

[HIST 306 Modern Mexico: From Independence to the Zapatistas (III) @ (HA)]

[HIST 309 History and Geographical Imagination # (III) (HA)]
Fall. 4 credits. R. Craib. Lecture and discussion. This course surveys geographical thought and practice from the encounter with the New World during the Age of Exploration to the assertion of a New World Order in our own age. The course is designed to provide a broad introduction to the history of geographical thought, as well as practices such as exploration, surveying and map-making, and their relationship to expansion, colonization, imperial rule, the rise of capitalism, modern state formation and contemporary geopolitics. Emphasis also will be given to alternative geographical conceptualizations and practices that do not fit easily into modern, liberal economic and political paradigms. Readings include primary and secondary literature as well as a variety of visual materials.

[HIST 404 Ethnicity, Race and Indigeneity in Latin America @ (III) (HA)]

[HIST 418 Comparative Agrarian History # (III)]
Fall. 4 credits. R. Craib.

A comparative, interdisciplinary examination of agrarian life from a broad temporal and geographical perspective. Strong emphasis on recent historiography, methodology and theory. Major themes include rural rebellion, resistance, and crime; capitalist transformation of the countryside; capitalist and agrarian urbanism; colonialism and practice; and the way in which rural life has been romanticized, denigrated, and essentialized. Readings include works of history, fiction, literary theory, anthropology, and geography.

[HIST 423 Chronicles of the Conquest of Latin America @ (III) (HA)]
Spring. 4 credits. K. Graubart.

In this seminar we examine the writings of participants in the conquest and colonization of Latin America. Readings include writings by European conquistadors, Amerindian elites, and non-alphabetic materials from the early colonial period. In particular we investigate how the history of the conquest itself and of the societies that existed prior to this contact were produced by its participants, with special attention to questions of ethnicity, gender, and class.

[HIST 424 Art and Politics in 20th Century Latin America @ (III) (CA)]

[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 2003–2004. M. Roldan.

[HIST 459 Radicals and Revolutionaries in Modern Latin America (also HIST 659) @ (III)]
Fall. 4 credits. HIST 296, or permission. Limited to 15 students. Not offered 2003–2004. R. Craib.

[HIST 649 Seminar in Latin American History]
African History

HIST 241 Sophomore Seminar: Riot and Revolution in Nineteenth-Century Africa: The Birth of the Modern @ (III) (HA)
Fall. 4 credits. S. Greene.
The beginning of the nineteenth century witnessed the rapid and often times forceful expansion of Islam in West Africa, the transformation of the Zulu from a small, inconsequential people to the largest and most powerful ethnic group in South Africa, and a major riot by enslaved peoples in east Africa. This course explores these revolutionary changes and upheavals as Africa remade itself to face the modern era. Lectures, readings and discussions focus on the causes and consequences of these events and their significance for understanding contemporary Africa.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

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-19th century histories of four different cultural areas in Africa (e.g., Ancient Egypt, the West African coast). Using both ancient and more recent oral traditions, travelers' accounts, and visual images, we link these histories to current debates about the role of history in contemporary politics; the significance of race, class, and gender in times past and present; and the role of Africa in world affairs.

HIST 319 Introduction to South Asia's Environmental History (also ASIAN 319) @ (III) (HA)
Spring. 4 credits. M. Rangarajan.
The course aims to be an introduction to key themes in the environmental history of South Asia, a region with diverse ecologies and cultures, differing environmental traditions, and lively debates about alternative futures. These have given rise to controversies, many of which are relevant beyond the subcontinent. The course sharply focuses on the colonial period and its aftermath, but seeks to place these events in perspective. The subsequent emergence of independent nation-states in the twentieth century and their record forms a major part of the course. Selections from a rich corpus of original sources including travel writings, pictorial books, and memoirs add variety to the study of the region.

HIST 328 Construction of Modern Japan @ (III)
Spring. 4 credits. J. V. Koschmann.
An introduction of Japanese history for the mid-1800s to the 1920s, emphasizing the Meiji Restoration, constitutional government, industrialization and social change, the road to nationalism and colonialism, and the texture of daily life in both early-modern and modern contexts. Sections will focus on translated primary sources, including literary works.

HIST 330 Japan from War to Prosperity @ (III) (HA)

HIST 360 Early Warfare, East and West @ (III)
For description see Comparative History.

HIST 388 Vietnamese Histories (also HIST 688 and ASIAN 385/685) @ (III) (HA)
Fall. 3 credits. K. Taylor.
For description see ASIAN 385.

HIST 392 Images of Humanity in Medieval China (also ASIAN 393) @ (III)

HIST 396 Southeast Asian History from the Eighteenth Century (also HIST 696 and ASIAN 396/696) @ (III) (HA)
Spring. 4 credits. S-U option. T. Loos.
Surveys the modern history of Southeast Asia with special attention to colonialism, the Chinese diaspora, and socio-cultural institutions. Considers the modern history of Southeast Asia as a region with diverse ecologies and cultures, differing environmental traditions, and lively debates about alternative futures. These have given rise to controversies, many of which are relevant beyond the subcontinent. The course sharply focuses on the colonial period and its aftermath, but seeks to place these events in perspective. The subsequent emergence of independent nation-states in the twentieth century and their record forms a major part of the course. Selections from a rich corpus of original sources including travel writings, pictorial books, and memoirs add variety to the study of the region.

HIST 416 Undergraduate Seminar on Gender and Sexuality in Southeast Asia (also ASIAN 416 and FGSS 416) @ (III) (CA)
Spring. 4 credits. Letter grade only.
T. Loos.
Students consider the relationships among colonialism and gender and sexual identity formation in Southeast Asia. Using material from a wide range of fields including anthropology and literature, the course
complicates a simplistic East/West and male/female binary.

[HIST 451 Crime and Diaspora in Southeast Asian History, 1750–1950 (also HIST 650 and ASIAN 450/651) @ (III)]

[HIST 476 Senior Seminar: Comparative Colonial Law and Society (also ASIAN 476) @ (III)]

[HIST 480 Senior Seminar: Gender Adjudicated (also FGSS 480 and ASIAN 482) @ (III)]

HIST 487 Seminar in Thailand (also HIST 687) @ (III) (HA)
Fall. 4 credits. Limited to 15 students.
T. Loos.
This seminar about modern Thailand tackles the issues that dominate the political, sociocultural, economic and historic landscape of Thailand. It will ask, through critical readings serving as a guide to the subject.

[HIST 496 Conservation, Politics, and History: Seminar on Comparative Perspectives on Colonialism (III) (HA)]
Spring. 4 credits. M. Rangarajan.
This course examines the social history and background of nature conservation in the Indian Ocean region in a comparative light. It begins with an introduction to wider themes in ecological history and environmental debates. It will then move on to specific topics, drawing out contrasts and comparisons between imperial powers and colonized countries and more so, between different experiences, mainly of South Asia with southern Africa. To enable clear focus, the contrasts are normally with Anglophone southern Africa and South Asia. Occasionally, the course may bring in wider themes. It also examines the emergence of new forms of knowledge, agendas of environmental control or repair, and alternative currents. Original works are extensively used with secondary readings serving as a guide to the subject.

[HIST 497 Senior Seminar: Comparative Colonial Law and Society (also ASIAN 476) @ (III)]

HIST 498 Seminar in Thailand (also HIST 687 and ASIAN 482) @ (III)

[HIST 499 Problems in Modern Chinese History (also HIST 694 and ASIAN 499/694) @ (III) (HA)]
Spring. 4 credits. Prerequisite: HIST 294 or permission of instructor. S. Cochran.
This course gives each student an opportunity to select one research topic and work on it throughout the semester. Knowledge of Chinese is not required, but background in Chinese studies is needed.

For description see HIST 207.]

[HIST 588 Proseminar in Modern Korean History Spring. 4 credits. Prerequisite: a course on East Asian history or equivalent. Not offered 2003–2004. J. V. Koschmann.]

[HIST 598 Colloquium in Modern Japanese History Spring. 4 credits. J. V. Koschmann.
For graduate students only. Students attend lectures and do the reading for HIST 298, participate in a special weekly colloquium, and write a seminar paper.


[HIST 609 Modern Japan Studies: The Formation of the Field in History and Literature (also ASIAN 609) Fall. 4 credits. Not offered 2003–2004. J. V. Koschmann and N. Sakai.]

[HIST 631 Seminar in Medieval Chinese History Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003–2004. C. A. Peterson.]

[HIST 632 Seminar in Medieval Chinese History Spring. 4 credits. Prerequisite: permission of instructor. Not offered 2003–2004. C. A. Peterson.]

For description, see HIST 451.]

For description, please see HIST 284.]

[HIST 687 Seminar in Thailand (also HIST 487 and ASIAN 601) @ Fall. 4 credits. Limited to 15 students. T. Loos.
For description see HIST 487.]

[HIST 688 Vietnamese Histories (also HIST 388 and ASIAN 385/685) Fall. 3 credits. K. Taylor.
For description, see ASIAN 385.]

[HIST 691 Chinese Historiography and Source Materials Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003–2004. C. Peterson.]

[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.
Conflicting interpretations of Chinese history during the late imperial period and the first half of the twentieth century.

[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 Proseminar (also HIST 396 and ASIAN 396/696) Spring. 4 credits. T. Loos.
Introduction to the modern history of Southeast Asia for graduate students. Students are expected to attend the lectures and complete the readings for HIST 396, and they will separately as a group to further explore selected topics.

[HIST 697 Readings in Modern Japanese Thought Spring. 4 credits. Prerequisite: reading knowledge of Japanese and permission of instructor. J. V. Koschmann.
Reading and translation into English of selected Japanese political and historical texts from early-Meiji period to post-war.


Near Eastern History

[HIST 253 Introduction to Islamic Civilization I (also NES 255, RELST 255) @ (III or IV) (HA)]
Fall. 3 credits. D. Powers.
For description, see NES 255.

[HIST 254 Islamic History: 600–1258 (also NES 257 and RELST 257) @ (III)]
For description, see NES 257.]
A study of ancient soldier-historians who participated in the campaigns about which they later wrote. Topics include historiography, autobiography, propaganda, and prose style. Readings include selections from Thucydides, Xenophon, Julius Caesar, Josephus, Ammianus Marcellinus, as well as, for comparative purposes, modern soldier-historians.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to strong thinking and writing and to personalized instruction with top university professors.

HIST 265 Ancient Greece from Homer to Alexander the Great (also CLASS 265) # (III)
Fall. 4 credits. B. Strauss.

A survey of Greece from the earliest times to the end of the Classical period in the late fourth century B.C. The course focuses on the Greek genius: its causes, its greatness, its defects, and its legacy. The Heroic Age, the city-state, ancient democracy, and the intellectual ferment of the Greek Enlightenment are the main topics of study. Readings in translation from Homer, Aristophanes, Sophocles, Herodotus, Thucydides, Plato, Aristotle, and from the evidence of ancient inscriptions, coins, art, and architecture.

HIST 268 A History of Rome from Republic to Principate (also CLASS 268) # (III)
Summer and spring. 4 credits. Open to freshmen. B. Strauss.

A survey of Rome and its empire. This course explores the formation of Rome's Mediterranean empire and its political, social, and economic consequences; the constitutional and social struggles of the late Republic; the transition from Republic to Principate; society and state under the Caesars; the nature and limits of governing a world empire; and the interaction of pagans, Christians, and Jews in the Roman world.

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. 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 centuries, including such authors as Grote, Burchardt, Conford, Gloz, Momigliano, M. I. Finley, Ste. Croix, Vernant, Vidal-Naquet, and the current crop of scholars.

HIST 450 The Peloponnesian War (also HIST 630 and CLASS 450/632) # (III)
Fall. 4 credits. Spring. 4 credits. Spring. 4 credits. Prerequisite: HIST 285, CLASS 211 or 217, or permission of instructor. Not offered 2003–2004. B. Strauss.
SPECTERS, DEMONS, AND THE DEAD IN EUROPEAN SOCIETY

COURSE: 2003-2004

Specters, Demons, and the Dead in European Society, 1200-1800 # (III)

HIST 234 Seminar: Gender in Early Modern Europe (also FGSS 234) # (III) (CA)
Fall, 4 credits. Seminar designed for undergraduates but open to all students. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 2003-2004. R. Weil.

HIST 257 English History from Anglo-Saxon Times to 1485 # (III)

HIST 259 The Crusades @ (III)
Spring, 4 credits. P. Hyams.
A lecture course examining the Crusading Movement and the States it produced from the eleventh century to the fall of the mainland Kingdom of Jerusalem in 1292. The historical themes this generates are almost unlimited. The course treats the Christianity and Chivalry of the Medieval West, the confrontation of this culture with that of the Mediterranean and Islam, and what is perhaps the cradle of Western Colonialism. The very concept of "Crusade" itself is problematic today and will continue to cast its shadow on U.S. dealings with the Middle East. The readings allow students to choose from a very wide range of paper topics, and enjoy an excellent introduction to every aspect of the long-gone world of the Middle Ages.

HIST 262 The Middle Ages: Introduction and Sampler (also RELST 265) # (III) (CA)

HIST 264 The High Middle Ages # (III)

HIST 269 The Early Middle Ages # (III) (HA)

HIST 272 Atlantic World: From Conquest to Revolution @ (III) (HA)

HIST 275 Authority and Resistance in Europe, 1400-1600 # (III)

HIST 277 The Later Middle Ages # (III) (HA)
Spring, 4 credits. O. Falk.
This course surveys European history in the period ca. 1000 to 1500 AD from inauspicious beginnings as Eastern Christendom and Islam's ragged cousin, Western Europe was able to bootstrap itself into the position of a dominant western civilization. We will look at developments in government, economy, technology, religious institutions and faith, cultural media and social ideas. What enabled the "European miracle" of the later Middle Ages? How was it implemented and manifested? What were the costs of progress, and who bore them? Who reaped the benefits?

HIST 305 Britain, 1660-1815 # (III) (HA)

HIST 310 Life, Literature, and Power in Medieval Europe (also ENGL 314) # (III or IV)

HIST 320 The Viking Age # (III) (HA)
Fall, 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 often 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)

HIST 350 The Italian Renaissance (also ITALL 221) # (III or IV)

HIST 351 Machiavelli (also ITALL 351) # (III or IV)
Fall, 4 credits. J. Najemy.
This course presents Machiavelli in a variety of historical and interpretive contexts: European and Italian politics in the early sixteenth century; the decline of the Florentine principate; Machiavelli's own career in government and his, and the republic's, crisis in 1512-13; the intellectual traditions of Renaissance humanism, political thought, and the revival of antiquity, vernacular literary currents and popular culture; and the political figures, writers, and theorists with whom Machiavelli associated and corresponded. Emphasis is placed on a close reading of the major works (including the letters, The Prince, the Discourses, Mandragola, and selections from The Art of War and the Florentine Histories, all in translation) and a critical examination, in the light of that reading, of some major modern interpretations of Machiavelli.

HIST 364 The Culture of the Renaissance II (also COM L 362, ENGL 325, FRLIT 362, RELST 362, MUSIC 390) # (III or IV) (CA)
For description, see COM L 362.

HIST 368 Marriage and Sexuality in Medieval Europe (also RELST 368, FGSS 368) # (III)

HIST 369 The History of Florence in the Time of the Republic, 1250-1530 (also ITALL 369) @ (III or IV) (HA)
Spring, 4 credits. J. Najemy
Florentine politics and society from the communal period through the age of Dante, the rise and decline of the guild republic, the age of civic humanism, and the rise of the Medici, to the crisis of the republic in the time of Machiavelli. Social classes and conflicts, the elite families, economic structures, the working classes, guilds, family history, women, and political and historical ideas are considered in the context of the emergence and transformation of republican government.

HIST 408 Feast and Chivalry: Secular Culture in Medieval France, 1000-1300 # (III)

HIST 409 Seminar on Work in Europe and America # (III) (HA)

HIST 431 Gender, Power and Authority in Europe, 1600-1800 (also FGSS 431) @ (III) (CA)
Spring, 4 credits. Limited to 15 students. J. Weil.
This seminar concentrates on a time (late ninth to thirteenth centuries) when much of Europe lacked formal systems of justice, and so handled questions of social control quite largely by extra-legal means. Its subject is in one sense political history upside-down, as viewed by individuals rather than by their rulers. We examine ways in which anthropology and some recent approaches to law can assist: the readings are partly anthropology, partly translated medieval accounts of actual conflicts, with samples of recent interpretation. The topics covered should be of interest to law students and majors in anthropology and other modern social sciences.

HIST 444 Seminar: Witchcraft, Magic, and the Occult in Europe, 1400-1700 # (III)
Spring, 4 credits. Enrollment limited to 15 students. Prerequisite: permission of instructor. Not offered 2003-2004. S. Pohl.

HIST 446 Law, Crime and Society in Europe, 1400-1700 # (III)
Spring, 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. S. Pohl.
Modern European History

HIST 152 Introduction to Western Civilization (1600 to the End of World War II) # (III) (HA)
Spring. 4 credits. R. Well.
This course offers a comparative perspective on the development of modern states, societies, and cultures in Europe and North America. Topics include: religious and scientific revolutions in early modern Europe; European expansion and conquest; Enlightenment and revolution; liberalism, capitalism, and communism; the politics of race, slavery, and the new imperialism; the World Wars and the Holocaust; the Cold War; and the modern and the post-modern in European and American culture.

HIST 233 Sophomore Seminar: Soviet Society and Family Life During WWII: Perspectives from Culture (also RUSSL 233 and JWST 233) # (III) (CA)
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, and are discussed in France. We examine ethnographically and through writing and to personalized instruction with top university professors.

HIST 235 Antisemitism and Crisis Modernity (also JWST 254) # (III) (HA)

HIST 267 History of Zionism and the Birth of Israel (also JWST 290, NES 290) # (III) (CA)

HIST 270 The French Experience (also FRLIT 224 and ANTHR 224) (III or IV) (CA)
Fall. 4 credits. N. Furman, J. Weiss.
We look ethnographically and through literature at tastes and at class as they function and are discussed in France: We examine speech in its practice and as it is reflected upon; and we look at views from France, from America, and other countries. As we emphasize differences, the French experience emerges.

HIST 283 Europe in the Technological Age (III)

HIST 285 From Medievalism to Modernity: The History of Jews in Early Modern Europe, 1492-1789 (also NES 245, JWST 253) # (III) (HA)
Fall. 4 credits. Not offered 2003–2004. V. Caron.

HIST 290 Twentieth-Century Russia and the Soviet Union (III) (HA)
wartime political leaders and military commanders; the experience of war and occupation for soldiers and civilians, including Resistance movements and collaborators; Nazi genocide, intellectual and cultural changes during the war, including the impact on literature and philosophy; strategic questions about the origins and conduct of the war; the concluding phases involving the Nuremberg Trials, the Yalta and Potsdam conferences, and the launching of the Cold War; and the representation of the war in subsequent films, literature, and political culture.

[HIST 379 The First World War: Causes, Conduct, Consequences (III) (HA)]

[HIST 380 Social History of Western Technology # (III)]
For description, see History of Science.

[HIST 383 Europe, 1900-1945 (III) (HA)]

[HIST 384 Europe, 1945-1968 (III) (HA)]

[HIST 385 Europe in the Twentieth Century: 1968-1990 (III)]
Spring. 4 credits. J. Weiss.
The major political developments in Europe between the upheavals of 1968 and the collapse of communist regimes. Topics include the effects of economic turmoil in 1973-1974; the response to terrorism; regionalist movements; new ethnic minorities and their opponents; Socialist governments in southern Europe; the arrival of democracy in Spain, Portugal, and Greece; new dynamics in the European Community; the rise of Thatcherism; the war scare of the 1980s; and the final phase of the Cold War.

[HIST 405 Jewish Culture and Modernity (also S HUM 408, JWST 408, GERST 420) (III or IV)]

[HIST 406 The People in the French Revolution # (III)]

[HIST 409 Seminar on Work in Europe and America # (III) (HA)]
For description, see Comparative History.

[HIST 410 Russia in the Age of Revolution and Total War (III)]

[HIST 417 History of Jews in Modern France (also JWST 446, FRJLT 413) (III or IV)]
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003-2004. V. Caron.

[HIST 433 History of Modern German Jewry: From the Enlightenment to the post-1945 Era (also GERST 433 and JWST 433) (III) (HA)]

[HIST 435 Collective Action and Politics in Modern Europe (III)]
For description, see GOVT 435.

[HIST 441 Seminar in the European Enlightenment # (III)]

[HIST 456 Seminar in European Cultural History (III)]

[HIST 457 Seminar in European Fascism (III)]

[HIST 460 Opera, History, Politics, Gender (also FGSS 454, COM L 459, S HUM 459, ITALL 456, MUSIC 474) (III or IV)]

[HIST 462 Popular Culture in European History (III)]
Fall. 4 credits. S. L. Kaplan.
An examination of the origins, practices, and meanings of popular culture throughout Europe from the Middle Ages to the era of the French Revolution. After considering the various ways in which "culture" and "popular" can be construed, the seminar focuses on the specific manifestations of popular culture, its various languages and gestures, and its complex relations with the dominant/elite cultures.

[HIST 467 Seminar in Modern European Political History (III)]

[HIST 474 Topics in Modern European Intellectual and Cultural History (also COM L 474) (III or IV)]
Spring. 4 credits. Prerequisite: permission of the instructor. D. LaCapra.

[HIST 477 Seminar on the Politics of the Enlightenment # (III)]

[HIST 478 Stalinism as Civilization (III)]

[HIST 482 The Aesthetic and Cultural Theory of the Frankfurt School (also GERST 495) (III or IV)]

[HIST 488 Seminar in Late Nineteenth-Century European Imperialism (III)]

[HIST 601 European History Colloquium]
Fall and spring. 4 credits, each term. K. Graubart, J. Najemy (fall); P. Dear, R. Weil (spring).
A research colloquium designed for European history graduate students. The colloquium offers a forum for students to present papers and to discuss the work of visiting scholars.

[HIST 605 Graduate Seminar in European Cultural and Intellectual History]

[HIST 635 The Gates to Modernity: From Karlsbad to the 1848 Revolution (also GERST 635)]
For description, see GERST 655.

[HIST 661 Graduate Seminar In Twentieth-Century German History]
Fall. 4 credits. Prerequisite: permission of instructor. I. Hull.

[HIST 672 Seminar in European Intellectual History]

[HIST 673 Seminar in European Intellectual History]
Spring. 4 credits. D. LaCapra.

[HIST 674 Graduate Seminar in German History, 1770-1918]
Spring. 4 credits. I. Hull.

[HIST 675 After the Divide: German Critical Theory of the Seventies and Eighties (also COM L 675 and GERST 676)]
For description, see GERST 675.

[HIST 678 Seminar in Modern European Social History]

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.
B. Strauss (fall) and M. B. Norton (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 which explores the work of a major historian or school of historical writing.

HIST 401 Honors Guidance
Fall. 4 credits. Prerequisites: HIST 400 and permission of instructor. I. Hull.

HIST 402 Honors Research
Spring. 4 credits. Prerequisites: HIST 400 and permission of instructor. I. Hull.

HIST 700 Introduction to the Graduate Study of History
Fall. 4 credits. Required of all first-year graduate students. J. V Koschmann and T. Roidtan.
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 803-807 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 complete two courses at Cornell in the department by the end of their sophomore year. These courses should reflect the diversity of the departmental offerings. One must be at the 200 level, and one—but not both—must emphasize material either predominantly before 1800 or outside Europe/North America. These two courses are prerequisites for the major and a grade of C or above is required for admission; 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: one 400-level area seminar; two courses in art outside Europe/North America; and three courses in art predating 1800 (ancient, medieval, or Renaissance/Baroque). Majors must choose at least two courses from different categories. 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.

Honsors
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 B+ for all courses taken in the department and 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. 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 600 and 601 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 freshmen writing seminars.
200-level courses are introductions to the major subdivisions of Western art and art outside the West.
300-level courses are intermediate 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 Foundation's First-Year Writing Seminars.

Courses
ART H 202 Survey of European Art: Renaissance to Modern (also CLASS 220) (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 four days of classroom lectures.

ART H 215 Beyond Tradition: Native American Art, 1850-Present (also AIS 215) Fall. 4 credits. K. Morris.
This course will explore both the formal and contextual aspects of Native American art, drawing on examples from the arts of the Far North, the Pacific Northwest Coast, and the Great Plains. Lectures, slides, and readings will examine the myriad and complex pressures that have been brought to bear on these cultures over the past century and a half. Missionization, modernization, the repeated interventions of the U.S. and Canadian governments, tourism, and the rise of the art market will be addressed, as will the nature of the artistic process, and the changing role of the Native artist with respect to his/her community. Contemporary works, along with the writings of Native American historians, critics, and artists will be incorporated throughout the semester.

An overview of the art and archaeology of the Greek and Roman world. 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 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. J. E. Bernstock.
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), Fauvism (Matisse), 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)]

[ART H 270 Mapping America (also AM ST 270) # (IV) (CA)]
L. Meixner.

[ART H 280 Introduction to Art History: Approaches to Asian Art @ (IV) (CA)]
K. McGowan.

ART H 309 Dendrochronology of the Aegean (also CLASS 309 and ARKEO 309) # (IV) (MA)
Fall and spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students. P. I. 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 319 Art in the Daily Life of Greece and Rome (also CLASS 319) # (IV) (LA)]
A. Ramage.

[ART H 320 The Archaeology of Classical Greece (also CLASS 320) # (IV) (MA)]
A. Ramage.

ART H 321 Mycenae and Homer (also CLASS 321 and ARKEO 321) # (IV) (HA)
Fall. 4 credits. 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 architectural, burial customs, kinship, 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 Mycenae Greece (Linear B) and the Iron Age (the Semitic/Greek alphabet); and the nature of the Homeric poems and their value as historical sources.

[ART H 322 Arts of the Roman Empire (also CLASS 350) # (IV) (HA)]
A. Ramage.

[ART H 323 Painting in the Greek and Roman World (also CLASS 323) # (IV) (CA)]
A. Ramage.

[ART H 325 Greek Vase Painting (also CLASS 325) # (IV) (LA)]
4 credits. Next offered spring 2005.
A. Ramage.

[ART H 326 Greek Cities and Towns (also CLASS 326) # (IV)]
J. Coleman.

[ART H 327 Greek and Roman Coins (also CLASS 327) # (IV) (LA)]
A. Ramage.

[ART H 328 Greeks and Their Neighbors (also CLASS 322) # (IV) (HA)]
J. Coleman.
For description, see CLASS 322.

[ART H 329 Greek Sculpture (also CLASS 329) # (IV) (LA)]
J. Coleman.

[ART H 338 Modern Western Drama, Modern Western Theater: Theory and Practice (also COM L 335 and THETR 335) (IV) (LA)]
Staff.

[ART H 343 Art and Society in Early Renaissance Italy # (IV) (HA)]
C. Lazzaro.

ART H 344 Leonardo, Michelangelo, and Raphael # (IV) (HA)
Spring. 4 credits. C. Lazzaro.
Each of the three great artists of the sixteenth century—Leonardo, Michelangelo, and Raphael—is examined as a thinker as well as an artist, through writings together with his works of painting, sculpture, and architecture. We analyze contemporary constructions of the artist as genius and as courtier.

[ART H 345 Rome, Florence, and Venice in the Sixteenth Century # (IV) (HA)]
C. Lazzaro.

[ART H 346 Destination Rome: From Medieval Pilgrimage to Eighteenth-Century Grand Tour # (IV) (HA)]
S. Benson.

[ART H 351 The Culture of the Renaissance II (also COM L 362, HIST 364, MUSIC 390, RELST 362, ENGL 325) # (III or IV) (CA)]
K. Long, C. Kaske.

ART H 355 Romanesque and Early Gothic Art and Architecture: Europe and the Mediterranean, 900–1150 A.D. (also NES 359)
Fall. 4 credits. Prerequisite: freshmen enrollment with permission of instructor only. C. Robinson
Survey lectures and discussion of the visual cultures (architecture, luxury objects, book illumination and illustration) of the Medieval visual world, including northern and Mediterranean Europe (Ottonian, Romanesque, Early Gothic) and the Islamic World (Al-Andalus, Fatimid Egypt, Jerusalem), from 900–1150 A.D. We will pay particular attention to the ways and places in which East and West meet and, following a brief introductory period at the beginning of each half of the semester, also will be engaging the material from a thematic and critical perspective.

[ART H 360 Painting Nineteenth-Century America (also AM ST 360) # (IV) (CA)]
L. L. Meixner.

[ART H 362 Impressionism in Society (also FGSS 361) # (IV) (CA)]
L. L. Meixner.

ART H 365 U.S. Art from FDR to Reagan (also AM ST 355) (IV) (LA)
Fall. 4 credits. Prerequisite: each student must enroll in a section. J. E. Bernstock.
This course considers the contextual features of American art from the 1930s through the late 1980s. Art is examined in relation to contemporary politics, society and literature. A few of the developments on which the course focuses are: Abstract Expressionism, Pop Art, Earth Art, and Feminist Art. Various critical approaches are examined.

[ART H 366 Contemporary Art and Technology (IV) (CA)]
M. Fernandez.

ART H 367 Conceptual Art (IV) (CA)
Spring. 4 credits. M. Fernandez.
This course is designed as a thematic survey of Conceptual 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 Art movements, the creation of Latin American art centers, the interaction of high art and popular culture, the role of art criticism on popular perceptions of Latin American Art, and the contributions of Latin American women to various aspects of artistic practice. Special classes will examine borders between 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 368) (III or IV) (CA)
Fall. 4 credits. S. Buck-Morss.
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.
A historical and critical survey of the architecture of Washington. Attention is given to the periods, styles, architects, and clients—public and private—of the notable buildings and to the urban scale of the nation's capital. The vocabulary of architectural analysis and criticism is taught. Field trips required.

ART H 377 African American Art (also ASARC 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 socio-cultural 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 traditions in the decorative arts including: pottery, architecture, ironwork, quilt making, and basketry. 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 film strips 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&RC 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 socio-cultural 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)

ART H 384 Introduction to the Arts of Japan (also ASIAN 381 and VISST 384) (IV) (LA)
Fall. 4 credits. A. Pan.
As an island nation east of the Asian continent, Japan developed a unique culture that reflects both continental and indigenous characteristics. This course examines pre-and post-contact with continental culture and the process of artistic acculturation and assimilation in successive periods of Japanese art history.

ART H 385 Representation and Meaning in Chinese Painting (also ASIAN 384) (IV) (CA)
Spring. 4 credits. A. Pan.
Using major monuments of art, this course introduces various genres of Chinese painting through socio-political and religious history. The focus is on understanding the aesthetic criteria, artistic movements, stylistic transformations, and agendas of different social classes. Weekly sessions will meet at the Herbert F. Johnson Museum so that students can gain first-hand experience examining and handling Chinese paintings.

ART H 395 The House and the World: Architecture of Asia (also ASIAN 394) (IV) (HA)

ART H 400 The Arts of Southeast Asia (IV) (CA)

Seminars
Courses at the 400 and 500 level are open to juniors and seniors, majors, and graduate students. All seminars involve the writing and presentation of research papers. Enrollment is limited to 15 students, and permission of the instructor is required. Students may repeat courses that cover a different topic each semester.

ART H 401 Independent Study
Fall or spring. 2–4 credits. May be repeated for credit. Prerequisite: permission of a department faculty member.

ART H 402 Independent Study
Fall or spring. 2–4 credits. May be repeated for credit. Prerequisite: permission of a department faculty member.

ART H 403 Ritual, Play, Spectacle, Act: Performing Culture (also THETR 403 and 603) (IV)

ART H 407 The Museum and the Object (also VISST 407) (IV) (CA)
Fall. 4 credits. Prerequisite: History of Art majors only. Enrollment is limited. M. Dadi.

ART H 408 Tuscany as a New Jerusalem (also S HUM 408 and VISST 408)
Fall. 4 credits. Prerequisite: permission of instructor. Reading comprehension of Italian is strongly recommended. M. Lasansky.

During the late Middle Ages and Renaissance, Tuscany was remapped through a series of architectural constructions, frescoes, site-specific festivities, religious performances, and literary tracts to establish the landscape of New Jerusalem. This seminar will examine the way in which religious utopianism was used as a tool of secular salvation during a time of political upheaval.

ART H 423 Ceramics (also CLASS 423 and ARKEO 423) (IV) (CA)

ART H 424 Sardis and the Cities of Asia Minor (also ARKEO 432 and CLASS 432) (IV) (CA)

ART H 425 Seminar on the Bronze Age Architecture of Asia Minor (also CLASS 430 and ARKEO 425) (IV)

ART H 427 Seminar on Roman Art and Archaeology (also CLASS 435 and ARKEO 435) (IV) (CA)
4 credits. Not open to freshmen or sophomores without permission of instructor. Next offered spring 2005. A. Ramage.

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 been recorded by documentary photographers who have called attention to the country's progress and its poverty. Hollywood filmmakers have also recorded endless images of the 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 is James Agee's and Walker Evans' 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 2003–2004. P. I. Kuniholm.

ART H 446 European Art in the Age of Exploration, 1492–1700 (IV) (CA)

ART H 447 Aesthetic Theory: End of Art (also GERST 656 and COM L 656)
ART H 448 Studies in Sixteenth-Century European Art (IV) (HA)
Topic: Constructing the Self in the Sixteenth Century. This seminar examines portraits, self-portraits, autobiographies, and biographies, as well as treatises on etiquette and behavior. In this society, "civility," the mark of class and well as treatises on etiquette and behavior, all of which are evident in both visual and verbal representations of individuals.

ART H 450 Women in Italian Renaissance Art (also FGSS 451) (IV) (HA)
Fall. 4 credits. Prerequisite: permission of instructor. C. Lazzaro.
The seminar examines representations of women in various contexts in Renaissance Italy as well as women artists. These include the nursing Madonna, painted scenes on marriage chests, biblical and historical heroines such as Judith and Lucretia, portraits of patrician women and courtiers, and violence to women in a political context. It investigates contemporary ideas about motherhood, beauty, sexuality, social presentations, and creativity. These are examined through the existing critical frameworks in feminist art history and theory. The concern is in particular with how visual images are encoded with meaning, what kind of relationship can be established with their historical context, and how they convey social constructs and ideology.

ART H 451 Prints of the Fifteenth through the Seventeenth Century (IV) (HA)

ART H 452 The Printed Image: the World on Paper (II) (IV) (CA)
4 credits. Prerequisite: not open to freshmen or sophomores without permission of instructor. Not offered 2003-2004. S. Benson.

ART H 461 Art and Social Histories (also AM ST 463) (IV) (CA)

ART H 462 Topics in Early Modernism (IV)
4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not open to freshmen or sophomores. Not offered 2003-2004. L. Meixner.

ART H 463 Studies in Modern Art (IV) (LA)
Fall. 4 credits. Prerequisite: not open to freshmen or sophomores without permission of instructor. Auditing is not permitted. Not offered 2003-2004. J. E. Bernstock.

ART H 464 Studies in Modern Art (IV) (LA)
Spring. 4 credits. Prerequisite: permission of instructor. Auditing is not permitted. J. E. Bernstock.

ART H 486 Women Artists (also FGSS 404) (IV) (LA)
Fall. 4 credits. Prerequisite: permission of instructor. J. E. Bernstock.
This seminar examines both feminist art criticism and the work of women artists from antiquity to the present. We consider the works of the most prominent women artists from each period in relation to the changing roles of women in society. The artists covered include Jennifer Bartlett, Artemisia Gentileschi, Elizabeth Vigee-Lebrun, Mary Cassatt, K'the Kollwitz, Georgia O'Keeffe, Louise Nevelson, Joe Mitchell, Judy Chicago, and Barbara Kruger.

ART H 470 Reel/Real Indians: Art and Indigenous Identities in the Twentieth Century (also AIS 470, AM ST 472)
Spring. 4 credits. Prerequisite: not open to freshmen or sophomores without permission of instructor. K. Morris.
For much of the twentieth century, American Indian identities were shaped, at least in the public imagination, by John Wayne films, Edward Curtis photographs, tourist propaganda, and advertising imagery. In the past few decades, however, Native American artists and filmmakers have wrested their own image from these external forces, interrogating the established codes of representation. While exploring this history, this course will introduce students to a number of the more important texts regarding the gaze and identity formation theory. These writings will constitute the theoretical lens through which the works of contemporary indigenous artists such as Jimmie Durham, Shelly Niro, James Luna, Gerald McMaster, and Hachivi Edgar Heap of Birds will be viewed. The course offers a unique opportunity to explore issues of race, ethnicity, and gender as seen through indigenous eyes. Self-representation in a variety of visual media, including painting and photography, film, performance, and the digital arts will be considered.

ART H 476 Seminar in American Art (IV) (CA)

ART H 478 African Cinema (also AS&RCA 435) (IV) (LA)

ART H 481 Art of the Tang Dynasty (618-907) (also ASIAN 479) @ (IV)
4 credits. Prerequisite: ART H 383 or a course in Chinese history or Chinese literature and permission of instructor required. Not offered 2003-2004. A. Pan.

ART H 483 African Cinematics (also ASIAN 482 and VISST 482)
Spring. 4 credits. History of Art majors only. Not open to freshmen or sophomores without permission of instructor. A. Pan.

ART H 484 Art of the Tang Dynasty, with Focus on Tea Cultures in East Asia @ (IV)

ART H 490 Art and Collecting: East and West (also ASIAN 491) @ (IV) (CA)

ART H 520 Seminar in Hellenistic Archaeology (also CLASS 630 and ARKEO 520)
Spring. 4 credits. Prerequisite: permission of instructor. K. McGowan.
For description, see ARKEO 520.

ART H 531 Leon Battista Alberti: 1404-1472
4 credits. Prerequisite: not open to freshmen or sophomores without permission of instructor. Not offered 2003-2004. P. Morrill.

ART H 540 Seminar in Renaissance Art

ART H 549 Problems in Interpretation in Italian Renaissance Art

ART H 570 Theory Seminar I: Representation
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 post-structural theory and more recent writings in new areas of theory and artistic 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 ASARC 503)

ART H 572 Theory Seminar II: Mimesis
Spring. 4 credits. Prerequisite: graduate students only. M. Fernandez.
This seminar explores the significance of the concept of mimesis to selected aspects of contemporary art practice, including digital representations, genetic and bio-tech art, feminist art, and various forms of art activism. Relevant theoretical perspectives will be addressed.

ART H 580 Dancing the Stone: Body, Memory, and Architecture (also ASIAN 580 and THETR 580)

ART H 591-593 Supervised Reading
591-593, fall, 592, spring. 4 credits. May be repeated for credit. Limited to graduate students.
ART H 600 Honors Work
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 601 Honors Work
Fall or spring. 4 credits. Prerequisite: ART H 600.
The student under faculty direction prepares a senior thesis.

HUMAN BIOLOGY PROGRAM
J. Haas (nutritional sciences), director, 127 Savage Hall, 255–8001, B. Finlay (psychology), J. Fortune (physiology/women's studies), E. Frongillo (nutritional sciences), R. Johnston (psychology), K. A. R. Kennedy (ecology and systematics/anthropology), D. Levitsky (nutritional sciences), D. L. Pelletier (nutritional sciences), W. Provine (ecology and systematics/history), S. Robertson (human development), R. Savin-Williams (human development), S. 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 with 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 biology, 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 basic anatomical and physiological sciences with the behavior of individuals and groups within the context of evolutionary theory and ecology. The courses listed below are representative of the offerings in human biology and are included to assist the student in organizing a curriculum of study. They are organized into three groups that reflect the three levels of integration noted above: (1) human anatomy and physiology, (2) human behavior, and (3) human evolution and ecology. Students should choose at least one course from each of these areas of integration. It is anticipated that the student will include in a program of study at least one of the laboratory courses offered. It is expected that a student will take a minimum of 15 credits from among these courses.

There is no foreign language requirement for human biology beyond what is dictated by specific departments and colleges. The requirements for the human biology curriculum are set alongside requirements of the undergraduate majors as these are defined by different departments. Students with independent majors may design their own programs of study under the guidelines provided by their college. Although a student may indicate an interest in human biology in the freshman year and be able to obtain early guidance from a faculty 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

BIO AP 214 Biological Basis of Sex Differences (also B&SOC 214 and FGSS 214)
Spring. 3 credits.

BIO AP 311 Introductory Animal Physiology, Lectures (also VET PH 346)
Fall. 3 credits.

BIO AP 319 Animal Physiology, Experimentation
Fall. 4 credits.

BIO AP 458 Mammalian Physiology
Spring. 3 credits.

BIO BM 434 Applications of Molecular Biology to Medicine, Agriculture, and Industry
Fall. 3 credits.

BIO BM 439 Molecular Basis of Human Disease (also BIO GD 439)
Fall. 3 credits.

BIO EE 274 The Vertebrates: Structure, Function, and Evolution
Spring. 4 credits.

BIO EE 474 Forensic Anthropology and Human Biology (also ANTHR 474)
Spring. 5 credits.

BIO MI 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
Fall. 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 BIO AP 475)
Spring. 3 credits.

PSYCH 322 Hormones and Behavior (also BIONB 322)
Fall. 3 or 4 credits.

PSYCH 425 Cognitive Neuroscience
Fall. 4 credits.
**Human Evolution and Ecology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ANTHR 101</td>
<td>Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind</td>
<td>3</td>
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<tr>
<td>ANTHR 203</td>
<td>Early People: The Archaeological and Fossil Record (also ARKEO 203)</td>
<td>3</td>
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<tr>
<td>ANTHR 375</td>
<td>Evolutionary Theory and Human Behavior (also ANTHR 675)</td>
<td>4</td>
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<tr>
<td>ANTHR 390</td>
<td>Primate Behavior and Ecology</td>
<td>4</td>
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<tr>
<td>ANTHR 490</td>
<td>Topics in Biological Anthropology</td>
<td>4</td>
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**BIO EE 261** Ecology and the Environment Fall or summer. 4 credits.

**BIO EE 275** Human Biology and Evolution (also ANTHR 275 and NS 275) Fall. 3 credits.

**BIO EE 278** Evolutionary Biology Fall or spring. 3 or 4 credits.

**BIO EE 371** Human Paleontology (also ANTHR 371) Fall. 4 credits.

**BIO EE 464** Macroevolution Spring. 4 credits.

**BIO EE 469** Food, Agriculture, and Society (also B&SOC 469 and S&TS 469) Spring. 4 credits.

**BIO EE 673** Human Evolution: Concepts, History, and Theory (also ANTHR 673) Fall. 3 credits.

**BIO GD 481** Population Genetics Fall. 4 credits.

**BIO GD 482** Human Genetics and Society Fall. 4 credits.

**BIO GD 484** Molecular Evolution Spring. 3 credits.

**B&SOC 447** Seminar in the History of Biology (also HIST 415, BIO G 467, and S&TS 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 223** Introduction to Biopsychology Fall. 3 credits.

**PSYCH 266** Evolution of Human Behavior Fall. 4 credits.

**PSYCH 285** Cognitive Neuroscience Fall. 4 credits.

**PSYCH 326** Evolution of Human Behavior Spring. 4 credits.

**ANSO 201** Population Dynamics (also SOC 202) Spring. 3 credits.

**VET MI 431** Medical Parasitology (also BIO MI 417) Fall. 2 credits.

**VTPMD 664** Introduction to Epidemiology Fall. 3 credits.

**HUNGARIAN**

See Departments of Linguistics and Russian.

**INDEPENDENT MAJOR PROGRAM**

S. Friedfeld, director, 172 Goldwin Smith Hall, 255-3386.

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
URL: http://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; and 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 coursework.

- 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 R SOC 209)
- Comparative Social Stratification (R 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, R SOC 222, and GOVT 222)

This seminar (taken for 1-3 credits) introduces students to other concentrators and to faculty at Cornell University carrying out relevant research. In weekly meetings, students are exposed to research on inequality underway 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 Elizabeth Heitner (363 Uris Hall) or can be viewed on the website for the Center for the Study of Inequality, www.inequality.cornell.edu. Although students may tailor their programs to match their interests, the electives and overview course must be distributed across at least three departments (thereby ensuring breadth in the analytic approaches that are represented).

D. Lectures and Seminars

The Center for the Study of Inequality 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 website www.inequality.cornell.edu.

Enrolling in the Concentration

The website 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, Elizabeth Heitner (initequality@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, 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 website 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 website 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 advisers. The listing of available advisers can be obtained from Jessica Henning at inequality@cornell.edu.

Director: David Grusky, 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 Cunningham, 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; Davidd Greenwood, Goldman 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 Mohanty, Professor, Dept. of English; Elizabeth Peters, Professor and Director of Graduate Studies, Dept. of Policy Analysis and Management, Jonas Pontusson, Professor, Dept. of Government; Szoja 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 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 form 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 both 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 383)

Globalization and Inequality

As a global economy takes hold, there has been increasing concern that economic inequalities will grow available, 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 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 (R SOC 205 and SOC 206)
- Economic Development (ECON 371)
- Labor Markets and Income Distribution in Developing Countries (ILRRCB 635)
- Globalization and Inequality (SOC 320)
- Indigenous Peoples and Globalization (R SOC 325)

Comparative Ethnic Stratification: Demographic Perspectives (R SOC 431 and R SOC 631)
Global Perspectives on Gender (AS&RC 562)
Sex and Gender in Cross-Cultural Perspective (ANTHR 321/621 and FGSS 521/651)
Human Migration: Internal and International (R SOC 450)
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, and related forms of amelioration. The social policy and inequality track explores the role of the state in generating and reducing inequalities of various kinds.

I. Overview Course (choose any one)
- Controversies About Inequality
- Three Perspectives on Social Inequality (R SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

II. 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 (ILRRCB 640 and ECON 451)
- Employment Discrimination and the Law (ILRRCB 684)
- Human Resource Economics and Public Policy (ILRHR 360)
- Employee Relations and Diversity (ILRHR 463)
- Social Welfare as a Social Institution (PAM 383)
- 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 426 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 AEM 630)
Economic Analysis of the Welfare State (ILRRCB 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)
Seminar: Beliefs, Attitudes, and Ideologies (PSYCH 489 and FGSS 488)
Feminist Jurisprudence (LAW 646)
Political Economy of Education (EDUC 378)
Research on Education Reform and Human Resource Policy (ILRHR 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?

I. Overview Course: (choose any one)
- International 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)
- Values in Law, Economics, and Industrial Relations (ILRRCB 607)
- Appropriation and Alienation (PHIL 142)
- Global Thinking (PHIL 194 and GOVT 294)
- Modern Policy Analysis (PHIL 436 and GOVT 462)
- Contemporary Political Philosophy (PHIL 447 and GOVT 465)
- International Justice (PHIL 448 and GOVT 492)
- Feminism and Philosophy (PHIL 249 and FGSS 249)
- Marx: An Overview of His Thought (ANTHR 368)

B. Social Science Classes (choose two)
- Select courses in consultation with adviser (see list of electives below)

Literature, Postmodernism, and Inequality
This program juxtaposes literary and social scientific approaches to the understanding of inequality. Although considerations of power and inequality have long been fundamental to social scientific analysis and are increasingly central to literary analysis, these two traditions of scholarly inquiry have not always adequately informed one another. This program of study allows students to combine these two traditions in potentially creative ways.

I. Overview Course (choose any one)
- Critical Perspectives (R SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

II. Controversies About Inequality (SOC 222, PAM 222, ILROB 222, PHIL 195, and GOVT 222)

III. Possible Electives:
A. Literature Classes (choose two)
- Introduction to Cultural Studies (ENGL 209)
- Poetry and Poetics of Difference (COM L 225 and ENGL 225)
- Rewriting the Classics: Stories of Travels and Encounters (ENGL 235)
- Twentieth Century Women Novelists (ENGL 251, FGSS 251, and AM ST 252)
- Politics and Culture in the 1960s (ENGL 268 and AM ST 268)
- Shakespeare: Gender and Power (ENGL 327 and FGSS 327)
- Introduction to Global Women's Literature (ENGL 396 and FGSS 396)
- Global Women's Literature (ENGL 476 and FGSS 476)
- Literatures of the Archipelagoes: Caribbean and Pacific "tidalectics" (ENGL 490)
- Europe and Its Others: An Introduction to the Literature of Colonialism (COM L 304)
- Feminist Theory/Lesbian Theory (FGSS 465, COM L 465, and GERST 465)
- Virtual Orientalism (ASIAN 415, S HUM 415, and COM L 418)
- Language, Religion, and Politics in Modern South Asia (ASIAN 431)
- Internationalism, Nationalism, and Modern Japanese Discursive Space (ASIAN 483)
- Political Theory and Cinema (GERST 330, COM L 350, GOVT 370, and THEOR 329)
- Reading Freud: Gender, Race, and Psychoanalysis (GERST 447, COM L 447, FGSS 447)
- Minority Literature in the Federal Republic (GERST 392)
- The Afro-Europeans (GERST 403)
- Women Around Freud (GERST 413, COM L 412, and FGSS 413)
- Marx, Nietzsche, and Religion (GERST 415, COM L 425, and GOVT 473)
- The Cultural Theory of the Frankfurt School (GERST 495, COM L 495, and GOVT 471)
- Gender and Society in the Muslim Middle East (NES 281, RELST 281, and FGSS 212)
- May '68 and its Consequences (FRML 326)
- Contemporary Narratives by Latina Writers (SPANL 246, LSP 246, and FGSS 246)
- Hispanic Caribbean Culture and Literature (SPANL 346)

B. Social Science Classes (choose two)
- Select courses in consultation with adviser (see list of electives below)
Poverty and Economic Development
Over the last century, rich countries have become 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 (R SOC 438 and SOC 437)
- International Justice (PHIL 448 and GOVT 492)
- Economics of Development (ECON 466 and AEM 666)
- Land Reform Old and New (R SOC 645)
- Issues in African Development (CRP 477 and CRP 677)
- Labor Markets and Income Distribution in Developing Countries (ILRRC 635)
- 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):
- Education and Development in Sub-Saharan Africa (R SOC 495)
- Population, Environment, and Development (SOC 438 and SOC 495)
- Gender and International Development (FGSS 614 and CRP 614)
- Economics of Transnationalism (GOVT 681)
- Economic Development (ECON 371)

Comparative Labor Movements in Latin America (ILRRC 631)
Union Organizing (ILRRC 400)
Theorizing of Industrial Relations Systems (ILRRC 600)
Revitalizing the Labor Movement: A Comparative Perspective (ILRRC 622)
Women and Unions (ILRRC 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 development 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 (R 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 (ILRRC 653)
- Education, Technology, and Productivity (ILRRC 695)
- Educational Finance (EDUC 664)
- Education in Africa and the Diaspora (AS&RC 450 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.

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):
A. General Courses

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 (HIST 302)
Immigration and Ethnic Identity (SOC 438 and AAS 438)
Human Migration: Internal and International (R SOC 430)
The Immigrant City: 1900-2000 (LSP 406, SHUM 406, AM ST 406, and HIST 412)
Immigration and the American Labor Force (ILRRC 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 335)
The African-American Workers, 1865-1910: The Rural and Urban Experience (HIST 375 and ILRRC 385)
The African-American Workers, 1910-The Present: Race, Work, and the City (HIST 376 and ILRRC 386)
African-American Women in Slavery and Freedom (HIST 303, FGSS 307, and AM ST 303)
INTENSIVE ENGLISH PROGRAM
123 McGraw Hall
This noncredit, nondegree program provides full-time intensive English as a second language instruction as well as academic, social, and cultural orientation to the United States and its institutions. The program helps participants improve their language skills in English for academic, professional, business, or personal use.
Programs are offered both fall and spring semesters and in the six-week summer session (from late June to early August). Participants receive a minimum of 20 hours of classroom instruction each week in speaking, listening, reading, writing, and grammar, which are taught at all levels from low intermediate through very high advanced. Applicants must be at least 17 years of age, hold the equivalent of a high school diploma, and have had some previous study of English. Participants receive a Form I-20 ID to obtain an F-1 visa. Part-time participation is also available for F-2 dependents currently in Ithaca. Contact the program office for information.
Students who have gained full admission to or who are already registered in degree-granting programs at Cornell should consult the section "English for Academic Purposes" (series ENGL). The Intensive English Program is coordinated by the director, Jeannette Mancusi. Information and application materials are available directly from the program at Cornell University, Intensive English Program, McGraw Hall, Ithaca, NY 14853-6011, USA: tel. 607/255-4863; fax 607/255-7491; e-mail cuiep@cornell.edu, web page: http://irc.cornell.edu/iep.

INTERNATIONAL RELATIONS CONCENTRATION
Office: 152 Uris Hall, 254-5004
www.einaudi.cornell.edu/about/irc.asp
D. R. Lee (AEM), director; Faculty Advisory Board: M. Cook (IILR), M. Evangelista (Government); S. Feldman (Rural Sociology); J. Reppy (S&TS); B. Strauss (History); B. Szekely (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 nongovernmental 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. International Relations Concentrators 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 coursework and language study add a global and cross-cultural dimension to those majors. Some students even design an independent major in some aspect of international relations or comparative social or cultural studies. Spending a semester or year of study abroad can contribute to meeting the course requirements of the IR Concentration, 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 elective from either Group 1 or Group 2—one elective from Group 3 and 4, and one additional elective from either Group 3 and Group 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 152 Uris Hall, as well as from the website. 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**

IR Concentrators are expected to complete additional language study beyond the College of Arts and Science 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**

IR Concentrators 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, 152 Uris Hall, Tel 254-5004.

**Course List for 2003-2004**

Course options are listed below. Most courses offered one semester only. See 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
- ECON 263/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 433/CRP 412 Development, Privatization and New Public Management
- CRP 477 Issues in African Development

**Group 2: World Politics and Foreign Policy**

**Core:**
- GOVT 354 Capitalism, Competition, and Conflict

**Electives:**
- GOVT 326 Building a Better Democracy
- GOVT 329 Comparative Politics of Latin America
- GOVT 341/NES 294/ JWST 294 Modern European Society and Politics
- GOVT 345 Politics of European Integration
- GOVT 353 Recent East Asian Politics
- GOVT 358 History of Modern Middle East
- GOVT 363 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 US 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
- ILRRCB 302 Immigration and Labor in US History
- ILRHR 450 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/SOC 324 Environment and Society
- SOC 437/SOC 438 Population and Development
- S&T/442/SOC 442/CRP 442 The Sociology of Science

**Group 4: Cultural Studies**

**Core:**
- ANTHR 102 Introduction to Anthropology: The Comparison of Cultures
- ANTHR 200 Cultural Diversity and Contemporary Issues

**Electives:**
- ANTHR 230/AIS 230 Cultures of Native North America
- ANTHR 260 Japanese Popular Culture
- ANTHR 303 Asians in the Americas
- ANTHR 321/FGSS 321 Sex and Gender in Cross-Cultural Perspective
- ANTHR 384 Africa in the Global Economy
- ANTHR 387 Comparative Islamic Movements
- ANTHR 388 Masks of Power/Strategies of Resistance
- ANTHR 441 Himalayan Ethnographies
- ART H 245 Renaissance and Baroque
- ART H 568/LSP 568 Modern and Contemporary Latin American Art
- ART H 378/AS&RC 310 Art in African Culture & 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 450 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 20th 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
JAPANESE
See Department of Asian Studies.

JAVA

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), G. Altshuler (American-Jewish History and Culture), D. Batruck (Holocaust Film Studies), R. Brann (Judeo-Islamic Studies), M. Campos (Modern Middle Eastern History), V. Caron (Modern French and European-Jewish History), W. T. Dickens (Catholic Studies), M. Diesing (Yiddish Language and Linguistics), N. Furman (French Holocaust Literature), K. Haines-Eitzen (Early Judaism and Early Christianity), P. Hohendahl (German Literature), R. Hoffmann (Holocaust Studies), P. Hyams (Medieval Jewish History), E. Rosenberg (Holocaust Studies), T. Serek (Sociology), D. Starr (Modern Hebrew and Arabic Literature; Critical Theory; Middle Eastern Film), M. Steinberg (German-Jewish History and Culture), Y. Szekely (Judaica Bibliography), S. Toorawa (Arabic Literature and Islamic Studies), 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 Judaic civilization merits its own comprehensive and thorough treatment and that proper understanding of any culture is inconceivable without adequate knowledge of the language, literature, and history of the people that created it. Accordingly, the members of the Department of Near Eastern Studies, in 1973

Courses Offered

**JWST 101-102 Intermediate Modern Hebrew I and II (also NES 101-102)**
101 fall; 102 spring. 4 credits. S. Shoer.
For description, see NES 101-102.

**JWST 103-200 Intermediate Modern Hebrew I and II (also NES 103-200)**
103 fall; 200 spring. 4 credits. N. Scharf.
For description, see NES 103-200.

**JWST 123-124 Introduction to Biblical Hebrew I and II (also NES 123-124, RELST 123-124)**
123 fall, 124 spring. 3 credits each term.
JWST 124 provides language qualification. Staff. Enrollment limited to 17 students. Staff. For description, see NES 123 and NES 124.

**JWST 223-224 Introduction to the Bible I and II (also NES 223-224 and RELST 223-224)**
223 fall, 224 spring. 3 credits each term.
G. Rendsburg.
For description, see NES 223-224.

**JWST 227 The Bible and Ancient Near Eastern Civilization (also NES 227 and RELST 227)**
Spring. 3 credits. J. Zorn.
For description, see NES 227.

**JWST 229 Introduction to the New Testament (also RELST 229, NES 229)**
Fall. 3 credits. Not offered 2003-2004.
K. Haines-Eitzen.
For description, see NES 229.

**JWST 234 Muslims and Jews in Confluence and Conflict (also NES 234 and RELST 234)**
Fall. 3 credits. R. Brann.
For description, see NES 234.

**JWST 235 Jews and Arabs in Contact and Conflict: The Modern Period (also COM L 245 and NES 235)**
D. Starr.
For description, see NES 235.

**JWST 244 Introduction to Ancient Judaism (also NES 244, RELST 244)**
Fall. 3 credits. Not offered 2003-2004.
G. Rendsburg.
For description, see NES 244.

**JWST 251 Judaism, Christianity and Islam (also NES 251, RELST 251)**
Spring. 3 credits. R. Haines-Eitzen and R. Brann.
For description, see NES 251.

**JWST 282 Modern European Jewish History, 1789-1948 (also HIST 291)**
V. Caron.
For description, see HIST 291.
JWST 253 From Medievalism to Modernity: The History of Jews in E. Modern Europe, 1492-1789 (also NES 253, HIST 295)  
V. Caron.  
For description, see HIST 285.

JWST 254 Anti-Semitism and the Crisis of Modernity: From the Enlightenment to the Holocaust (also HIST 295)  
V. Caron.  
For description, see HIST 235.

JWST 256 Introduction to the Quran (also NES 267, RELST 271/272, COM L 256)  
Spring. 3 credits. S. M. Toorawa.  
For description, see NES 256.

JWST 257 Ethics of Imagining the Holocaust (also GERST 221, ENGL 221)  
D. Schwartz.  
For description, see ENGL 221.

JWST 263 Introduction to Biblical History and Archaeology (also RELST 264, ARKEO 263, and NES 263)  
Spring. 3 credits. J. Zorn.  
For description, see NES 263.

JWST 266 Jerusalem Through the Ages (also RELST 266, NES 266, and ARKEO 266)  
Fall. 3 credits. Not offered 2003-2004. 
J. Zorn.  
For description, see NES 266.

JWST 289 History of Zionism and the Birth of Israel (also NES 290, HIST 267)  
V. Caron.  
For description, see HIST 267.

JWST 291 Sophomore Seminar: Middle Eastern Cinema (also NES 293, FILM 293, COM L 293, and VISST 293)  
Fall. 3 credits. Limited to 15 students. 
D. Starr.  
This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline's outlook, discourse community, modes of knowledge, and ways of articulating that knowledge. 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.

JWST 294 History of the Modern Middle East, Eighteenth to Twentieth Centuries (also NES 294 and GOVT 358)  
Fall. 3 credits. M. Campos.  
For description, see NES 294.

JWST 295 Introduction to Christian History (also RELST 295, NES 295, HIST 299)  
K. Haines-Eitzen.  
For description, see NES 295.

JWST 301-302 Advanced Modern Hebrew I and II (also NES 301-302)  
V. Caron.  
For description, see NES 301-302.

JWST 305 Conversational Hebrew (also NES 305)  
Fall. 2 credits each term. Limited to 15 students. Prerequisite: NES 302 or permission of instructor; for non-native speakers only. N. Scharf.  
For complete description, see NES 305.

JWST 320 Women in the Hebrew Bible (also NES 320, RELST 316, FGSS 322)  
G. Rendsburg.  
For description, see NES 320.

JWST 325 Conversational Hebrew (also NES 325 and RELST 318)  
Fall. 1 credit. Spring. 1 credit.  
G. Rendsburg.  
For description, see NES 325.

JWST 326 Seminar-Women in the Hebrew Bible (also NES 326, FGSS 326)  
G. Rendsburg.  
For description, see NES 326.

JWST 328 Readings in Ancient Jewish Texts (also NES 328, RELST 317)  
G. Rendsburg.  
For description, see NES 328.

JWST 333 Islamic Spain: Culture and Society (also RELST 334, SPANL 339, COM L 334, NES 339)  
R. Brann.  
For description, see NES 339.

JWST 353 History of the Holocaust (also HIST 370)  
V. Caron.  
For description, see HIST 370.

JWST 360 Ancient Iraq: Origins of Mesopotamian Civilization (also NES 360, ARKEO 360)  
Fall. 4 credits. D. I. Owen.  
For description, see NES 360.

JWST 361 Sumerian Language and Culture (also NES 361, ARKEO 361)  
Spring. 4 credits. D. I. Owen.  
For description, see NES 361.

JWST 368 The Jews in and out of Egypt (also NES 368 and COM L 398)  
Spring. 4 credits. D. Starr.  
For description, see NES 368.

JWST 393 History of Jews and Christians in the Modern Middle East (also NES 393)  
Fall. 4 credits. M. Campos.  
For description, see NES 393.

JWST 394 Gender, Sexuality, and the Body in Early Christianity (also NES 394, FGSS 394, RELST 394)  
K. Haines-Eitzen.  
For description, see NES 394.

JWST 395 Israeli Society (also NES 395 and SOC 390)  
Fall. 4 credits. T. Sorek.  
For description, see NES 395.

JWST 397 History of the Israeli-Palestinian Conflict (also NES 397 and GOVT 397)  
Spring. 4 credits. M. Campos.  
For description, see NES 397.

JWST 400 Seminar in Advanced Hebrew (also NES 400)  
Fall. 4 credits. Enrollment limited to 15 students. Not offered 2003-2004. N. Scharf.  
For description, see NES 400.

JWST 401 Topics in Modern Hebrew Literature (also NES 401)  
Spring. 4 credits. D. Starr.  
For description, see NES 401.

JWST 409 Season of Migration (also NES 409, RELST 409)  
S. Toorawa.  

JWST 420 Readings in Biblical Hebrew Prose (also NES 420, RELST 420)  
G. Rendsburg.  
For description, see NES 420.

JWST 421 Readings in Biblical Hebrew Poetry (also NES 421 and RELST 423)  
Spring. 4 credits. Prerequisite: one year of Biblical or Modern Hebrew. Course is repeated for credit. G. Rendsburg.  
For complete description, see NES 421.

JWST 422 Dead Sea Scrolls (also RELST 422, NES 422)  
G. Rendsburg.  
For description, see NES 422.

JWST 423 Sacred Fictions (also NES 423, RELST 411, COM L 411, CLASS 461 and SOC H 411)  
Fall. 4 credits. K. Haines-Eitzen.  
For description, see NES 423.

JWST 425 Concepts of Improvisation (also MUSIC 415 and NES 425)  
Fall. 4 credits. Limited to 25 students. Prerequisite: ability to read music. J. Rubin.  
For complete description, see NES 425.

JWST 446 History of Jews in Modern France (also HIST 417, FRLIT 413)  
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)  
V. Caron.  
For description, see HIST 433.

JWST 456 History of Women and Gender in the Modern Middle East (also NES 456, GOVT 454, and FGSS 456)  
Spring. 4 credits. M. Campos.  
For complete description, see NES 456.

JWST 458 Imagining the Holocaust (also NES 458, ENGL 458/658, GERST 457/657)  
D. Schwarz.  
For description, see ENGL 458.

JWST 474 Topics in Modern Europe: Intellectual and Cultural History (also HIST 474, COM L 474)  
D. LaCapra.
JOHN S. KNIGHT INSTITUTE FOR WRITING IN THE DISCIPLINES

The director of the John S. Knight Institute is Jonathan Monroe, associate dean of the College of Arts and Sciences, professor in the Department of Comparative Literature, and George Ellicott Professor of Writing and Rhetoric. Katherine Gottschalk, senior lecturer in the Department of English, is the Walter C. Teagle Director of First-Year Writing Seminars. The Institute's offices are in 101 McGraw Hall, 255-4061.

S. Donatelli (Sophomore Seminars Program), M. Gilliland (Writing Workshop), K. Hjortshoj (Writing Workshop), J. Martin (Writing in the Majors), B. LeGendre (Writing Workshop), M. Gilliland (Writing Workshop), K. Hjortshoj (Writing Workshop), E. Shapiro, (Writing Workshop).

The John S. Knight Institute helps to coordinate the teaching of writing for undergraduates in six of the university's schools and colleges (the School of Industrial and Labor Relations and the colleges of Agriculture and Life Sciences; Architecture, Art, and Planning; Arts and Sciences; Engineering, and Human Ecology). The program administrates writing seminars for first-year and upperclass students, discipline-based seminars in its Sophomore Seminars Program, tutorial writing classes, and seminars in its Sophomore Seminars Program. More than thirty academic departments and programs in addition to written commentary on drafts, individual conferences, in-class group work, peer commentary, reading responses, journals, and so on.

John S. Knight Institute or the Department of English accept first-year writing seminars in fulfillment of their individual graduation requirements in categories referred to variously as "first-year writing," "oral and written expression," and the like. The Institute does not decide whether students may graduate; it makes courses available. Individual colleges and schools administer their own graduation requirements.

Currently, most undergraduate students are required to take two first-year writing seminars. Architecture majors, however, need only one. Hotel students fulfill their requirement in one semester, through H ADM 165 in one semester plus one First-Year Writing Seminar in the other. Agriculture and Life Sciences students can take first-year writing seminars or choose from among a variety of other courses to fulfill their requirement.

All students who score "4" or "5" on the Princeton Advanced Placement Examination in English receive three credits. Such credits are awarded automatically; no application to the John S. Knight Institute or the Department of English is necessary. How these credits may be applied to first-year writing or other distribution requirements depends on the student's college and score. All students who score "5," except Architecture majors, may
apply their three credits towards the writing requirements of their college. Of students who score "4," only Agriculture and Life Sciences students and Industrial and Labor Relations students may apply their three credits toward the writing requirements of their college. Students should always consult their college registrars to be certain that they understand their writing requirements.

Students who have already taken a first-year writing seminar, or who score "4" or "5" on the Advanced Placement (AP), or "700" or better on the English Composition or CEEB tests, may enroll, space permitting, in the following upper-level first-year writing seminars: ENGL 270, 271, or 272.

Although there are no exemptions from college writing requirements, some students may fulfill all or part of their college's writing requirement through transfer credits or writing-course substitutions.

For work done at other institutions to be accepted as equivalent to first-year writing seminars, students should demonstrate that they have done a reasonably equivalent amount of writing in a formal course. (It is not sufficient to write, for example, one 50-page term paper.) Students in the College of Engineering and the College of Arts and Sciences must file an "application for transfer evaluation" to request writing credit for such courses, students in other colleges should consult their college registrars.

In unusual circumstances, upper-level students may petition to use a Cornell writing course other than a first-year writing seminar to satisfy part of their writing requirement. The John S. Knight Institute must approve all such petitions in advance.

For information about the requirements for first-year writing seminars and descriptions of seminar offerings, consult the John S. Knight Institute brochure, available from college registrars in August for the fall term and on the web in late October for the spring term.

English 288–289: Expository Writing
English 288–289, "Expository Writing," helps students write with more confidence and skill in all disciplines. Open to Cornell sophomores, juniors, and seniors, ENGL 288–289 courses explore themes shaped by a genre or use of expository writing, by the common concerns of several disciplines, or by an interdisciplinary topic intimately related to the written medium. Although English department instructors make up roughly half the staff, the Knight Institute’s involvement enables the course to extend and diversify its offerings in separately defined, 16-member sections that appeal to the varied interests and needs of students in many areas of study. Students may choose among a variety of sections focusing on such themes as “Understanding the Body,” “The Essay: Personal to Public,” “Issues, Audiences, and Ourselves,” “Reading the News, Understanding the Media,” and “Myths of the City.” All staff are selected because their special interests and their training and experience in First-Year Writing Seminars promise original course design and superior performance.

Sophomore Seminars
Since 2001, the John S. Knight Institute has been sponsoring a distinctive tier of electives 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 24 seminars from 17 disciplines:

**Knight Institute Sophomore Seminars 2001–2004**

ANTHR 211  Naturc and Culture
AEM 200  Contemporary Controversies in the Global Economy
ART 372  Contemporary Art: Making and Looking
AAS 211  Race and the American City: Reading New York and San Francisco
AAS 210  South Asian Diasporic Locations
ASTRO 233  From Planets to Galaxies: The Origin of Cosmic Structures
CLASS 244*  Psyche, Ego, and Self
COM I. 215  Comparative American Literatures
COM L 225  Poetry and Poetics of Difference
BIOEE 467  Why Is Evolutionary Biology So Controversial?
ENGL 204  Introduction to American Literatures: Narrating the Nation
ENGL 209  Introduction to Cultural Studies
ENGL 220*  The Idea of the Pet in Literature
ENGL 221  Imagining the Holocaust
GOVT 215  Gender, Nationalism, and War
HIST 225*  U.S./Mexico Border: History, Culture, and Representation
HIST 232*  Eyewitness to War in the Ancient World
HIST 241  Riot and Revolution in Nineteenth-Century Africa
ITAL 250*  The Uses of Learning
MUSIC 300  Proseminar in Musicology
NENS 293  Middle Eastern Cinema
NENS 296*  Jesus in History, Tradition, and the Cultural Imagination
PHIL 216*  Self, Ego, Psyche
PSYCH 531  Neuroscience as the Search for Perfect Self-Knowledge
SPANL 239  Viewing Modern Barcelona
THETR 202  Film Style and Cinema
THETR 446  Shakespeare in (Con)Text


**Writing in the Majors**

Spanning the humanities, social sciences, and sciences, the Knight Institute’s upper-level, Writing in the Majors courses do not satisfy formal writing requirements, and faculty participation is entirely voluntary. While all Writing in the Majors courses include extensive writing, usually with guided revision, they also emphasize other forms of active, interactive learning essential to scholarship and careers in the disciplines. Writing in the Majors initiatives have included individual and collaborative research projects, collaborative writing, oral presentations, group oral exams, field studies, authentic student-designed laboratory experiments, debates, analytical and critical reading exercises, topical symposia, conversation groups, student-led discussions, poster sessions, and many kinds of informal writing, including on-line 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 thirteen years have involved collaboration with 100 faculty members and more than 150 graduate teaching assistants to enrich learning in 63 upper-level courses offered in 22 departments.

**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 reading representing a range of pedagogical theories and practices, seminar discussions, and presentations of faculty, visiting scholars in the field, and experienced TAs. 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
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

Fall, spring, 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 grades 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 139-239 Special Topics in Writing

Fall, spring, 139, undergraduate students only; 239, graduate students only. 3 credits. S-U grades 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 come to 174 Rockefeller for more information.

LATIN AMERICAN STUDIES

190 Uris Hall


The Latin American Studies Program encourages and coordinates faculty and student interests in Latin America. 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/LSP 301/ANTHR 340 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 346/644)
355 Archaeology of Mexico and Central America (LASP 355)

358 Archaeology of the Andes (LASP 356)
382 Latin America: An Anthropological Perspective (LASP 382)
456 Moscaian 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 565)

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 I

482 Latin American Woman Writers (LASP 482)

CRP

371 Cuba: The Search for Development Alternatives (LASP 371)
376/676 Latin American Cities (LASP 376/676)
616 Globalization and Development

670 Regional Planning and Development in Developing Nations

671 Seminar in International Studies and Planning

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)

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

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)
The Latino Studies Program is an interdisciplinary academic program that focuses on the contributions, concerns, and welfare of those persons of Latino origin who reside in the United States. It includes support for historical, linguistic, literary, social, economic, and political studies of this diverse group of Americans. To this end the program objectives are (1) to expand the available course curriculum by providing both undergraduate and graduate courses pertaining to Latino subject matters; (2) to enlarge the size of the Latino faculty at Cornell through permanent appointments visiting scholars, and post-doctoral fellowships; and (3) to enhance the academic environment on campus through support of such activities as lectures, conferences, seminars, exhibits, and research activities.

**Undergraduate Concentration**

The Latino Studies Program offers an undergraduate concentration in Latino Studies which consists of an interdisciplinary course of study primarily in history, sociology, anthropology, literature, and language. To complete the concentration, students must take at least five courses (minimum total of 15 credits) in Latino Studies, including “Latinos in the United States” (LSP 201/SOC/R SOC 265) offered each spring semester. Students are required to include at least two courses at the 300 or 400 levels. Students who are interested in the concentration must meet with the LSP adviser, senior lecturer Loretta Carrillo, and file an application with the Latino Studies Program office by the beginning of their junior year. A maximum of one independent study, which requires the approval of the LSP adviser, will be allowed to fulfill the requirements of the concentration. The FWS does not count towards fulfilling concentration requirements. Courses must be completed with a letter grade of C or above.

**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 entitled “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 100 Introduction to World Music: Africa and the Americas (also MUSIC 103)**

Spring. 3 credits. 1 hour discussion. M W 11:15-12:05. 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.

**LSP 110 Introduction to American Studies: New Approaches to Understanding American Diversity: The Twentieth Century (also AM ST 110 and HIST 111)**

4 credits. Not offered 2003-2004. M. C. Garcia. 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 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 RSOC 265)**

Spring. 4 credits variable. T R 2:55-4:10. 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 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.

**LSP 202 Spanish for English/Spanish Bilinguals (also SPANR 200)**

Fall and spring. 4 credits. T R 11:40-12:55. N. Maldonado-Mendez. 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)**

4 credits. Not offered 2003-2004. M. C. Garcia. 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 restrictionist responses; and women and migration, remittances, and transnationalism. Among the immigrant-receiving nations studied are Argentina, Brazil, Canada, Cuba, Mexico, and the United States.

**LSP 219 Mexican Immigration to the United States (also HIST 219, AM ST 219, LSP 215)**

4 credits. Not offered 2003-2004. This seminar course explores the historical and contemporary conditions and expressions of Mexican immigrants in the twentieth century. We discuss issues such as: the history of the Southwest; historical ideologies and theories of immigration and national identity; socio-economic conditions; cultural displays of identity; the politics of Mexican immigration and assimilation; adaptation and resistance of Mexican immigrants and their children to "mainstream" culture, economic, and social policies and their effects upon the Mexican immigrant communities; and trans-national identities and globalizations.

**LSP 220 Sociology of Health and Ethnic Minorities (also R SOC 220)**

Fall. 3 credits. T-R 10:10-11:25. P. Parra. Discusses the health status of minorities in the United States. Specifically, we explore the 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.
This course offers a survey of narratives by several others. Be the largest "minority group" in the country. Personal, social and cultural issues alongside textual criticism. Write several papers of varying lengths that policy-making in the United States and Mexico. And representations of the border that are so this assumption out: in no other field of study of the U.S.-Mexico border, requires us to cross academic itself. The proliferation of provocative writings on the border in recent years bears this assumption out: in no other field of study has the interest been so remarkably interdisciplinary, so methodologically eclectic, nor so theoretically provocative. This seminar intends to tap that literature to help students analyze and understand the histories, cultures and representations of the border that are so important to contemporary self-fashioning and policy-making in the United States and Mexico. Readings include works of fiction, literary and cultural theory, history, science studies, and postcolonial criticism. Students can expect to write several papers of varying lengths that develop their skills in historical research and textual criticism.

LSP 240 Survey in U.S. Latino Literature (also ENGL and AM ST 240)

Fall. 4 credits. M W 2:55-4:10. M. P. Brady. It is estimated that by the year 2030, the Latino/a population in the United States will be the largest "minority group" in the country. This course seeks to introduce students to the growing body of literature across time, space, and genre, by the various U.S. Latino/a communities. Of particular interest are the manner and degree to which Latino/a literature's convergence and diverge as they explore issues of "race," ethnicity, sexuality, class, nationality, and identity in general, at a time when the American profile is increasingly becoming self-fashioning and policy-making in the United States. Authors examined include Juan Seguin, Alurista, Gloria Anzaldúa, Cherrie Moraga, Bernardo Vega, Miguel Piñero, Nicolosa Mohr, Cristina García, Oscar Hijuelos, Julia Alvarez, Ruben Martínez, and several others.

LSP 246 Contemporary Narratives by Latina Writers (also SPANL 246 and FGSS 246)

Fall. 3 credits. T-TH 2:55-4:10. L. Carrillo. This course offers a survey of narratives by representative Latina writers of various Latino ethnic groups in the United States including Chicana, Chilean, Cuban, Dominican, and Puerto Rican. 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 such issues as culture, language, feminism, family, gender, sexuality, and domesticity. We account for regional distinctions and contributions. Readings include works by Julia Alvarez, Gloria Anzaldúa, Elena Castedo, Ana Castillo, Denise Chavez, Marisol Conde, Judith Ortiz Cofer, Cristina García, Nora Glickman, Nicholas Mohr, Cherríe Moraga, Archy Obejas, Esmeralda Santiago, Ana Lydia Vega, and Helena María Viramontes.

LSP 258 U.S. Culture and Mexican Americans, 1848-Pre sent (also HIST 256, AM ST 257)

4 credits. Not offered 2003-2004. M. C. García. This course explores the different political and cultural interactions between dominant ideologies of nationalism, race, and ethnicity in the United States, and Mexican Americans. We explore the development of national identities in conjunction to gender, class, and political discourses, and use both primary sources and secondary sources in our course.

LSP 260 Introduction to U.S. Latino History, Part I (also HIST 260 and AM ST 259)

4 credits. Not offered 2003-2004. M. C. García. This course examines the history of various Latino populations in the United States since 1898. Some of the topics we will discuss include: immigration as the product of U.S. hemispheric policies; the civil rights struggles of the twentieth century and the evolution of a distinct "Latino" identity; the "new" migration from Latin America; the transnational influence of immigrant communities on their homelands.

LSP 311 Social Movements (also R SOC and AIS 311)

Spring. 3 credits. A. Gonzales. 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 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.

LSP 319 Minority Politics in the United States (also GOVT 319)

4 credits. Not offered 2003-2004. M. Jones-Coorea. 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 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 366 Spanish in the United States (also LING 366 and SPANR 366)

Spring. 4 credits. Prerequisite: some knowledge of Spanish. T R 10:10-11:25. M. Suner. 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)

Fall. 4 credits. T R 2:55-4:10. 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 American visual arts, the creation of national artistic styles, the relation of Latin American 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 artists to various aspects of artistic practice.

LSP 377 The United States (also ANTHR and AM ST 377)

Fall. 4 credits. T R 10:10-11:25. V. Santiago-irizarry. 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 "pluralistic" 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 Third Cinema (also FILM 386)

4 credits. Prerequisite: previous course in film history or analysis helpful, though not mandatory. Time/day TBA. Not offered 2003-2004. Next offered spring 2005. A. Villarejo. This course explores postcolonial film and video through the rubric of "third cinema."
investigate the diverse historical, national, political, and genetic 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, AM ST 396] Spring. 4 credits. T R 10:10–11:25. M. P. Brady. This course explores Latino/a cultural work ranging from O’xen to comic books, architecture to film, music to sculpture, musicals to spoken word, theater to Internet sites. We consider how this work emerges in the context of U.S. engagements with Latin America and in the context of struggles for social and economic equality among ethnoracial groups in the U.S. We consider therefore the production of stereotypes (particularly in the nineteenth century) and the ongoing efforts of contemporary artists to dispel such stereotypes, to work alongside them and to rework them. We also consider the relationship between cultural production, representation, and public policy. U.S. Latino/a history is strongly recommended as a prerequisite, but not required.


[LSP 420/421] Undergraduate Independent Study Fall and spring. 2–4 credits. Permission of instructor. Guided independent study.

[LSP 424/624] Ethnoracial Identity in Anthropology, Language, and Law [also ANTHR 424/624] 4 credits. Not offered 2003–2004. V. Santiago-Irizarry. This course will examine the role that both law and language, as mutually constitutive mediating systems, occupy in constructing ethnoracial identity in the United States. We will approach the law from a critical anthropological perspective, as a signifying and significant sociocultural system rather than as an abstract collection of rules, norms, and cultural production and reproduction that contribute to the creation and maintenance of (differential) power relations. Course material will draw on anthropological, linguistic, and critical race theory as well as ethnocultural and legal material to guide and document our analyses.


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 right to stay. Even 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.


This upper-level seminar examines the role of political exiles and immigrants in shaping U.S. policy toward the country of origin. As a case study we will examine the economic and cultural relations between the United States and Cuba over the past two centuries, emphasizing the role of exiles and immigrants in shaping policy.


The social sciences generally treat ethnicity, nationalism and race as descriptive categories or variables, while avoiding actually defining these categories, or thinking about how they should be used. How should we go about describing ethnicity, nationalism, and race? Should we treat them as primordial or as social constructions? Much of the recent literature suggests the latter. If constructed, by whom are they constructed (or by what)? What constrains/structures these constructions? What purposes do these constructions serve? Whom do they serve? Are some constructions better representations of identity than others, and what does this mean? How should we go about applying these categories in political analysis?

[LSP 620/621] Graduate Independent Study Fall, spring. 2 to 4 credits. Permission of instructor. Guided independent study.


Cultural identity and citizenship in the United States have often been organized around linguistic difference and the issues this raises in an English-dominant society. Drawing from anthropological theories on language, this course looks at the place of language as a signifying practice in the United States by focusing on the experience of Latino communities. Topics explored include linguistic diversity and change, accommodation and resistance, language shift, linguistic ideologies, the production of language hierarchies, and institutional applications of language.


It is customary to date globalization as beginning at the end of World War II with the ensuing rapidity of international “development” and “modernization,” the proliferation of transnational corporations, the end of the Cold War, and the crafting of the “geopolitical control model” as Venezuelan Sociologist Rosa del Olmo terms it. Alternatively, globalization might be dated to the development of a mercantile system centered upon slavery. Such a contrapuntal account offers a reminder that Anthony Giddens calls global capitalism’s “emerging world market in labour” or what Rhacel Parreñas refers to as the new “international division of reproductive labor” has perhaps a longer history. This definition also has the advantage of drawing into the conversation about globalization a broader spectrum of public intellectuals including Phyllis Wheatley, Herman Melville, José Martí, María Amparo Ruiz de Burton, Ignacio Bonilla and other nineteenth century thinkers. This course begins by studying their insights into the production of (racialized) gender within a world-labor-market system and then narrow its focus to concentrate on the particular analysis provided by Latino/a writers and artists including Denise Chavez, Hector Tobar, Francisco Goldman, Reinaldo Arenas, Alma Lopez, Ana Mendietta, Dianne Gambou, and Laura Alvarez. Each offers a critique of socio-economic change through lenses of gender by complicating the notions of flexible citizenship and cosmopolitanism championed by many theorists of globalization (whom we also study, including Ong, Sassen, Castells, Giddens, Massey, Cheah, Sub. Marcus, and others). Put differently, this course analyzes how many Latina/o authors, and their precursors, illustrate the fissures and faultlines of a neoliberalism emerging as a new form of civilization.

**LAW AND SOCIETY**

**Co-Directors:** M. Fineman (law), fall semester only, 208 Myron Taylor Hall, 255–2622, melf22@cornell.edu; R. Lieberwitz (ILR), spring semester only, 287A Ives Hall, 255–3289, rli5@cornell.edu; and M. Lynch (science & technology), 622 Clark Hall, 255–7294, mel27@cornell.edu. **Advisors:** G. Alexander (law), D. Dunning (psychology), G. Hay (law), B. Hendrix (government), P. Hyams (history), M. Katzenstein (government), R. Miller (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), K. Stone (law).

The Law and Society concentration provides an opportunity for focused study of the interaction between law and society from an interdisciplinary perspective that is predominantly 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 policy and procedures regarding external concentrations.

In order to allow sufficient time for a coherent program of study to be developed and completed, students who have an interest in this concentration are strongly encouraged to register by the fall of their junior year and no later than the fall of their senior year.

Registration forms are available online at http://www.arts.cornell.edu/epl/LawandSociety.html and in the Ethics & Public Life (EPL) office, 240 Goldwin Smith Hall. Consult your college's policy and procedures regarding external concentrations. To obtain additional information about the concentration, contact the Ethics and Public Life advisor who is available to provide guidance with the course selection process and help with other questions and concerns related to the student's participation in the concentration.

Students in the Law and Society concentration are required to take, and must receive a passing letter grade in, at least four courses from the approved list of courses available on the Law and Society web page and in the EPL office. At least two of the courses must be outside the student's major, and no more than two can be within the same subject area. There are no required courses, but past students have found GOVT 313 and PSYCH 265 particularly relevant. It may be possible for courses not included on the list to be substituted with the approval of the director; this includes courses taken at other approved educational institutions or as part of an approved study abroad program. Courses taken prior to registering in the concentration can be counted toward the four-course requirement.

Many students find access to 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 (approximately 10 per semester) and other pertinent information 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 wish.

To obtain additional information about the Law and Society concentration, contact the Ethics and Public Life office, 240 Goldwin Smith Hall, 255-8515, epl@cornell.edu, or consult the program's web site, http://www.arts.cornell.edu/epl.

### Approved Law and Society Courses

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PHIL 242/GOVT 242 Social and Political Philosophy

PHIL 245 Ethics and Health Care

PHIL 246/S&TS 246 Ethics and the Environment

PHIL 247 Ethics and Public Life

PHIL 341 Ethical Theory

PHIL 342 Law, Society, and Morality

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S&TS 427/B&SOC 427 The Politics of Environmental Protection in America

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SOC 208 Social Inequality

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SOC 293/GOVT 293/PHIL 193/CRP 293 Inequality, Diversity, and Justice

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/RSOC 301 Theories of Society

**College of Art, Architecture, and Planning**

CRP 293/GOVT 293/PHIL 193/CRP 193 Inequality, Diversity, and Justice

CRP 380 Environmental Politics

CRP 444/544/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 250 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

**College of Agriculture and Life Sciences**

AIS 311/R SOC 311 Social Movements

AIS 367/R SOC 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 444/544 Resources Management and Environmental Law

R SOC 200/SOC 200 Social Problems

R SOC 206/FGSS 206 Gender and Society

R SOC 207/SOC 207 Problems of Contemporary Society

R SOC 301/SOC 375 Theories of Society

R SOC 311/AIS 311 Social Movements

R SOC 367/AIS 367 American Indian Politics and Policy

**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, & 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 segis 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 quality 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 FGSS; they cannot double-count their credits and thereby use the same courses for both concentrations.

Students interested in the LBG Studies concentration should contact the Lesbian, Bisexual, and Gay Studies Office in 386 Urs Hall.

**Courses**

ANTHR 200 Cultural Diversity and Contemporary Issues Fall. 3 credits. Staff.

For description, see ANTHR 200.

ANTHR 321/621 Sex and Gender in Cross-Cultural Perspective (also FGSS 321/631) Fall. 4 credits. Staff.

For descriptions, see ANTHR 321/621.

ENGL 276 Desire (also FGSS 276 and COM L 276) Spring. 4 credits. E. Hanson.

For description, see ENGL 276.

[ENGL 276 Quoer Fiction (also FGSS 279) Not offered 2003–2004. E. Hanson.]

[ENGL 327 Shakespeare: Gender and Society (also FGSS 327) Not offered 2003–2004. B. Correll.]

ENGL 355 Decadence (also FGSS 355) Fall. 4 credits. E. Hanson.

For description, see ENGL 355.


[ENGL 608 Seminar in Cultural Studies: Race, Drugs and Gender

[ENGL 651 The Sexual Child (also FGSS 651)
Not offered 2003–2004. E. Hanson.]

[ENGL 654 Queer Theory (also FGSS 654 and COM L 654)
Not offered 2003–2004. E. Hanson.]

[ENGL 655 Decadence (also FGSS 656 and COM L 655)
Not offered 2003–2004. E. Hanson.]

[ENGL 660 Cinematic Desire (also AM ST 662 and FGSS 661)
Spring. 4 credits. E. Hanson.
For description, see ENGL 660.]

[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 405/605 Domestic Television

[FGSS 610 Sexuality and the Politics of Representation (also THETR 610)
Next offered fall 2004. A. Villarejo.]

[FRLIT 493 French Feminisms (also FGSS 493)

[GERST 413 The Women around Freud

[GERST 614 Gender at the Fin-de-siècle

[GOVT 353 Feminist Movements and the State (also FGSS 353)

[GOVT 415 Race, Gender, and Organization (also FGSS 415)

[GOVT 467 Radical Democratic Feminisms (also FGSS 468)
Spring. 4 credits. A. M. Smith.
For description, see GOVT 467.]

[GOVT 486 Gender, Nationalism, and Conflict (also FGSS 487)

[GOVT 762 Sexuality and the Law (also FGSS 762)
Spring. 4 credits. A. M. Smith.
For description, see GOVT 762.]

[HD 284 Introduction to Sexual Minorities (also FGSS 285)
Fall. 3 credits. R. Savin-Williams.
For description, see HD 284.]

[HD 464 Sexual Minorities and Human Development (also FGSS 467)
Spring. 4 credits. R. Savin-Williams.
For description, see HD 464.]

[HIST 273 Women in American Society, Past and Present (also FGSS 273)
Spring. 4 credits. M. B. Norton.
For description, see HIST 273.]

[HIST 378 Topics in U.S. Women's History (also FGSS 378)

[HIST 416 Gender and Sex in Southeast Asia (also FGSS 416)
Spring. 4 credits. T. Loos.
For description, see HIST 416.]

[HIST 480 Gender Adjudicated (also ASIAN 488 and FGSS 480)

[HIST 626 American Women's History (also FGSS 626)

[LING 244 Language and Gender (also FGSS 244)
Spring. 4 credits. S. McConnell-Ginet.
For description, see LING 244.]

[MUSIC 492 Music and Queer Identity (also FGSS 494)

[PSYC 277 Social Construction of Gender (also FGSS 277)

[PSYC 450/650 Gender and Clinical Psychology (also FGSS 450/650)

[SPAN L 384 Literature and Revolution

[SPAN L 400 Maricoteoría/Queer Theory

[THETR 320 Queer Theatre

[THETR 336 American Drama and Theatre (also ENGL 336)

[THETR 436 The Female Dramatic Tradition (also FGSS 433)

[THETR 637 Seminar in Dramatic Theory
Not offered 2003–2004. R. Schneider.]

LINGUISTICS
http://ling.cornell.edu

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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) Three additional courses in linguistics at the 300 or 400 level, of which at least two must be courses in general linguistics (as opposed to courses devoted to a single language or family)

4) A course at or beyond the 300 level in the structure of a language, or LING 300 (Field Methods) or 400 (Language Typology).

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 additional 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, J. Whitman; spring, M. Diesing. An introductory course designed to provide an overview of the science of language, especially its theoretical underpinnings, methodology, and major findings. The course focuses on the basic analytic methods of several subfields of linguistics including phonetics, phonology, morphology, syntax, semantics, language variation, language change, and psycholinguistics.

LING 109 English Words: Histories and Mysteries (also CLASS 171) # (III) (KCM)
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 to be discussed include 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 natural 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 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, PSYCH 102, and PSYCH 102) (III) (KCM)
For description, see COGST 101.

LING 212 Language and Culture (III) (KCM)
We often assume that there is a close relationship between differences in language and cultural variation. This course focuses on that relationship, beginning with an examination of the linguistic relativity hypothesis, which posits a link between basic properties of languages and crosscultural differences in world view. 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 systems.

LING 215/715 Language and Gender (also VOCH 215) (III) (KCM)
For description, see PSYCH 215.

LING 217 History of the English Language to 1300 (also ENGL 217) # (III or IV) (HA)
Fall. 4 credits. 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, changes in sound, vocabulary and grammatical structure, external influences, and Old and Early Middle English language and literature. This course forms a sequence with LING 218, but the two may be taken independently.

LING 218 History of the English Language since 1300 (also ENGL 218) (III or IV) (HA)
Spring. 4 credits. 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, culture, and English and politics. Guest lecturers will be invited to discuss Middle and Modern English literature. This course forms a sequence with LING 217, but it may be taken independently.

LING 236 Introduction to Gaelic
Spring. 3 credits. W. Harbert. This course is an introduction to the Scottish Gaelic language, with some discussion of its history, structure, and current status.

LING 237 The Germanic Languages (III) (KCM)
This course provides an introduction to the modern Germanic languages (English, German, Dutch, Afrikaans, Swedish, Danish, Icelandic, Norwegian, Faroese, and Yiddish.)

LING 238 Introduction to Welsh
This course and 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 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 241 Yiddish Linguistics (also JWST 271) (III) (SBA)
This course covers a wide variety of topics relating to the Yiddish language and Yiddish culture, including the structure of Yiddish, the history of the Yiddish language, Yiddish in America (the Yiddish revival, the role of the Yiddish press, etc.), Yiddish as a minority/ dying language, and the influence of Yiddish on present-day American English. No previous knowledge of Yiddish required.

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 FGSS 244) (III) (SBA)
Spring. 4 credits. Nonmajors or majors.
S. McConnell-Ginet.
This course explores connections between language (use) and gender/sex systems, addressing such questions as the following: How do sex and gender affect the ways we speak, the ways we interpret and evaluate
speech? How do sociocultural differences in women’s and men’s roles affect their language use, their relation to language change? What is meant by sexist language? How does women’s and men’s roles affect their language speech? How do sociocultural differences in

[LING 246/546 Minority Languages and Linguistics (III) (SBA)]


This course examines minority languages from linguistic, social, and political perspectives. 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 CLASS 251–252 and SANSK 251–252) (IV)]


[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 2003–2004. 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 acquisition. 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 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.

[LING 270 Truth and Interpretation (also COGST 270 and PHIL 270) (III or IV)]

Not offered 2003–2004. For description, see PHIL 270.

[LING 285/585 Linguistic Theory and Poetic Structure (also ENGL 296/585) (III or IV) (LA)]

Spring. 4 credits. Graduate students register under LING 585. J. Bowers.

Poems are among the most highly structured linguistic objects that human beings produce. While some of the devices used in poetry are arbitrary and purely conventional, most are natural extensions of structural properties inherent in 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 300/500 Field Methods (III) (KCM)]

Fall. 4 credits. Graduate students register under LING 500. Prerequisites: LING 201 and 203 or permission of instructor. C. Collins, A. Miller-Ockhuizen.

Elicitation, recording, and analysis of data from a native speaker of a non-Western language not generally known to students.

[LING 301 Introduction to Phonetics (III) (KCM)]

Fall. 4 credits. Prerequisite: LING 101 or permission of instructor. A. Miller-Ockhuizen.

An introduction to the study of the physical properties of human speech sounds, 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, which 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. J. Bowers.

This course is an introduction to syntax, which studies how words are combined to form phrases and sentences. Emphasis 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. M. Diesing.

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 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 syntactic analysis to linguistically interesting legal cases (torts and criminal law), slips of the tongue, acquisition studies, and language disorders, and connections with the philosophy of language.

[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. C. Collins.

This course covers foundational issues in linguistic theory, including the nature of linguistic data, poverty of stimulus, autonomy of syntax, different frameworks (Chomsky, functional linguistics), and the history of linguistics.

[LING 308 Readings in Celtic Languages]

Fall or spring, depending on demand. 2 credits. 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) (III or IV) (KCM)]

Spring. 4 credits. M. Suter.

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 # (III) (HA)]

Spring. 4 credits. Prerequisite: LING 201 or 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. K. Olafsson.

Old Norse is a collective term for the earliest North Germanic literary language, 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 selections from some of the major Icelandic family sagas: Njals saga, Grettis saga, and Egils saga, as well as the whole Hrafnkelss saga.

[LING 321-[322] History of the Romance Languages (also ROM S 321) # (III) (HA)]

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 2004. C. Rosen.

321: 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 2003–2004. 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)
Not offered 2003–2004. 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. 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 is 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 relations, event semantics, Jackendoff's conceptual semantics, the linguistic architecture linking lexical semantics to syntax and morphology, and comprehensive lexical-semiotic classifications such as Levin classes and WordNet.

[LING 347 Topics in the History of English (II) (HA) (RI)]
Spring. 4 credits. Prerequisite: LING 217, 314, a course in Old or Middle English, or permission of instructor. Not offered 2003–2004; next offered 2004–2005. W. Harbert. The course will treat specific topics in the linguistic history of the English language, selected on the basis of the particular interests of the students and the instructor. The topic area for 2000–2001 was morphological and syntactic changes during the Early Middle English period—a period crucial to the development of the distinctive syntactic properties of Modern English.]

LING 368 Spanish in the United States (also SPANR 368 and LSP 368) (III) (CA)
Spring. 4 credits. Prerequisite: some knowledge of Spanish. M. Suñer. Examination of major Spanish dialects in the United States from a linguistic perspective. Contrast with the standard language. Borrowing, influence, and code switching. Syntactic, morphological, and phonological characteristics.

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)
Fall. 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 universal 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 cases of synonymy, agreement, and voice.

LING 401-402 Phonology I, II (III) (KCM)
401, fall; 402, spring. 4 credits each term. Prerequisites: for LING 401, LING 201 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 203; for LING 404, LING 403 or permission of instructor. Fall, M. Dielse; spring, C. Collins. 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 null objects. The purpose of the course is to develop the background needed for independent syntactic research.

LING 405 Sociolinguistics (III) (CA)
Spring. 4 credits. Prerequisite: LING 101 or permission of instructor. Not offered 2003–2004. Staff. 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 nonlinguistic variables are discussed and we evaluate the various ways researchers have dealt with these problems.

LING 406 Ethnolinguistics (III) (CA)
Spring. 4 credits. Prerequisite: LING 101 or permission of instructor. Not offered 2003–2004; next offered 2004–2005. M. Suñer. This course seeks to equip the advanced student or the future language professional with practical insights into problem areas for foreign language learners with the aid of linguistic descriptions. The intent is to narrow the gap known to exist between the knowledge that a native speaker has and the incomplete one that a foreign language learner possesses.

LING 407 Grammatical Structure of Spanish I (also SPANR 407) (III) (KCM)

LING 409 Structure of Italian (III) (KCM)

LING 410 History of the Italian Language (III) (HA)

LING 411 History of the Japanese Language (also ASIAN 411) [I & II] (CA)
Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 2003–2004. 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 History of the Japanese Language (also ASIAN 412) (II) (CA)
Spring. 4 credits. Prerequisite: LING 411. Offered alternate years. Not offered 2003–2004; next offered 2004–2005. M. Suñer. Survey of Japanese morpho-syntax using contemporary theoretical models to highlight hidden patterns and generalizations. Topics may vary according to students' interests, but may include major clause types, word order possibilities, negation, agreement, and null categories.
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 2003–2004. 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 2003–2004; next offered 2004–2005. 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 and affective factors (motivation, anxiety); group and language teaching, and contact between first and second language communities.

LING 414 Second Language Acquisition (also ASIAN 414) (III) (KCM)
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)
This course examines various issues in second language acquisition research that is particularly relevant to foreign language teaching and learning. Topics covered include: the role of input (listening/reading) vs. output (speaking/writing); implicit vs. explicit learning; negative vs. positive evidence (including the role of natural language); affective factors (motivation, anxiety); individual differences; teachability hypothesis and syllabus construction; the structure of second language proficiency.

LING 417—418 History of the Russian Language (also RUSSA 401–402) (III) (KCM)
LING 417, spring; [418]. 4 credits each term. Prerequisites: for LING 417, permission of instructor; for LING 418, LING 417 or equivalent. Offered alternate years. 418 not offered 2003–2004. W. Browne.
Phonological, morphological, and syntactic developments from Old Russian to modern Russian.

LING 419 Phonetics I (III) (KCM)
Fall. 4 credits. Prerequisite: LING 201 or permission of instructor. S. Hertz.
This course provides a basic introduction to the study of phonetics. Topics covered 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)
Spring. 4 credits. Prerequisite: LING 419. A. Miller-Ockhuizen.
This course is a continuation of Phonetics I and provides 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 203. D. Abusch.
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, indefinite descriptions, and anaphora are analyzed in a dynamic compositional framework that formalizes the idea that sentence meaning effects a change in an information state.

LING 423 Morphology (III) (KCM)
Spring. 4 credits. Prerequisite: LING 101 or equivalent or permission of instructor. J. Bowers.
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 424) (II) (MGR)
Fall. 4 credits. Prerequisite: LING 203 or permission of instructor; COM S 114 is also recommended. M. Rooth.
Steady progress in formalisms, algorithms, linguistic knowledge, and computational 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 which combine linguistic knowledge with powerful computational formalisms. Topics: 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)
Fall. 4 credits. Prerequisite: LING 201 or PHIL 231, or permission of instructor. D. Abusch.
An introduction to aspects of linguistic meaning which 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 (III) (KCM)
Survey of phonology, morphology, and syntax of this non-Indo-European language. Topics to be stressed include vowel harmony, consonant assimilation; definite and indefinite conjugations, possessives, verb prefixes, causatives; and focus, word order, clause types, movement, intonation.

LING 428/628 Connectionist Psycholinguistics (also COGST 428 and PSYCH 428/628) (III)
Not offered 2003–2004. For description, see PSYCH 428.

LING 430 Structure of Korean (also ASIAN 430) (III) (KCM)
Spring. 4 credits. Prerequisite: KOREA 102 or a previous course in linguistics. Offered alternate years. Not offered 2003–2004. 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 KRLIT 432) @ IV (LA)
Spring. 4 credits. Offered alternate years. Prerequisite: KOREA 202 or equivalent. J. Whitman.
with phonology and its relation to syntax and 444 with syntax and word order.

[LING 450 Lab Course: Language Development (also COGST 450 and PSYCH 437)]

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. They include 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 (CLAL), and training necessary to the collection and analysis of new child language data. Emphasis is placed on developing research methods in order to test hypotheses.

[LING 451 Greek Comparative Grammar (also CLASS 421) (III) (KCM)]
Fall. 4 credits. Prerequisite: thorough familiarity with classical Greek morphology. Not offered 2003-2004. A. Nussbaum.

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)]

The prehistory and evolution of the sounds and forms of classical Latin as reconstructed by comparison with the other Indo-European languages.

[LING 454 Italic Dialects (also CLASS 424) (III) (KCM)]

The phonology and morphology of Faliscan, Osco, 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. 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)]

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)]
Spring. 4 credits. Prerequisite: ability to read Homeric Greek. Not offered 2003-2004. A. Nussbaum.

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.

[LING 459 Mycenaean Greek (also CLASS 429)]
Spring. 4 credits. Prerequisite: thorough familiarity with classical Greek morphology. A. Nussbaum.

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 Sciences) (III)]
Not offered 2003-2004. For description, see COM S 474.

[LING 485 Topics in Computational Linguistics (II) (MGR)]

The 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.

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 Cognition (also COGST 501 and PHIL 501) For description, see COGST 501.

[LING 530 Representation of Structure in Vision and Language (also COGST 530 and PSYCH 530) For description, see PSYCH 530.

[LING 531 Topics in Cognitive Studies (also COGST 531 and PSYCH 531) For description, see COGST 531.

[LING 601 Topics in Phonological Theory Fall. 4 credits variable. Prerequisites: LING 301 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 2003-2004. D. Zec.
Selected topics in current morphological theory.

LING 604 Research Workshop
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 covered include grammaticalization, word order change, and the interplay between morphological and syntactic change. Assumes a basic background in syntax.

LING 606 Historical Syntax
This course surveys the literature on the acquisition of Asian languages both in first and second language. We mainly focus on Japanese, Korean, Chinese (Mandarin/ Cantonese), but other languages (Thai, Malay, Vietnamese, Burmese, Tagalog, etc.) may be dealt with, depending on faculty/student interest.

LING 610 Topics in Syntactic Theory
Fall. 4 credits variable. Prerequisite: LING 304 or permission of instructor. M. Diesing.
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, fall; 618, spring. 4 credits each term. Prerequisites: for LING 617, permission of instructor; for LING 618, LING 617 or permission of instructor. Not offered 2003–2004. Staff.
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 2003–2004. 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 2003–2004. 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 Haptañhau. Some knowledge of Sanskrit required.

LING 631 Comparative Indo-European Linguistics
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003–2004. 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. 635 not offered 2003–2004. 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.

LING 646 Old High German, Old Saxon (also GERST 658)
Spring. 4 credits. Prerequisite: LING 101. Offered alternate years. W. Harbert.
This course combines a survey of the linguistic history and structure of Old High German and Old Saxon with extensive readings from the major documents in which they are recorded. Reading knowledge of Modern German is highly recommended.

LING 648 Speech Synthesis by Rule
Investigates the nature of the acoustic structure of speech synthesis, using speech as a tool for exploring this structure. A particular acoustic model is proposed, developed, and motivated by considering the relationship between phonological and acoustic structure, speech timing, phonetic universals, coarticulation, and speech perception. The primary tool for investigation will be the Delta System, a powerful software system for investigating phonological and phonetics through speech synthesis. The course is meant for graduate students and advanced undergraduate students in linguistics, but may also be of interest to students in psychology/psycholinguistics, computer science, and cognitive sciences.

LING 649 Structure of Old English
Spring. 4 credits. Prerequisite: LING 441. Offered alternate years. W. Harbert.
Linguistic overview of Old English, with emphasis on phonology and syntax.

LING 653-654 Seminar in Southeast Asian Linguistics
Spring. 4 credits each term. Prerequisite: LING 305 or permission of instructor. LING 653 is not a prerequisite for 654. Not offered 2003–2004. Staff.
Languages of mainland Southeast Asia. Topics, chosen according to student interests, may include description, dialectology, typology, comparative reconstruction, and historical studies.

LING 655-656 Seminar in Austronesian Linguistics
Spring. 4 credits each term. Prerequisites: for LING 655, LING 101 and permission of instructor; for LING 656, LING 655. Not offered 2003–2004. Staff.
Descriptive and comparative studies of Malayo-Polynesian languages.
the important scientific developments of our science; basic training in the discipline is also 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 concentrations. For example, a double major in mathematics and computer science 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.

Further high-level mathematical courses. Any one of (a)-(f) below is sufficient. The six 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 concentration in probability and statistics is currently under consideration. Students who are interested should consult a member of the mathematics major committee or the director of undergraduate studies.

(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.
   (ii) Mathematics courses numbered 300 or above
   (iv) Economics courses with significant mathematical content. Eligible courses are ECON 319, 320, 416, 419, 450 (also ARMS 450), 467, 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, 342, 432, 455, 474 and 476. However, the student may, with the adviser'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 BIO/MTH 321, BIOE/MATH 362, BIOC 460, BIOGD 481, 484, 487, BIONB 330, 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 and combinatorics, probability and statistics, and mathematical logic. Eligible courses are MATH 311, 321, 323, 401, 413, 414, 420, 418 or 422, 424, 425, 427, 428, 431 or 435, 452 or 454, 441, 442, 451, 452, 453, 454, 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, 443, 444, 454, 480.

(f) Concentration in Operations Research: Five additional courses from (x) and (xi), 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 and Industrial Engineering in which the primary focus involves mathematical techniques. Undergraduate courses include OR&IE 320–462 excluding OR&IE 350, 414, and 416. Many Operations Research graduate courses are also allowed. Students should consult with their advisers.

5. One course dealing with mathematical models. Any course from outside mathematics with serious mathematical content and dealing with mathematical 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 116, 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 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 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.

Hons 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 required for permanent 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 Avery Solomon (Mathematics, aps5@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 no minor in mathematics; however, some other scientific departments in the college offer, within their own majors, concentrations in mathematics and mathematics-related fields. A student interested in such a concentration should consult the Director of Undergraduate Studies of his/her major department.

The Engineering College offers a minor in applied mathematics that is open to any undergraduate in that college. The minor is sponsored jointly by the Department of Mathematics and the Department of Theoretical and Applied Mechanics, and is administered by the latter department; Engineering students interested in this minor should contact Professor Richard Rand of the Department of Theoretical and Applied Mechanics (255–7145; rhr2@cornell.edu). Information about the minor is also available at www.math.cornell.edu.

The Mathematics Department welcomes into its upper-level courses students from all colleges, schools, and departments at Cornell. In particular, undergraduates who wish to pursue serious study of mathematics, whether within or to complement their own major fields, are encouraged to consult with the department. The department's Director of Undergraduate Studies and other faculty can provide assistance in selecting appropriate areas of study and individual courses.

Distribution Requirement
The mathematics courses that can be used to satisfy the Group II (Quantitative and Formal Reasoning) part of the Arts College distribution...
requirements are indicated by the symbol "(II)" next to the title of the course and those that can be used to satisfy the new Mathematics and Quantitative Reasoning Requirement are indicated by the symbol "(MQR)".

Basic Sequences

Precalculus

Description

Courses

1. Algebra and trigonometry
   to prepare students for calculus
   MATH 109* or EDUC 005*

2. Algebra, analytic geometry,
   elements of calculus
   MATH 110, EDUC 005, and EDUC 115 do not
   carry credit for graduation in the Arts College.

Special-Purpose Sequences

Description

Courses

1. Standard three-semester
   sequence for students
   who do not expect to
   take advanced courses in
   mathematics
   MATH 111-112-213

2. Calculus for engineers
   (also taken by some
discipline major students)
   MATH 190/191-192

3. Several sequences are possible
   for prospective mathematics majors and others
   who expect to take advanced courses in
   mathematics: 111-112-221-222,
   121-122-221-222, 121-122-223-224
   or some mix of these courses. Students may
   also take the engineering sequence
   MATH 190/191-192-293-294.

MATH 190 or 191 may be substituted for 111.

The two-year sequences include some linear
algebra. Students who take the 3-semester
sequence 111-112-213 may learn some linear
algebra by taking MATH 251.

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 with
similar content. Students will receive credit for
only one of the courses in each group.

106, 111, 121, 190, 191
112, 122, 192
213, 222, 224, 293
221, 251, 294
332 and 356
143 and 145
142 and 144

Credit for both MATH 332 and MATH 336
will be granted only if both were taken during
or before spring 2002 or by a mathematics
major graduating in or before spring 2003.

Note: Courses with overlapping content are
not necessarily equivalent courses. Students
are encouraged to consult a mathematics
faculty member when choosing between
them.

Fees

In some courses there may be a small fee for
photocopying materials to be handed out to
students.

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 corrections.

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: 405
General and Liberal Arts Courses: 103, 135,
171, 401, 402, 408
Analysis: 311, 413, 414, 418
Algebra and Number Theory: 332, 356, 431,
432, 433, 434, 436
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
Applied Analysis and Differential Equations:
421, 422, 422, 424, 425, 427, 428

MATH 100 Calculus Preparation

Fall. 2 transcript credits only. This course
is designed to prepare students
for MATH 111. Algebra, trigonometry,
logarithms, and exponential functions are
reviewed.

MATH 109 Precalculus Mathematics

Summer. 3 transcript credits only; cannot be
used toward graduation.

This course is designed to prepare students
for MATH 111. Algebra, trigonometry,
logarithms, and exponential functions 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

*See the list of courses with overlapping content at
the end of the introduction.
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 excellent performance in MATH 106. Those who do well in MATH 111 and expect to major in mathematics or a strongly 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 quite successful in their previous mathematics courses. The syllabus for the course is quite 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. Students planning to continue with MATH 213 are advised to take 112 instead of this course.*
The approach of this course to calculus is more theoretical than that in MATH 112. Topics covered include: differentiation and integration of elementary transcendental functions, applications 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)
Spring. 3 credits. Prerequisite: 3 years of high school mathematics. The course examines classical and modern methods of message encryption, decryption, and codeanalysis. We develop mathematical tools to describe these methods (modular arithmetic, probability, matrix arithmetic, number theory) and become acquainted with some of the fascinating history of the methods and people involved.

MATH 171 Statistical Theory and Application in the Real World (II) (MQR)
Fall, spring, summer. 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.*
This course is restricted to engineering students who have had no previous successful experience with calculus. Students who have had such experience but with a first-semester calculus course should take MATH 191. Course topics include: plane analytic geometry, differential and integral calculus, and applications.

MATH 191 Calculus for Engineers (II) (MQR)
Fall, spring, summer. 4 credits.
Prerequisite: 3 years of high school mathematics including trigonometry and logarithms, plus some knowledge of calculus.*
MATH 191 covers essentially the same topics as 190, but is designed for students with some previous successful experience with calculus. Course topics include: plane analytic geometry, differential and integral calculus, and applications.

MATH 192 Calculus for Engineers (II) (MQR)
Fall, spring, summer. 4 credits.
Prerequisite: MATH 190 or 191.*
Course topics include: polar coordinates, infinite series, and power series. Also covered are: vectors and calculus of functions of several variables through double and triple integrals.

MATH 213 Calculus III (II) (MQR)
Fall, spring. 4 credits. Prerequisite: MATH 112, 122, or 192.*
This course is designed for students who wish to master the basic techniques of calculus, but whose major will not require a substantial amount of mathematics. Course topics include: vectors and vector-valued functions; multivariable and vector calculus including multiple and line integrals; first- and second-order differential equations with applications; systems of differential equations; and elementary partial differential equations. The course may emphasize different topics in the syllabus in different semesters.

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.*
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 223–224 provides an integrated treatment of linear algebra and multivariable calculus designed for students who have been highly successful in their previous calculus courses. Course topics include: vectors, matrices, and linear transformations; differential calculus of functions of several variables; inverse and implicit function theorems; quadratic forms, extremum, and manifolds; multiple and iterated integrals.

MATH 224 Theoretical Linear Algebra and Calculus (II) (MQR)
Spring. 4 credits. Prerequisite: MATH 223.*
Course topics include: vector fields; line integrals; differential forms and exterior derivative; work, flux, and density forms; integration of forms over parameterized domains; and Green’s, Stokes’, and divergence theorems.

MATH 231 Linear Algebra (II) (MQR)
Spring. 3 credits. Prerequisite: MATH 111 or equivalent.* Students interested in the mathematics major should take MATH 221 or 292.*
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 Elementary Probability for Applications (II) (MQR)
Spring. 3 credits. Prerequisites: 1 semester of calculus
An introduction to probability emphasizing applications. The course begins with basics: combinatorial probability, mean and variance, independence, conditional probability, and Bayes’ formula. The law of large numbers and central limit theorem are stated and their implications for statistics are discussed. The course concludes with a discussion of Markov chains and their applications.

MATH 281 Deductive Logic (also PHIL 331) (II) (MQR)
Fall. 4 credits.
For description, see PHIL 331.

*See the list of courses with overlapping content at the end of the introduction.

MATHEMATICS 587
MATH 293  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 product spaces; applications include brief introductions to difference equations, Markov chains, and systems of linear ordinary differential equations. May include computer use in solving problems.

MATH 294  Engineering Mathematics (II)  (MQR)
Fall, spring, summer. 4 credits. 
Prerequisite: MATH 192.*
The conclusion 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.

MATH 311  Introduction to Analysis (II)  (MQR)
Spring. 4 credits. Prerequisites: MATH 221–222, 223–224 or 293–294.
Provides a transition from calculus to real analysis. Topics include: rigorous treatment of fundamental concepts in calculus; including limits and continuity of sequences and series, compact sets; uniform continuity and differentiability of functions. Emphasis will be placed upon understanding and constructing mathematical proofs.

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.
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 will investigate manifolds and the structures that they are endowed with, such as tangent vectors, boundaries, orientations, and differential forms. A differential form encompasses such ideas as surface and volume forms, the work exerted by a force, the flow of a fluid, and the curvature of a surface, space, or hyperspace. We will re-examine the integral theorems of vector calculus (Green, Gauss and Stokes) in the light of differential forms and apply them to problems in partial differential equations, topology, fluid mechanics, and electromagnetism.

MATH 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 of and techniques in both ordinary and partial differential equations. (Fuller introductions are given in MATH 427 and 428.) Topics for ordinary differential equations may include: initial-value and two-point boundary value problems, the basic existence and uniqueness theorems, continuous dependence on data, stability of fix-points, numerical methods, special functions. Topics for partial differential equations may include: the Poisson, heat and wave equations, boundary and initial-boundary value problems, maximum principles, continuous dependence on data, separation of variables, Fourier series, Green's functions, numerical methods, transform methods.

MATH 332  Algebra and Number Theory (II)  (MQR)
Fall, summer. 4 credits. Prerequisite: MATH 221, 223, 231 or 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 336  Applicable Algebra (II)  (MQR)
Spring, summer. 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 theory of groups, rings and fields and their applications to such areas as public-key cryptography, error-correcting codes, parallel computing, and experimental designs. Applications include the RSA cryptosystem and use of finite fields to construct error-correcting codes and Latin squares. Topics include elementary number theory, Euclidean algorithm, prime factorization, congruences, theorems of Fermat and Euler, elementary group theory, Chinese remainder theorem, factorization in the ring of polynomials, and classification of finite fields.

MATH 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 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: symmetry groups, 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)  (II)  (MQR)
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 requirement for the Biological Sciences major or equivalent.
For description, see BIOEE 362.

MATH 401  Honors Seminar: Topics in Modern Mathematics (II)  (MQR)
Spring. 4 credits. Prerequisite: Two 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 (i.e., pure or applied mathematics, physical or biological sciences, business and industry, medicine). The content varies from year to year.

MATH 403  History of Mathematics (II)  (MQR)
Spring. 4 credits. Prerequisite: 2 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.
The purpose of this course is for students to step back and form an overview of the mathematics they have learned. The course is intended for junior and senior mathematics majors and other undergraduates with strong backgrounds in mathematics. Subjects will be chosen based on their interest for prospective high school teachers.

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 who do not intend to take MATH 414 are encouraged to take MATH 413 in the spring.
This course provides an introduction to the rigorous theory underlying calculus, covering the real number system and functions of one variable. The course is entirely based 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.

*See the list of courses with overlapping content at the end of the introduction.

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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 requirement for the Biological Sciences major or equivalent.
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This course provides an introduction to the rigorous theory underlying calculus, covering the real number system and functions of one variable. The course is entirely based 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.

*See the list of courses with overlapping content at the end of the introduction.
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 (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 213 and 231.
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. A full understanding of both topics requires a background involving Lebesgue integration theory and functional analysis. This course presents as much as possible on both topics without such formidable prerequisites. The emphasis is on clear statements of results and key ideas of proofs, working out examples, and applications. Related topics that may be included in the course: 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 and one course numbered 300 or higher in mathematics, or permission of instructor. Generally offered every two years.
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 topics 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 427 Introduction to Ordinary Differential Equations (II) (MQR)
Fall. 4 credits. Prerequisite: MATH 221-222, 223-224, or 293-294 or permission of instructor.
This course covers the basic existence, uniqueness, and stability theory together with methods of solution and methods of approximation. Topics include singular points, series solutions, Sturm-Liouville theory, transform methods, approximation methods, and application to physical problems.

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, 335, 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 assignments 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, 335, 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 principal ideal domains, fields, and Galois theory. The course emphasizes understanding the theory with proofs in both homework and exams. An optional computational component using the computer language GAP is available. A less theoretical course that covers similar subject matter is MATH 432.

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 application. 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 some 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)
Spring. 4 credits. Prerequisite: MATH 221, 223, 231, or 294. Generally offered every two years.
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 its application, as well as

*See the list of courses with overlapping content at

- MATHEMATICS 589

- MATH 414 Honors Introduction to Analysis (II) (MQR)

- MATH 420 Differential Equations and Dynamical Systems (II) (MQR)

- MATH 422 Applied Complex Analysis (II) (MQR)

- MATH 424 Wavelets and Fourier Series (II) (MQR)

- MATH 425 Numerical Analysis and Differential Equations (II) (MQR)

- MATH 427 Introduction to Ordinary Differential Equations (II) (MQR)

- MATH 428 Introduction to Partial Differential Equations (II) (MQR)

- MATH 431 Linear Algebra (II) (MQR)

- MATH 432 Introduction to Algebra (II) (MQR)

- MATH 433 Honors Linear Algebra (II) (MQR)

- MATH 434 Honors Introduction to Algebra (II) (MQR)

- MATH 441 Introduction to Combinatorics I (II) (MQR)

- MATH 442 Introduction to Combinatorics II (II) (MQR)
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 can be understood within the structure of projective geometry. Topics in hyperbolic geometry include: models of the hyperbolic plane and relations to spherical geometry. Topics in projective geometry include: homogeneously 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 Moebius 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 453 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. Not offered 2003–2004. 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 multivariable 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 in the course include parameter estimation, hypothesis testing, and linear regression. The course emphasizes both the mathematical theory of statistics as well as 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 225 and preferably some additional course involving proofs in mathematics, computer science, or philosophy. Generally offered every two years. Not offered 2003–2004. A first course in mathematical logic providing precise definitions of the language of mathematics and the student's ability to write proofs (propositional and predicate logic). The completeness theorem says that we have all the rules of proof we could ever have. The Gödel incompleteness theorem says that they are not enough to decide all statements even about arithmetic. The compactness theorem exploits the finiteness of proofs to show that theories have unintended (nonstandard) models. Possible additional topics: the mathematical definition of an algorithm and the existence of noncomputable functions; the basics of set theory to cardinality and the uncountability of the real numbers.

**MATH 482 Topics in Logic (also PHIL 432) (II) (MQR)**
Fall. 4 credits. Prerequisite: 1 logic course from the Mathematics Department at the 200 level or higher. A survey course from the Philosophy Department at the 300 level or higher, or permission of the instructor. Not offered 2003–2004. 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 or the Mathematics Department, or permission of instructor. Not offered 2003–2004. 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, 434, 436, 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; topos, data types, 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.

**Professional Level and Mathematics Education Courses**

**MATH 500 College Teaching**
Fall, meets alternate weeks. 1 credit. Prerequisite: graduate student standing or permission of instructor. Among the topics covered: basic topics about teaching, such as how to plan recitations, how to prepare lesson plans for lectures, exam design and grading, syllabus planning. Also discussed: the structure of colleges and universities, jobs and tenure, professionalism, alternative teaching strategies.

**MATH 505 Educational Issues in Undergraduate Mathematics**
Spring. 4 credits. Prerequisite: graduate student standing or permission of instructor. Generally offered every two years. 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 school teachers, 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 Practices**
Spring. 4 credits. This course provides direct experience of new approaches, curricula and standards in mathematics education. Discussion of articles, activities for the secondary classroom and videotape of classroom teaching is tied to in-class exploration of math problems. Experience in the computer lab, examining software environments and their use in the mathematics classroom is included.

Participants are expected to write short papers, share ideas in class and present their opinions on issues.
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, spring. 4 credits. 613 not offered 2003-2004.

MATH 615 Mathematical Methods in Physics

Fall. 4 credits. Intended for graduate students in physics or related fields who have had 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, separation of variables 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 partial differential equations, and Sturm-Liouville problem in quantum mechanics. Math 614, spring. 4 credits. Not offered every year. Course covers basic theory of Hilbert and Banach spaces and operations on them. Applications.

MATH 622 Applied Functional Analysis

Spring. 4 credits. Not offered every year. Course covers measure theory, integration, and Lp spaces.

MATH 628 Complex Dynamical Systems

Spring. 4 credits. Prerequisite: MATH 418. Not offered every year. Various topics in the dynamics of analytic mappings in one complex variable, such as Julia and Fatou sets, the Mandelbrot set, Ma-w-Sullivan’s theorem on structural stability. Also covers: local theory, including repulsive cycles and the Yoccoz inequality, parabolic points and Ecalle-Voronin invariants, Siegel disks and Yoccoz’s proof of the Siegel-Bruno theorem; quasi-conformal mappings and surgery; Sullivan’s theorem on non-wandering domains, polynomial-like mappings and renormalization, Shishikura’s construction of combinatorial sunflowers, 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, commutative rings, introduction to affine algebraic geometry, multilinear algebra. 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 634 Algebra


MATH 649 Lie Algebras

Fall. 4 credits. Generally offered every two years. Not offered 2003-2004. Topics include: nilpotent, solvable and reductive Lie algebras; enveloping algebras; root systems; Coxeter groups; and classification of simple algebras.

MATH 650 Lie Groups

Fall. 4 credits. Generally offered every two years. Course topics include: topological groups, Lie groups; relation between Lie groups and Lie algebras, exponential map, homogeneous manifolds, and invariant differential operators.

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 focusses on verification of the Eilenberg-Steenrod axioms and on effective methods of calculation such as simplicial and cellular homology and Mayer-Vietoris sequences. If time permits, the cohomology ring of such spaces may be introduced.

MATH 652 Differentiable Manifolds I

Fall. 4 credits. Prerequisite: 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. Prerequisite: MATH 652 or equivalent. Generally offered every 3-4 years. Not offered 2003-2004. Advanced topics from differential geometry and differential topology selected by instructor. Examples of eligible topics include: transversality, cobordism, Morse theory, classification of vector bundles and principal bundles, characteristic classes, microlocal analysis, conformal geometry, geometric analysis and partial differential equations, and Atiyah-Singer index theorem.

MATH 661 Geometric 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 662 Riemannian Geometry

covariant differentiation and curvature tensors; the exponential map, the Gauss Lemma and completeness of the metric; isometries and space forms, Jacobi fields and the theorem of Cartan-Hadamard; the first and second variation formulas; the index form of Morse and the theorem of Bonnet-Meyer; 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**

Spring, 4 credits. Prerequisites: MATH 671 and OR&IE 670 or permission of instructor. Topics include: an introduction to the theory of probability and statistics, including: probability, random variables, expectation and moments, independence, Borel-Cantelli lemma, zero-one law; convergence of random variables, probability spaces, sample space, random variables, and distribution functions; expectation and moments, independence, Borel-Cantelli lemma, zero-one law; convergence of random variables, probability measures, and characteristic functions; law of large numbers; central limit theorems for sums of independent random variables; Markov chains, recurrent events; ergodic and renewal theorems; Martingale theory; and Brownian motion, and processes with independent increments.

**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, sufficiency, and the method of maximum likelihood. Basic concepts of decision theory are discussed; asymptotic methods are introduced and developed in detail. The course is coordinated with OR&IE 670 to form the second half of a one-year course in mathematical statistics.

**MATH 675 Statistical Theories Applicable to Genomics**

Fall. 4 credits. 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 Bonferroni correction), family-wise error rate, false discovery rate (FDR) of Benjamini and Hochberg, and Storey's papers relating to pFDR. We also discuss the large sample theory 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 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 on permutation tests, bootstrapping, and QTIL 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. Other topics as time permits.

**MATH 703 Topics in the History of Mathematics**

Spring. 4 credits. Prerequisites: undergraduate algebra and analysis. Generally offered every two years. Topics in the history of modern mathematics at the level of F. Klein's *Evolution of Mathematics in the 19th Century*, J. Dieudonne's *Abrege D'Histoire Des Mathematiques 1700–1900*, and G. Birkhoff's *Source Book of Classical Analysis*.}

**MATH 711–[712] Seminar in Analysis**


**MATH 713 Functional Analysis**


**MATH 715 Fourier Analysis**


**MATH 717 Applied Dynamical Systems (also T&AM 776)**

Spring. 4 credits. Suggested prerequisite: T&AM 675; MATH 671, or equivalent. Generally offered every two years. Course topics include: review of planar (single-degree-of-freedom) systems; local and global analysis; structural stability and bifurcations in planar systems; center manifolds and normal forms; the averaging theorem and perturbation methods; Melnikov's method; discrete dynamical systems, maps and difference equations, homoclinic and heteroclinic motions; the Smale Horseshoe and other complex invariant sets; global bifurcations, strange attractors, and chaos in free and forced oscillator equations; and applications to problems in solid and fluid mechanics.

**MATH 722 Topics in Complex Analysis**

Fall. 4 credits. Not offered every year. Not offered 2003–2004. Selections of advanced topics from complex analysis, such as Riemann surfaces, complex dynamics, and conformal and quasiconformal mapping. Course content varies.

**MATH 728 Seminar in Partial Differential Equations**

Spring. 4 credits. Generally offered every two years.

**MATH 731–732 Seminar in Algebra**

Fall, 731; spring, 732. 4 credits each.

**MATH 735 Topics in Algebra**

Fall. 4 credits. Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

**MATH 737 Algebraic Number Theory**

Fall. 4 credits.

**MATH 739 Topics in Algebra**

Fall, spring. 4 credits. Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

**MATH 740 Homological Algebra**


**MATH 751–752 Berstein Seminar in Mathematics**


**MATH 753 Algebraic Topology**

Spring. 4 credits. The continuation of 651. The standard topics covered in this course most years are homology, cup products, Poincaré duality, and homotopy theory. Other possible topics include fiber bundles, fibrations, vector bundles, and characteristic classes. The course may sometimes be taught from a differential forms viewpoint.

**MATH 755–756 Topology and Geometric Group Theory Seminar**

755, fall; 756, spring. 4 credits each.

**MATH 757–758 Topics in Topology**

757, fall; 758, spring. 4 credits each. Selection of advanced topics from modern algebraic, differential, and geometric topology. Course content varies.

**MATH 761–762 Seminar in Geometry**

761, fall; 762, spring. 4 credits each. Either 761 or 762 generally offered every year.

**MATH 767 Algebraic Geometry**

Fall. 4 credits.

**MATH 771–772 Seminar in Probability and Statistics**

771, fall; 772, spring. 4 credits each.

**MATH 774 Asymptotic Statistics**

Fall. 4 credits. Prerequisites: probability theory (MATH 671–672 or equivalent), containing stochastic processes) and statistics (MATH 472 or MATH 674). Not offered 2003–2004. Introduction to asymptotic statistical decision theory and to empirical stochastic processes. Course covers: the notion of experiment, reduction by sufficiency, equivalence classes, the Le Cam delta distance, local asymptotic normality and minimaxity, optimal rates of convergence, white noise models, the Pincherle bound, and Gaussian approximation of nonparametric experiments. Topics in empirical processes include coupling theorems, some probability metrics, entropy conditions, functional limit theorems, and Hungarian constructions.

**MATH 777–778 Stochastic Processes**

777, fall; 778, spring. 4 credits each.

**MATH 781–782 Seminar in Logic**

781, fall; 782, spring. 4 credits each.

**MATH 783 Model Theory**

Spring. 4 credits. Generally offered every two years. An introduction to model theory at the level of the books by Hodges or Chang and Keisler.

**MATH 784 Recursion Theory**

Fall. 4 credits.

**MATH 797–798 Topics in Applied Logic**

797, fall; 798, spring. 4 credits each.

**MATH 798 Topics in Applied Logic**

Fall. 4 credits. Not offered 2003–2004. This course covers applications of the results and methods of mathematical logic to other
areas of mathematics and science. Topics vary each year; some recent examples are: automatic theorem proving, formal semantics of programming and specification languages, linear logic, constructivism (intuitionism), nonstandard analysis. Students are expected to be familiar with the standard results in graduate level mathematical logic.

**MEDIEVAL STUDIES**


**Undergraduate Study in Medieval Studies**

Coursework in Medieval Studies enhances the student's environment and understanding of the artistic and material relics of the Middle Ages: Gregorian chant, manuscripts and stained glass windows, Gothic cathedrals, Crusader castles, and picturesque towns crammed 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 popes, fear of demons and djinns, and the reassuring presence of angels. You can study all this 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 in 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, **Quedlibet**, that arranges 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 a time span from roughly the fifth century into the sixteenth and ranges from Western Europe and the Mediterranean to China and Japan. To discover the vibrant state of medieval studies today, look at the extraordinary range of scholarly, but accessible, web sites that have sprung up all over the Internet. (You can start from *Cornucopia* noted below.) Cornell possesses a wealth of resources to introduce students to every corner of the field.

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. Many students feel bound to choose their majors with an eye to future careers and earning potential. 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, 255-4545, 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 lively and informative when read in the original, and Cornell fortunately offers many courses for students interested in acquiring the relevant skills: Classical Arabic, Medieval Hebrew, Medieval Latin, Classical Chinese, Classical Japanese, Old English, Middle English, Gothic, Old Saxon, Old High German, Middle High German, Old Norse-Icelandic, Old Irish, Middle Welsh, Old Occitan (Provençal), Old French, Medieval Spanish, Medieval Italian, Old Russian, and Old Church Slavonic.

Some medieval languages require study of a modern language (e.g., French for Old Occitan and Old French) or a classical language (Classical Latin for Medieval Latin) as background. Students interested in a concentration in Medieval Studies should begin the study of a medieval language as early as possible, so that they may be able to study texts in the original before they graduate. Students are advised to consult the sponsoring departments for information about the prerequisites for various medieval languages.

### Graduate Study

The Medieval Studies Program offers both an interdisciplinary and a literary comparative Ph.D. in Medieval Studies. Disciplinary fields of concentration offered within the Field of Medieval Studies are: Medieval Archaeology, Medieval History, Medieval History of Art, Medieval Literature, Medieval Music, Medieval Philology and Linguistics, and Medieval Philosophy. Information about the graduate program in Medieval Studies is contained in the catalog of the Graduate School, in a brochure on Medieval Studies available from the field coordinator, and at *Cornucopia*, the program's web site, www.arts.cornell.edu/medieval.

### Medieval Studies Courses: Graduate and Undergraduate

Courses in various aspects of Medieval Studies are offered every year in several cooperating departments, including Art History, Asian Studies, Classics, Comparative Literature, English, German Studies, History, Linguistics, Music, Near Eastern Studies, Philosophy, Romance Studies, Russian Literature, and by the Society for the Humanities. The current year's offerings are:

**ART H 355 Romanesque and Early Gothic Art and Architecture: Europe and the Mediterranean, 900–1150**

A.D. (also NES 359)

Fall. 4 credits. C. Robinson.

**CHLIT 213–214 Introduction to Classical Chinese**

213, fall; 214, spring. 4 credits each term. D. Zhang.

**CHLIT 307 Readings in Classical Chinese Literature**

Fall. 4 credits. D. X. Warner.

**CLASS 679 Graduate Seminar in Latin Paleography**

Fall. 4 credits. R. Ziomkowski.

**COM L 350 Renaissance Literature**

Spring. 4 credits. W. J. Kennedy.

**COM L 452/652 Renaissance Poetry**

Spring. 4 credits. W. J. Kennedy.

**ENGL 311/611 Old English**

Fall. 4 credits. T. Hill.

**ENGL 312/611 Beowulf**

Spring. 4 credits. R. Farrell.

**ENGL 319 Chaucer**

Fall. 4 credits. R. Farrell.

**ENGL 321 Spenser and Malory**

Fall. 4 credits. C. Kaske.

**ENGL 404/640 Paleography, Bibliography, and Reception History**

Spring. 4 credits. A. Galloway.

**ENGL 615 Medieval Writers and the City**

Spring. 4 credits. A. Galloway.

**ENGL 619 Chaucer**

Fall. 4 credits. W. Wetherbee.

**FRLIT 448 Medieval Literature: Romances and Lyrics**

Spring. 4 credits. A. Colby-Hall.

**GERST 410/610 Senior Seminar: Early Modern City Culture**

Fall. 4 credits. A. Groos.

**HIST 151 Introduction to Western Civilization, Part I**

Fall. 4 credits. P. Hyams and K. Graubart.

**HIST 210 The Government of God**

Spring. 4 credits. O. Falk.

**HIST 259 The Crusades**

Spring. 4 credits. P. Hyams.

**HIST 277 The Later Middle Ages**

Spring. 4 credits. O. Falk.

**HIST 293 History of China up to Modern Times**

Fall. 4 credits. C. Peterson.

**HIST 320 The Viking Age**

Fall. 4 credits. O. Falk.
MODERN EUROPEAN STUDIES CONCENTRATION

Susan Tarrow, coordinator

Students from any college may choose an undergraduate concentration in Modern European Studies to complement any major in any college. The purpose of the concentration is to provide a coherent structure for students with an interest in interdisciplinary study in the field of European studies.

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:

   - GOVT 341/SOC 341: Modern European Society and Politics
   - COM L 364: The European Novel
   - ANTHR 450: The Anthropology of Europe

Under certain conditions, students may be permitted to substitute other courses for those listed above.

3) Completion of one course in modern (post-1789) European history.

4) Two additional courses in any of the three areas, which may include a senior seminar (400 level).

a) Courses in European and comparative politics, anthropology, sociology, women's 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, fine arts, architecture, music, philosophy, film and theatre arts, and women's studies.

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. All concentrators are encouraged to participate in the Language House Program, and to spend a semester or more in a program of study in Europe. Courses taken abroad may be applied to the concentration if they are approved for Cornell credit.

Undergraduates in the College of Arts and Sciences can major in European Studies through the Independent Major or College Scholar programs.

Departmental advisers include: D. Greenwood (anthropology); C. Otto (architecture); I. Abel (College Scholars, Independent Majors); S. Christopherson (CRP); G. Fields (economics); D. Schwarz (English); A. Schwarz (German studies); J. Pontusson (government); J. Weiss (history); C. Rosen (linguistics); M. Suher (linguistics); N. Zaslaw (music); S. Tarrow (sociology); G. Shapiro (Russian literature); S. G. Tarrow (sociology); D. Bathrick (theatre, film, dance)

For a complete list of relevant courses and seminars, and any further information, contact Susan Tarrow, coordinator of the Modern European Studies Concentration, at the Institute for European Studies, 120 Uris Hall (telephone 255-7592, e-mail SRT2@cornell.edu) and visit the web site at www.einaudi.cornell.edu/Europe.
MUSIC


Department office: 255-4097
Department web site: www.arts.cornell.edu/music

Musical Performance and Concerts

Musical performance is an integral part of Cornell's cultural life and an essential part of its undergraduate academic programs in music. The department encourages music-making through its offerings in individual instruction and through musical organizations and ensembles that are directed and trained by members of the faculty. Students from all colleges and departments of the university join with music majors in all of these ensembles:

Vocal ensembles
- Chamber Singers
- Chorale
- Chorus
- Glee Club
- Sage Chapel Choir

Instrumental ensembles
- Chamber Music Ensembles
- Chamber Orchestra
- Symphony Orchestra
- Jazz Ensembles
- Jazz Chamber Ensembles
- Chamber Winds
- Symphonic Band
- Wind Ensemble
- Wind Symphony
- Gamelan
- Middle Eastern Ensemble
- World Drumming Group
- Steel Band

Information about requirements, rehearsal hours, and conditions for academic credit can be found in the following listings for the Department of Music. Announcements of auditions are posted during registration each fall term and, where appropriate, each spring term as well.

The university is also home to many student-run musical organizations, including the Big Red Marching Band and Big Red Pep Band, the Cornell Savoyards, and several a cappella groups. Information about these groups, too, is available through the Department of Music office, 101 Lincoln Hall (255-4097).

The Department of Music and the Faculty Committee on Music sponsor more than 100 formal and informal concerts each year by Cornell's ensembles, faculty, and students. By distinguishing among various groups. The great majority of concerts are free and open to the public. Lectures and concerts are listed on the web (www.arts.cornell.edu/music/).

Additional information is available through the events office (255-4760).

Nonmajors

In addition to its performing, instructional, and concert activities, the department offers numerous courses for nonmajors, many of which carry no prerequisites and presuppose no previous formal training in music. Consult the following course listings, and for further information, consult the department office, 101 Lincoln Hall (255-4097), or Prof. R. Sierra, the director of undergraduate studies (255-3663).

The Major

The major carries the study of music to an advanced level through the integration of performance, music theory, and music history. It is designed to accommodate both students who are oriented toward eventual graduate or professional work in music and those who wish to take a more general approach, often in conjunction with a major in another department.

Students contemplating a major in music should arrange for placement examinations and advising in the department as early as possible preferably during the freshman orientation period. Information is available from the director of undergraduate studies. Prerequisites for admission to the major are completion of MUSIC 152 and 154, at the latest by the end of the sophomore year (the freshman year is preferable), with an overall grade of B- or better in each course.

In consultation with the director of undergraduate studies, students are expected to have chosen a minor from among the department faculty before acceptance into the major; admission to the major is decided by the faculty as a whole. Students majoring in music then design their course of study with their adviser.

Music majors must complete the Core Curriculum plus at least two electives. The Core Curriculum serves as the basis for focus in specific areas, such as composition, performance, music theory, and ensembles. Western art music, or Asian music. Students may, however, choose electives that reflect a more broadly-based study. Those intending to pursue graduate study or professional work in music are advised to take further courses in addition to the two required electives.

The Core Curriculum consists of courses:

1) in music theory: MUSIC 251, 252, 253, 254
2) in music history: MUSIC 207, 208, 300, 400
3) in performance: four semesters of performance (MUSIC 321-322, 323-324) or in organizations and ensembles (MUSIC 331 through 346 and 421 through 448).

Electives: at least eight credits from the following:

1) in music theory: courses among the theory listings at the 300-level or above
2) in music history: courses above and including MUSIC 374
3) in performance: MUSIC 321, 322, 323, 324

Honors. The honors program in music is intended to provide special distinction for the department's ablest undergraduate majors. Qualified students are invited to become candidates by the faculty early in the second semester of their junior year. As soon as possible thereafter, the student forms a committee of three or more faculty members to guide and evaluate the honors work. In their senior year, candidates enroll in MUSIC 401-402 with the chair of the honors committee as instructor. Candidates are encouraged to formulate programs that allow them to demonstrate their musical and scholarly abilities, culminating in an honors thesis, composition, or recital. To be presented not later than April 1 of the senior year. A comprehensive examination administered by the candidate's committee is held not later than May 1. The level of honors conferred is based primarily on the candidate's performance in the honors program, and secondarily on the candidate's overall record in departmental courses and activities.

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, 323-324) or in organizations and ensembles (MUSIC 331 through 346 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 (MUSIC 321-322, 323-324) or up to four credits earned in organizations and ensembles (MUSIC 331 through 346 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 130,000 periodicals, books, scores, and parts; 55,000 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 uses), 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-century keyboard and chamber music, seventeenth- and eighteenth-century books on music, and an archive of American popular song from 1850 to 1900. In addition, the Carl A. Kroch Library houses, in the Division of Rare and Manuscript Collections, a collection 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 (about 1,400), Sage Chapel (about 800), and Barnes Hall Auditorium (about 280).

Rehearsal Spaces. Departmental ensembles rehearse primarily in Lincoln Hall, Barnes Hall, and Sage Chapel. Practice studios in Lincoln Hall are available for individual practice by pianists, vocalists, and
instrumentalists who are members of the Cornell community.

Thirty-four grand pianos and 17 upright or studio pianos are housed in Cornell's offices, classrooms, and rehearsal spaces. Six concert grand pianos are available for performances in the various concert halls, plus the following historical keyboard instruments: a modern copy of an eighteenth-century fortepiano by Johann Andreas Stein, a new fortepiano by Robert McNulty, a Broadwood grand piano from 1827, an 1824 Conrad Graf fortepiano replica, an 1810 Erard grand, one Dowd and one Hubbard harpsichord, and a Challen clavichord. Four distinctive organs are available to qualified individuals for lessons and practice: a small Italian organ (1746) and a two-manual mechanical action instrument (1972), both in Anabel Taylor Chapel; a three-manual symphonic organ (1941) in Sage Chapel; and an eighteenth-century German-style chamber organ (2003) in Barnes Hall.

Digital Music Program Workstations. There are four Power Macintosh workstations available for qualified students. Two are project/entry-level studios that use Digital Performer, SoundDiver, Peak, Reason, and other software packages. The MIDI hardware includes a Proteus 2000, Korg OSR/W, Access Virus b, and an Alesis QS8.1 keyboard controller. The other two workstations are more advanced. In addition to the software above, they use Final Cut Pro and Pro Tools. The MIDI hardware includes an E-Mu Platinum Sampler, a Novation SuperNova II, and a Kurzweil K2600 (with sampling) keyboard controller. Also included are several plug-in packages.

Introductory Courses

MUSIC 100 Elements of Musical Notation Fall or spring, weeks 2-5. 1 credit. Prerequisite: concurrent enrollment in any 3-credit course in music and permission of instructor. Staff. 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 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 I: Asia and the Americas (also LSP 100) @ (IV) (CA) Spring. 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 @ (IV) (CA) Fall. 3 credits. No previous training in music required. Not offered 2003-2004. M. Hatch. Exploration of folk, popular, and traditional musical genres from South, Southeast, and East Asia. 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 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 fundamental 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 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 elements of modal and tonal music: rhythm, scales, intervals, triads; melodic principles and 2-part counterpoint; diatonic harmony and 4-part voice leading; basic formal structures. Study engages different repertories, 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. A grade of 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. Sight singing: diatonic melodies in treble, alto, and bass clefs. Keyboard: scales, triads, seventh chords, short diatonic melodies; short diatonic chorale phrases. Score reading: 2 parts using treble, alto, and bass clefs. Musical terms: tempo markings and rhythmic terminology.

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 chord progressions 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. J. Webster. Continuation of diatonic and introduction to chromatic harmony; species counterpoint; composition in small forms.

MUSIC 252 Tonal Theory IV (IV) (LA)  
Spring. 3 credits. Prerequisites: MUSIC 251 and 253 or equivalent, and concurrent enrollment in MUSIC 254. K. Taavola. Study of and composition in larger forms, including sonata form; systematic study of chromatic harmony, voice-leading, and modulation; composition in chromatic style.

MUSIC 253 Musicianship III  

MUSIC 254 Musicianship IV  
Spring. 2 credits. Prerequisite: concurrent enrollment in or previous credit for MUSIC 252. K. Taavola. Sight singing: melodies in 4 clefs, including modality and chromatic modulation. Keyboard: chromatic sequences, chromatic modulations, improvised modulations employing diatonic pivot chords. Dictation: intervals, rhythms, short melodies, and short, diatonic chorale phrases. Score reading: 4 parts, including transposing instruments. Musical terms: other terms in French, German, and Italian.

MUSIC 358 Improvisational Theory (IV) (LA)  
Spring. 4 credits. Prerequisite: MUSIC 152 or permission of instructor. Not offered 2003–2004. P. Merrill. Study of tonal concepts in jazz improvisation including major and minor modes; rhythmic motif development; swing feel; even eighth-note feel; phrase construction; chordal style; linear style; arranging and ear development through performance, analysis, keyboard skill, transcription, and composition.

MUSIC 451 Counterpoint  
Spring. 4 credits. Prerequisite: MUSIC 251 or permission of instructor. S. Stucky. Composition in the polyphonic vocal style of the late Renaissance.

MUSIC 452 Topics in Music Analysis (also MUSIC 602)  
Spring. 4 credits. Prerequisite: MUSIC 251 or permission of instructor. Not offered 2003–2004. J. Webster. A survey of important analytical approaches to tonal music, including thematic-motivic relations; harmonic, large-scale paragraph construction, structural and modal voice-leading, and relations among the movements in a multiform work.

MUSIC 454 Composition (IV) (LA)  
Fall. 4 credits. Prerequisite: MUSIC 251 or permission of instructor. R. Sierra. Study of music composition through the use of traditional forms such as variation and sonata. The student is required to write original pieces for solo and chamber ensembles.

MUSIC 455 Conducting (IV) (LA)  
Spring. 4 credits. Prerequisite: MUSIC 251 or permission of instructor. S. Tucker. Covers fundamentals of score reading, score analysis, rehearsal procedures and conducting technique; instrumental and choral conducting.

MUSIC 456 Orchestration (IV) (LA)  

MUSIC 457 20th-Century Musical Languages (IV) (LA)  
Fall. 4 credits. Prerequisite: MUSIC 252 and 254. Not offered 2003–2004. K. Taavola. This course examines the diverse compositional structures and styles of the Twentieth Century, developing student's skills through listening, analysis, improvisation, and short compositional assignments, as well as supplementary readings. Beginning with the expanded tonal languages of Wagner, Prokofiev, and Liszt, the course covers the modal, atonal, and serial techniques developed in the first half of the century by Debussy, Bartok, Schoenberg, Varese, Stravinsky, and others. Post-1945 use of these compositional styles will be compared and contrasted with such musical trends as minimalism, experimentalism, and atonal and microtonal approaches.

MUSIC 458 Jazz Arranging (IV) (LA)  
Spring. 4 credits. Prerequisite: MUSIC 251 or permission of instructor. P. Merrill. A survey of jazz arranging techniques for the big band, including basic jazz calligraphy; four-part close, drop two, and drop four voicings; rhythm section writing; standard chord nomenclature; chord scale relationships; chordal and rhythmic variation; section writing, standard formal structures; riff style; lead line; and counterpoint through analysis and composition.

Music in History and Culture

MUSIC 221 History of Rock Music (also AM ST 223) (IV) (LA)  
Fall. 3 credits. No previous training in music required. J. Peraino. This course examines the development and cultural significance of rock music from its origins in blues, gospel, and Tin Pan Alley up to present-day genres of alternative rock and hip hop.

MUSIC 222 A Survey of Jazz (also AM ST 222) (IV) (LA)  
Fall. 3 credits. Not offered 2003–2004. S. Pond. This course addresses jazz from two perspectives: the various sounds of jazz, as well as the historical streams—musical and cultural—which have contributed to its development. The historical focus locates jazz as an expression of culture. We investigate how jazz affects and is affected by notions of ethnicity, class, nationalism, gender, art, and genre. We examine what has changed over time and try to understand why. Throughout we focus our inquiry through listening to recordings, studying writings about music by musicians and nonmusicians, learning to listen with new ears, experiencing jazz hands-on, and collaborating to add to the body of literature on jazz.

MUSIC 245 Gamelan in Indonesian History and Cultures (also ASIAN 245) (IV) (LA)  
Fall or spring. 3 credits. Permission of instructor. No previous knowledge of musical notation or performance experience necessary. M. Hatch. An introduction to Indonesia through its art. Elementary techniques of performance on the Javanese gamelan, a graphic introduction to Indonesian history and cultures, and the socio-cultural contexts for the arts there. Several short papers and one longer research report are required.

MUSIC 261 Bach and Handel (IV) (LA)  
Fall. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 2003–2004. D. Yeasley. Bach's music, product of a provincial life, and Handel's music, product of a cosmopolitan life, are compared. Genres studied include works for keyboard instruments, chamber music, concertos, cantatas, operas, oratorios, anthems, and oratorios.

MUSIC 262 Haydn and Mozart (IV) (LA)  
Fall. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. J. Webster. A survey of the lives, works, and historical roles of Joseph Haydn and Wolfgang Amadeus Mozart. Attention is given as well to the development of musical style during the later eighteenth century and to intellectual and social currents such as the aesthetics of music, the Enlightenment, and changing concepts of genius.

MUSIC 263 Beethoven (IV) (LA)  
Spring. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 2003–2004. J. Webster. A survey of Beethoven's life, works, and influence. While the primary focus is his musical style and its development, the course also covers social-cultural factors and the psychology and reception of genius.

MUSIC 264 Musical Romantics (IV) (LA)  
Spring. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 2003–2004. D. Rosen. This survey of music from 1815 to 1900 is divided into five segments focusing on five composers (Schubert, Berlioz, Verdi, Wagner, and Mahler) and two or three segments on broader topics, such as musical nationalism in Russia, fin-de-siècle Vienna, the art song, and the history of the piano and its music.

MUSIC 274 Opera (IV) (LA)  
Fall. 3 credits. D. Rosen. An introduction to opera through the examination of six or seven major works of the operatic repertoire, 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, for at least two of the operas, in live performances (Verdi's La traviata at the Syracuse Opera and Offenbach's The Tales of Hoffmann at the Tri-Cities Opera in Binghamton).
[MUSIC 275 Choral Sounds # (IV) (LA)]
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in MUSIC 100. Not offered 2003–2004.
R. Harris-Warrick.
This course examines representative works composed for group singing, primarily from the Western choral tradition, but also including folk and popular styles, from the Middle Ages to the twentieth century. Class includes discussion of performance practices as well as historical and stylistic issues, and is integrated with local concert offerings.

[MUSIC 276 The Orchestra and Its Music # (IV) (LA)]
Spring. 3 credits. Prerequisite: any 3-credit music course or permission of instructor. Not offered 2003–2004. N. Zaslav.
The music of, and the social structures supporting, large instrument ensembles in the Western world, including: Italian court festivals of the sixteenth century, string bands of the seventeenth century, lute ascendency at Paris and Versailles, and music of Purcell, Corelli, Vivaldi, Bach, Handel, Haydn, Mozart, Beethoven, Schubert, Schumann, Mendelssohn, Berlioz, Liszt, Wagner, Brahms, Tchaikovsky, Mahler, Strauss, Stravinsky, Schoenberg, Webern, Bartók, Shostakovich, Messiaen, Copland, Carter, Tower, Stucky, Sierra, and others.

[MUSIC 277 The Piano and Its Music (IV) (LA)]
Fall or spring. 3 credits. Prerequisite: 1 semester of music theory (MUSIC 105, an equivalent course, or equivalent experience) or permission of the instructors. Not offered 2003–2004.
D. Rosen and M. Bilson.
Representative masterpieces of the piano repertoire from Bach to the present are placed in the context of the instruments for which they were written and the social structures mediating their production. Thus three different historical approaches are interwoven: (1) the history of music written for the piano and its predecessors, the harpsichord and clavichord; (2) the development of the piano from these predecessors, through Mozart's Stein piano, the pianos of Beethoven, Chopin, Liszt, and Brahms, up to today's Steinway; and (3) the social history of the pianos.

[MUSIC 372 Mind and Memory (also ENGL 301, S HUM 301, and THETR 301) (IV)]
Spring. 4 credits. J. Morgenroth. See THETR 301 for description.

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. R. Harris-Warrick.
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)]
Spring. 3 credits. Prerequisite: MUSIC 152/154, concurrent enrollment in 152/154, or permission of instructor. R. Sierra.
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 Sophomore Seminar: Proseminar in Musicology (IV) (LA)]
Spring. 4 credits. N. Zaslav.
Introduction to methods in musicology, including historiography, criticism, approaches to vernacular and non-Western musics, and gender studies.

This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within a interdisciplinary context. While not restricted to Sophomores, these seminars aim at initiating students into the discipline's outlook, its discourse community, its modes of knowledge, and its ways of articulating that knowledge. Enrollment is limited to 15. Special emphasis is given to serious thinking and writing and to personalized instruction with top university professors.

[MUSIC 374 Opera and Culture (also GERST 374 and ITAL 374) (IV)]
Spring. 4 credits. Prerequisite: any 3-credit music course or proficiency in German or Italian. Not offered 2003–2004. A. Groos. See GERST 374 for description.

[MUSIC 381 Topics in Western Art Music to 1750 # (IV)]
Fall. 4 credits. Prerequisite: MUSIC 152 or permission of instructor. Not offered 2003–2004. Staff.

[MUSIC 383 Topics in Western Art Music 1750 to the Present (IV)]
Spring. 4 credits. Prerequisite: MUSIC 152 or permission of instructor. Not offered 2003–2004. Staff.

[MUSIC 386 Topics in Popular Music and Jazz (IV)]
Fall. 4 credits. Prerequisite: MUSIC 152/154 or permission of instructor. Not offered 2003–2004. S. Pond.
This course addresses alternating topics, centering on the post-World War 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 socio-political developments in black popular music to the advent of funk. Odd-numbered years: Post-bebop jazz. Using the "bebop revolution" as a beginning point, we examine style movements (including cubop, cool and West Coast jazz, avant-garde jazz, modulation, and fusion) in light of changing aesthetics, socio-political 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 389–399 Independent Study in Music History (IV)]
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. Taavla.
Topic for 2003–2004: Music in Fin-de-Siècle Paris. This course engages the rich cultural environment of Paris during the years 1899–1919 and in 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, Debussy, Stravinsky, and modernism associated with the French Conservatoire alongside contemporary films and ballets, as well as the commedia dell'arte, the growing presence of world folk traditions in Paris, and the emergence of jazz.

[MUSIC 410 Music and Monstrous Imaginings (IV) (LA)]
A. Richards.
This seminar explores the limits of the imaginary in the eighteenth- and nineteenth-century culture, from theories of fantasy, immanence, and "monstrous imagining" to freak shows, virtuosi, and illusionists. Focusing on visual, literary, and musical phantasmagoria, we investigate the performance of the uncanny (Fagin and devilish technical feats, Mesmer and the glass harmonica), the gendered imagination and artistic creation (pregnancy and invention), technologies of death and its representation (the guillotine and wax museum, magic lantern shows and automata). Novels by Field, Lewis, Shelley, instrumental music by C. P. E. Bach, Beethoven, Mendelssohn, Berlioz; opera by Mozart, Weber, Meyerbeer; critical texts from Addison and Steele to Freud and Foucault.

[MUSIC 411 The Organ in Western Culture # (IV) (LA)]
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 2003–2004.
A. Richards and D. Yeasler.
The oldest Western musical instrument, the organ, has the longest and richest repertory and has played a vital role in European culture for more than a millennium. This course traces the changing musical, technological, social, and political significance of the organ from Antiquity to the present day, from the Roman Colosseum to Yankee Stadium, from J. S. Bach to Jimmy Smith.

[MUSIC 412 Polyphonic: The Many Voices of Spanish Music in the Golden Age (also S HUM 412, SPAN L 412)]
Fall. 4 credits. M. Noone. See S HUM 412 for description.

[MUSIC 415 Concepts of Improvisation (also NES 425 and JWST 425)]
Fall. 4 credits. Prerequisite: ability to read music. J. Rubin.
A large portion of the world's musical cultures is based on the extended use of improvisation, which may be broadly defined.
as a form of composition during the course of performance. The concepts and processes of improvisation—which vary greatly among cultures—are complex and often fascinating, but from a "Western" perspective, little understood. Through a cross-cultural survey focusing on several traditions including Jewish klezmer, Greco-Turkish, jazz, and Gregorian chant, all music will be seen to exist somewhere on a continuum between the totally composed and the totally improvised.

MUSIC 416 Klezmer and Trauma (also JWS 426)
Spring. 4 credits. J. Rubin.
The American klezmer movement has evolved in recent years into one of the most visible transnational music movements, involving participants on several continents. The course looks at the American klezmer movement as a Jewish musical response to several overlapping crises, in particular to the destruction of Yiddish-speaking Eastern European Jewry in the Holocaust. It places the klezmer movement within the larger discourses of the Yiddish language and culture movement, the Jewish Renewal movement, and the "New Jewish Cultural Studies," showing that the staying power of its rhetoric, is ultimately concerned with the future course of American Jewry.

MUSIC 474 Opera, History, Politics, Gender (also HIST 460, FGSS 454, COM L 459, S HUM 459, ITAL 456) (II or IV)

MUSIC 490 American Musical Theatre (also ENGL 454) (IV) (LA)
Fall. 4 credits. S. McMillin. See ENGL 454 for description.

MUSIC 492 Music and Queer Identity (IV) (CA)
Throughout history music has been associated with "otherness" in Western cultures. Appropriately, lesbian and gay individuals and communities have turned to music as a means of expressing and negotiating their "queer" identity within status-quo culture. This course explores how and why music encodes "queerness" by focusing on various musical genres (such as opera, disco, women's music, country) and composer/musicians who have become significant for various lesbian and gay communities. The course also examines the reasons behind the general popularity of queer-coded but "straight-identified" performers such as Elvis Presley, Prince, and Michael Jackson.

MUSIC 493 Women and Music (also FGSS 496) (IV) (CA)
This course introduces the students to a critical examination of women's participation in Western European and American musical traditions. The course focuses on the various subject positions and critical perspectives that women hold in examples of music and writings about music. Of primary importance are the concepts of "objective" vs. "subjective" approaches to the topic of the week. Topics include approaches to history and criticism, women composers, women performers, women as objects, women's music, androgyny, and women as listeners. Students are asked to keep a journal of their reactions to the readings, listening assignments, and class discussions, and to write "objective" and "subjective" formal papers.

MUSIC 494 Love, Sex, and Song in Medieval France (also FGSS 403) (IV) (LA)
This course explores the cult of courtly love and its inextricable relationship with singing. We focus on secular music and poetry and relevant narratives of Southern and Northern France from the twelfth and thirteenth centuries, and consider issues such as constructions of gender and gender relations, music and sexuality in the Middle Ages, medieval misogyny, women's voices in courtly love lyrics, the relationship of words and music, performance context, and reconstruction.

MUSIC 495 Sondheim & Musical Theatre (also ENGL 473, THETR 472) (IV) (LA)
This course explores the American musical theatre as a form of composition during the course of performance. The concepts and processes of improvisation—which vary greatly among cultures—are complex and often fascinating, but from a "Western" perspective, little understood. Through a cross-cultural survey focusing on several traditions including Jewish klezmer, Greco-Turkish, jazz, and Gregorian chant, all music will be seen to exist somewhere on a continuum between the totally composed and the totally improvised.

MUSIC 498 Honors in Music
MUSIC 401-402 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. 4 credits each term. Limited to honors candidates in their senior year. Staff.

Digital Music and New Media
MUSIC 120 Learning Music through Digital Technology (IV) (LA)
Fall or spring. 3 credits. Enrollment limited. Prerequisite: permission of instructor. D. Borden.
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 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 composed and/or dance performance using the sounds and music provided by the students in this course.

Musical Instruction
Cornell faculty members offer individual instruction in voice, organ, harpsichord, piano and keyboard, string instruments, woodwinds, brass, and percussion. All lessons are conducted in individual rooms, and opportunities for advanced students are made possible by an annual fund-raising appeal. Additional support is provided through endowed scholarships, private donations, and special funds. Any student is eligible to take lessons without credit or, through MUSIC 321-322, with credit. Other instruments may sometimes be studied for credit outside Cornell, but only by audition only (see MUSIC 321b-322b).

Lessons for beginners. The Music Department can recommend outside teachers for those who wish to begin studying voice or an instrument. No credit is available for beginning instruction.

Auditions. Auditions are held at the beginning of each term for lessons for advanced students. Contact the Department of Music office (101 Lincoln Hall) for information.

Fees. The fee for a one-half hour lesson weekly, without credit, is $150 per term. For a one-hour lesson (or two half-hour lessons) weekly, without credit, the fee is $300. The fee in MUSIC 321-322 is for a one-hour lesson (or two half-hour lessons) for credit is $225 per term. All fees are nonrefundable once lessons begin, even if the course is subsequently dropped.

Scholarships. Music majors receive a scholarship of up to $225 per term. Members of department-sponsored organizations and ensembles may, with the permission of the director of the organization, receive a scholarship of up to $100 of the Cornell fee for the type of lessons chosen during the term. 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.

Practice rooms. Practice-room fees for a room with a grand piano are $75 per term for up to 10 hours weekly, with a charge of $10 for each additional hour. A $25 cash deposit must be made for a key to the grand piano practice rooms, $20 of which is refunded upon return of the key. Fees for a room with either an upright piano or drum set are $60 per term for up to 10 hours weekly, with a charge of $8 for each additional hour, and fees for a room without a piano are $25 per term for up to 10 hours weekly. The fee for use of the pipe organs is $60 per term for up to 10 hours weekly. All fees are non-refundable and are not prorated.

Earning credit for lessons. For every four credits earned in MUSIC 321-322, the student must earn, or currently be earning, at least three credits in another music course (excluding freshman seminars, MUSIC 321-322, 323-324, 331-343, or 421 through 448). These three credits must be earned prior
or, simultaneously with the first two credits in 321–322, they cannot be applied retroactively. Transfer credit for appropriate music courses already taken elsewhere may be used to satisfy this requirement with the approval of the department chair.

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 321h–322h and contact the Music Department office.

MUSIC 321–322 Individual Instruction in Voice, Organ, Harpsichord, Piano, Strings, Woodwinds, and Brass
Prerequisite: advanced students may register only after a successful audition with the instructor, and will receive credit only as described under "Earning credit". Students earn two credits each term for a one-hour lesson (or two half-hour lessons) weekly accompanied by an appropriate practice schedule. Students should contact the instructor or the department office about scheduling an audition. Students may register for this course in successive years.

MUSIC 321a–322a Individual Instruction in Voice
321a, fall; 322a, spring. 2 credits each term. Prerequisite: successful audition. Limited enrollment. Attendance at weekly studio class required for all credit students. J. Kellock.

MUSIC 321b–322b Individual Instruction in Organ
321b, fall; 322b, spring. 2 credits each term. Prerequisite: successful audition. T. Olsen.

MUSIC 321c–322c Individual Instruction in Piano
321c, fall; 322c, spring. 2 credits each term. Prerequisite: successful audition. X. Bjorken, M. Bilsen.

MUSIC 321d–322d Individual Instruction in Harpsichord

MUSIC 321e–322e Individual Instruction in Violin or Viola
321e, fall; 322e, spring. 2 credits each term. Prerequisite: successful audition. K. Tan.

MUSIC 321f–322f Individual Instruction in Cello
321f, fall; 322f, spring. 2 credits each term. Prerequisite: successful audition. H. Hoffman.

MUSIC 321g–322g Individual Instruction in Brass
321g, fall; 322g, spring. 2 credits each term. Prerequisite: successful audition. Staff.

MUSIC 321h–322h Individual Instruction Outside Cornell
321h, fall; 322h, spring. 2 credits each term. Prerequisite: successful audition. All the standard orchestral and band instruments, keyboard instruments, guitar and voice may, under certain conditions, be studied for credit with outside teachers. This course is available primarily for the study of instruments not taught at Cornell and when there is limited enrollment in MUSIC 321–322. 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 credit," above. Additionally, a departmental petition must be completed by the end of the third week of classes. For information and a list of approved teachers, consult the department office, 101 Lincoln Hall.

MUSIC 321i–322i Individual Instruction in Woodwinds
321i, fall; 322i, spring. 2 credits each term. Prerequisite: successful audition. Staff.

MUSIC 323–324 Advanced Individual Instruction
323, fall; 324, spring. 4 credits each term. Open only to juniors and seniors majoring in music and to graduate students. Majors whose lessons must be taken outside Cornell may apply to the department for financial assistance toward the cost of lessons; $225 per semester is normally awarded to such students.

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 two 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. D. Conn and J. Miller.

MUSIC 338 Symphonic Band
Spring. 1 credit each term. Prerequisite: successful audition. D. Conn 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. Rehearsals once a week with 1–2 performances a semester.

MUSIC 342 Wind Ensemble
Spring. 1 credit each term. Prerequisite: successful audition. D. Conn.

MUSIC 343–344 Symphony Orchestra
343, fall; 344, spring. 1 credit each term. Prerequisite: successful audition. J. Hsu.

MUSIC 345–346 Introduction to the Gamelan
345, fall; 346, spring. 1 credit each term. Enrollment limited. Prerequisite: permission of instructor. M. Hatcher. Concentrated instruction for students in advanced techniques of performance on the Indonesian gamelan.

MUSIC 347–348 World Music Chorus
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. X. Bjerken. Study and performance of chamber orchestra works with a broad repertoire from Mozart to premieres of contemporary works.

MUSIC 431–432 Middle Eastern Music Ensemble
431, fall; 432, spring. 1 credit each term. Prerequisite: permission of instructor. M. Hatcher. 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 language 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 Drumming 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. Prerequisite: enrollment in Symphonic Band, Wind Symphony or Wind Ensemble in the same semester as this course AND permission of instructor only. Coordinator: D. Conn. 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 premiers. 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**  
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 Ensemble**  
441, fall; 442, spring. 1 credit each term.  
Prerequisite: successful audition.  
Coordinator: K. Tan.  
Study and performance of chamber music works from duos 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. M. Noone.  
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 MUSIC 482)**  
Spring. 4 credits. J. Webster.  
A critical survey of various analytical methods in current use. Frequent analytical assignments and class presentations.

**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. Not offered 2003-2004. 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 Practicum**  
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 633 Topics in Tonal Theory and Analysis**  

**MUSIC 653 Topics in Post-Tonal Theory and Analysis**  

**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**  
Fall. 4 credits. D. Borden.  
This course is designed for graduate students in music composition who wish to learn about MIDI, digital audio, and various electronic synthesizers both in hardware and software form. It explores the use of computer software to compose electroacoustic pieces meant for live performance as well as techniques for composing soundtracks for film and video.

**MUSIC 674 German Opera (also GERST 672)**  
See GERST 672 for description.

**MUSIC 677 Mozart: His Life, Works, and Times (also GERST 757)**  
Fall. 4 credits. N. Zaslaw.  
Topic: Mozart the borrower. Mozart's quotation, paraphrase, pastiche, and theft of the music of other composers, and the subsequent reception of those activities.

**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. S. Pond.  
Topic: Rhythm and blues in musical-cultural perspective.

**MUSIC 681 Seminar in Medieval Music**  

**MUSIC 683 Music and Postmodern Critical Theory**  
This course surveys the many critical theories that have been included under the umbrella of "postmodernism," and that have fueled the debate between "old" and "new" styles of musicology. Readings focus on structuralism and poststructuralism, feminist literary criticism, queer theory, and postmodern and postcolonialism, and their application in musicology and ethnomusicology. A broad spectrum of music is examined along with the readings.

**MUSIC 684 Seminar in Renaissance Music**  

**MUSIC 686 Seminar in Baroque Music**  

**MUSIC 688 Seminar in Classical Music**  
Spring. 4 credits. J. Webster.  
Topic: Haydn.

**MUSIC 689 Seminar in Music of the Romantic Era**  

**MUSIC 690 Seminar in Music of the Twentieth Century**  
Fall. 4 credits. D. Rosen and A. Groos.  
Topic: Puccini.

**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**  
Spring. 4 credits. N. Zaslaw.  
Topic: Practices of ornamentation and improvisation in European music of the seventeenth and eighteenth centuries.

**MUSIC 697-698 Independent Study and Research**  
697, fall; 698, spring. Credit 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**

R. Brann, (chair); M. Campos, W. T. Dickens, K. Haines-Eitzen, D. I. Owen, (director of the Program of Jewish Studies); D. Powers, A. Rahmouni, G. Rendsburg, N. Scharf, S. Shoer, D. Starr, (director of Undergraduate Studies), S. M. Toerawga (director of Graduate Studies), M. Younes, J. Zorn

Joint faculty: M. Bernal (Emeritus), C. Robinson

**The Department**

The Department of Near Eastern Studies (409 White Hall, 255-6275) offers courses in Near Eastern civilization including archaeology, history, religions, languages, and literatures. These course offerings treat the Near East from the dawn of history to the present and emphasize methods of historical, cultural, and literary analysis. Students are encouraged to take an interdisciplinary approach to the religions and cultures of the region and their articulation during antique, late antique, medieval, and modern times.
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 in the social sciences/humanities. 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 second 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 advisor. 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 Seafering
      - 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 advisor, students must submit an outline of their proposed honors work to the department director of undergraduate studies before formally enrolling in 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. Archaelogical field work on Cornell-sponsored projects in the Near East may also quality 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 17 in each session. 4 credits each term. NES 111 is prerequisite for 112, or permission of instructor. M. Younes.

The course provides a thorough grounding in all language skills: listening, speaking, reading, and writing. It starts with spoken Arabic and gradually integrates Modern Standard Arabic in the form of listening and reading texts. Emphasis is on learning the language through using it in meaningful contexts. Students who successfully complete the two-semester sequence are able to: (1) understand and actively participate in simple conversations involving basic practical and social situations (introductions, greetings, school, home and family, work, simple instructions, etc.); (2) read Arabic material of limited complexity and variety (simple narrative and descriptive texts, directions, etc.); (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 15 students in each section. 4 credits each term. NES 210 @ provides language proficiency and Option I. Prerequisites: NES 112 or permission of instructor; for NES 210, 113 or permission of instructor. 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)]
133, fall, R. Brann; 134, spring, S. Toorawa. 4 credits each semester. NES 134 provides language qualification. Not offered 2003-2004.

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) @ 4 (IV) (LA)
Spring. 3 credits. Prerequisite: NES 210 or equivalent. D. Powers.

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) @ 2 (IV) (LA)
Fall. 3 credits. D. Powers.

This course is an advanced study of classical Arabic through a close reading of selected chapters of the Qur'an, together with the Qur'anic commentary (tafsir) and other relevant literature. Special attention is given to grammar, syntax, and lexicography.

NES 311-312 Advanced Intermediate Arabic I and II @
311 fall; 312 spring. 4 credits each term. Limited to 15 students. Option I. Prerequisite for NES 311 is NES 210 or permission of instructor, prerequisite for NES 312 is NES 311 or permission of instructor. 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 required 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)
Spring. 4 credits. Limited to 15 students. Prerequisite: one year of Arabic or a linguistic background, M. Younes.

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 111-112)
121, fall, 122, spring. 4 credits each term.
Limited to 15 students. Staff.
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.

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 15 students in each section. S. Shoer.
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 15 students in each section. 4 credits each term.
NES 200 @ provides language proficiency and Option I. Prerequisites: for NES 103, 102 or permission of instructor; for NES 200, 103 or permission of instructor. N. Scharf.
A sequel to NES 101-102. Continued development of reading, writing, grammar, oral comprehension, and speaking skills. The 200 course introduces Hebrew literature and Israeli culture through the use of texts and audio-visual 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. Staff.
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.

NES 301-302 Advanced Modern Hebrew I and II (also JWST 301-302) @ 301, fall; 302, spring. Limited to 15 students. 4 credits each term. Fulfills Option I. Prerequisite for NES 301: 300 or equivalent, with permission of instructor. Prerequisite for NES 302: 301 or equivalent, with permission of instructor. This sequence may be used to fulfill the humanities distribution requirement in literature. N. Scharf.
Advanced study of the Hebrew Language both orally and through the analysis of mostly unedited texts of social, political, and cultural relevance, with less emphasis on the study of grammar. Students are introduced to articles published in Israeli newspapers and magazines, works by authors, and movies. Students develop composition and advanced writing skills by studying language structure, idioms, and various registers of style.

NES 305 Conversational Hebrew (also JWST 305)
Fall. 2 credits. Limited to 15 students.
Prerequisite: NES 302 or permission of instructor; for non-native speakers only. Students are introduced to authentic, unedited Hebrew 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 discussions 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 in 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 420 Readings in the Biblical Hebrew Prose (also JWST 420, RELST 420) @ # (IV) (LA)
Fall. 4 credits. Provides language proficiency and Option I. Prerequisite: 1 year of biblical or modern Hebrew. Course may be repeated for credit. Not offered 2003-2004. G. Rendsburg.
An advanced course in reading selected portions of the Hebrew Bible. Emphasis is placed on the philological method, with attention to literary, historical, and comparative concerns.

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.

Turkish

NES 117-118 Elementary Turkish I and II
117, fall; 118, spring. 4 credits each term.
Limited to 15 students. Staff.
Intended for students with no experience in Turkish. The goal is to provide a thorough grounding in Turkish language with an emphasis on communication. Small class size provides intensive practice in speaking, writing, and listening/comprehension. The course is co-sponsored by the Institute for European Studies.

Ancient Near Eastern Languages

Akkadian

NES 333-334 Elementary Akkadian I and II (also NES 633-634) (IV)
333, fall; 334, spring @ # (IV) (LA). 4 credits each term. Prerequisite for NES 334: 333 or permission of Not offered 2003-2004.
An introduction to the Semitic language of the Akkadians and Babylonians of ancient Mesopotamia. Utilizing the inductive method, students are rapidly introduced to the grammar and the cuneiform writing system of Akkadian through selected readings in 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.

Aramaic

NES 435 Aramaic I @ # (IV)
A panoply of Aramaic materials is read during the course, including selections from ancient Aramaic inscriptions, the biblical books of Ezra and Daniel, Qumran texts, and the Targumim. Explanations of grammar, syntax, and vocabulary are based on the linguistic data which occur in the readings.

Hieroglyphic Egyptian

NES 330-331 Hieroglyphic Egyptian I and II
330 fall; 331 spring @ # (LA). 4 credits. Not offered 2003-2004. Staff.

Sumerian

NES 433 Introductory Sumerian I (also NES 633) @ # (IV)
Fall. 4 credits each semester. Prerequisite: permission of instructor. Not offered 2003-2004. D. I. Owen.

NES 434 Introductory Sumerian II (also NES 634) @ # (IV)
D. I. Owen.
Continued study of Sumerian grammar and syntax; further readings in selected Sumerian economic, legal, and historical inscriptions of the late third millennium B.C.E.; additional discussion of Sumerian civilization and culture.

Ugaritic

NES 337-338 Ugaritic I & II (also NES 637-638) @ # (IV)
337, fall; 338, spring @ # (LA). 4 credits each semester. Prerequisite: knowledge of another Semitic language (preferably Hebrew). Fall, G. Rendsburg; spring, A. Rahmouni.
Study of the language and literature of ancient Ugarit, an important site in northern Canaan. Special attention is paid to the relationships between Ugaritic and Hebrew and between Canaanite literature and the Bible.

**West Semitic Inscriptions**

[NES 625 West Semitic Inscriptions]  
A study of the major inscriptions of the West Semitic languages of the Iron Age. These include texts in Hebrew, Aramaic, Phoenician, Ammian, Moabite, and Edomite.

**Archaeology**

NES 277 The Bible and Ancient Near Eastern Civilization [also JWST 227, ARKEO 227, and RELST 227] @ (IV) (LA)  
Spring. 3 credits. J. Zorn.  
The Hebrew Scriptures contain a wide array of literary forms: historical works, prophetic texts, wisdom literature, etc. These works—compiled from an even wider assortment of text types (cosmologies, folk tales, love songs, palace records, treaties, letters, and more)—were not written in a cultural vacuum but find a home in the literary world of Israel's neighbors, including Mesopotamians, Egyptians, Hittites, and others. This course examines the different literary genres found in the Hebrew Scriptures in comparison with similar material from the ancient Near East to clarify the interpretation, dating, and purpose of the Biblical material.

NES 261 Ancient Seafaring [also ARKEO 275, JWST 261] @ (III) (HA)  

NES 263 Introduction to Biblical History and Archaeology [also ARKEO 263, JWST 263, and RELST 264] @ (III) (HA)  
Spring. 3 credits. J. Zorn.  
A survey of the principal archaeological developments in Canaan/Israel from the Neolithic period (ca 9000 B.C.E.) to the Babylonian Exile (586 B.C.E.). Includes an introduction to archaeological methodology used in the reconstruction of ancient cultures, as well as the basic bibliography of the field. Emphasis is placed on the use of archaeological data for understanding major problems in Israelite history and archaeology: such as the dating of the cultural milieu of the patriarchs, the dating and geographical setting of the Exodus and the Israelite conquest, and the origin and history of the Philistines. Special lectures are devoted to topics such as warfare, cult, food production and storage, writing, and writing systems. Recommended for students planning to participate in excavations in Israel.

NES 266 Jerusalem Through the Ages [also JWST 266, ARKEO 266, and RELST 268] @ (III) (HA)  
Jerusalem is a holy city to the adherents of the three great monotheistic faiths: Judaism, Christianity, and Islam. For most of its existence it has also been a national capital or major provincial center for the many states and empires that vied for control of the vital land bridge connecting Africa, Europe, and Asia. Thus many of the pivotal events that shaped western civilization were played out in the streets and structures of Jerusalem. This class will explore the history, archaeology, and natural topography of Jerusalem throughout its long life, from its earliest remains in the Chalcolithic period (ca. 4000 B.C.E.) to the 19th century, including Jebusite Jerusalem, Judah, the capital of the Davidic dynasty, the Roman era city of Herod and Jesus, the Crusaders and medieval Jerusalem, and Ottoman Jerusalem as the city entered the modern era. Students will examine the original historical sources (e.g., the Bible, Josephus, the Madeba map, etc.) which pertain to Jerusalem. Slides and videos will be used to illustrate the natural features, man-made monuments, and artifacts that flesh out the textual material providing a fuller image of the world's most prominent spiritual and secular capital.

NES 360 Ancient Iraq: Origins of Mesopotamian Civilization [also JWST 360, ARKEO 360] @ (III or IV) (LA)  
Fall. 4 credits. D. I. Owen.  
An introduction to the language, literature, history, culture and archaeology of Syro-Mesopotamia in the fourth and third millennia B.C.E. The course focuses on Sumerian civilization from its emergence 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 (Ebla), and upper Mesopotamia (Akkad), and will introduce the student to the basic introduction to the Semitic language utilizing basic cuneiform tablets in the collection of the Department of Near Eastern Studies.

NES 361 Sumerian Language and Culture [also JWST 361, ARKEO 361] @ (IV) (LA)  
Spring. 4 credits. D. I. Owen.  
A continuation of NES 360, the course focuses on the more in-depth introduction to Sumerian language and grammar with additional readings in literature in translation. Particular emphasis is 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.

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 2003-2004. D. I. Owen.

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 covenant, law and society, sacrifice and prayer as modes of worship, holidays, Sabbath, circumcision, dietary laws, etc. 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. In addition, there is a one-credit option for reading the texts in Hebrew (NES 328).

NES 251 Judaism, Christianity, and Islam [also JWST 251, RELST 251] @ (IV) (HA)  
Spring. 3 credits. K. Haines-Eitzen and R. Brann.

For description, see NES 251 under Near Eastern History.

NES 255 Introduction to Islamic Civilization [also HIST 253, RELST 255] @ (III or IV) (HA)  
Fall. 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. The class meets three times weekly, and the classroom format is that of a lecture/discussion in which students are encouraged to participate actively. Lectures are accompanied by slide presentations, when appropriate.

NES 281 Gender and Society in the Muslim Middle East [also RELST 281, FGSS 281] @ (III)  

NES 291 Arab Society and Culture [also JWST 197 and RELST 197] @ (IV) (CA)  

NES 298 Issues in Catholic Thought [also RELST 201] (IV) (CA)  
Fall. 4 credits. W. T. Dickens.

Issues in Catholic Thought: 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 feminism. 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 studies, 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, Gustavo Gutiérrez, Karl Rahner, and Pierre Teilhard de Chardin).

[NES 328 Readings in Ancient Jewish Texts (also RELST 317, JWST 328)]
G. Hanin.
This course is a one-credit add-on to NES 244 Introduction to Ancient Judaism. Students enrolled in NES 244, who wish to read a selection of the texts to be discussed in that class in the Hebrew original, should enroll in this one-credit seminar. NES 328 Terminology include selections from the Bible, the Dead Sea Scrolls, and the Mishnah.

[NES 339 Islamic Spain: Culture and Society (also JWST 339, COM L 334, RELST 334, SPANL 339/669, NES 639) @ (IV) (CA)]
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 the Almohad Caliphate. 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 Andalusi 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)]
P. Powers.
After surveying the historical development of Islamic Law, the seminar focuses on the structure of the Islamic legal system in the thirteenth, fourteenth, and fifteenth centuries, using legal documents, judicial opinions, and court cases (all in English translation) to elucidate 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)
P. Powers.
The Shari'ah, or sacred law of Islam, embodies the totality of God's commands that regulate the life of every Muslim in all its aspects. The Shari'ah 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'ah and the major social, economic, and political institutions of Islamic society. Topics discussed include the status of women, slaves, and non-Muslims: attitudes toward the Islamic legal system and the arts; the significance of jihad (holy war); the nature of the Muslim city; and the relationship between the religious establishment and the government. Attention is given to the function of the Shari'ah in the modern world, with special reference to the problems and challenges of legal reform.

[NES 371 A Mediterranean Society, and Its Opinion: The Jews (CA)]
R. Brann.

[NES 386 Catholicism in a Global Context (also RELST 386) (CA)]
Spring. 4 credits. W. T. Dickens.
This course explores the diversity of Catholic thought and practice occasioned by the worldwide growth of the Roman Catholic Church. We begin with an historical orientation to the modern missionary movements beginning in the seventeenth century, noting their role in the struggles with Protestantism and in the cultural expansion of western Europe. We then examine specific socio-cultural contexts (in Asia, Africa, South America, and North America) to discern some of the distinctive theological, ethical, artistic, and ritual patterns exhibited by contemporary Catholics. Our inquiry will be governed by the demise of the following religious traditions: In what ways have these socio-cultural settings transformed Catholicism and in what ways have Catholics transformed these settings? What impact does adaptation to new circumstances have on traditions of biblical interpretation, doctrinal statements, institutional forms, and ritual practices? What implications do such adaptations have for understanding the nature and scope of ecclesial authority; the role of folk traditions, art, and architecture; the logical status of doctrines; and the functions of the rituals? Our sources will include histories, indigenous myths and narratives, ethnographies, ecclesiical documents, and works by theologians and ethicists.

[NES 395 Israeli Society (also JWST 395 and SPANL 395) @ (IV) (CA)]
Fall. 4 credits. T. Sorek.
The course introduces students to the major themes in the 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.

[NES 425 Concepts of Improvisation (also MUSIC 415 and JWST 425)]
Fall. 4 credits. Limited to 25 students.
Prerequisite: ability to read music.
J. Rubin.
A large portion of the world's musical cultures, based on the extended use of improvisation, may be broadly defined as a form of composition during the course of performance. The concepts and processes of improvisation—which vary greatly among cultures—are complex and often fascinating, but from a "Western" perspective, little understood. Through a cross-cultural survey focusing on several traditions, including Jewish klezmer, Greco-Turkish, jazz, and Gregorian chant, all music will be seen to exist somewhere on a continuum between the totally composed and the totally improvised.

[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. Performance of diverse musical traditions from the Middle East. Instruction in percussion, oud, ney, and kanun, among others.

[NES 496 Religion and Science (also RELST 496) (IV) (KCM)]
Spring. 4 credits. Next offered Spring 2005.
W. T. Dickens.
A seminar examining the encounter between religion and the natural, social, and historical sciences in western civilization. We begin by clarifying what we mean by "religion" and "science," noting the variety of definitions of both and the ways one's definitions will have on one's views of how they relate. We then examine four basic forms these relations tend to take: religious and science are in conflict; they are distinct, yet complementary; religious beliefs are reconcilable with scientific discoveries; and religious beliefs inform scientific inquiry. We use this fourfold framework to analyze and assess the debates that occur within eight areas of engagement: scientific knowledge and religious belief, the origins of the cosmos, evolution and creationism, natural laws and miracles, religion and the mind-body problem, psychology and religion, anthropology and religion, and the historical-critical study of religious texts. Finally, the writings of E. O. Wilson and A. R. Peacocke provide us with case studies of two different answers to the question whether it is intellectually defensible to be a religious scientist.

[NES 639 Islamic Spain: Culture and Society (also NES 339, JWST 339, and SPANL 339/669)]
R. Brann.
For description, see NES 339.

[NES 651 Law, Society, and Culture in the Middle East, 1200–1500 (also NES 351, RELST 350, HIST 372/652)]
P. Powers.
For description, see NES 351.

History

[NES 234 Muslims and Jews in Confluence and Conflict (also JWST 234 and RELST 234) @ (IV) (HA)]
Fall. 3 credits. 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 student research projects. Not offered 2003–2004.

NEAR EASTERN STUDIES 605
After we undertake a historical overview of the West; the end of the "Golden Age" of Spain from the late Visigothic period until the establishment of Jewish communities in Spain, 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 socio-economic dimensions of the Marrano dispersion, including Lurianic Kabbalah and the messianic movement of Shabbetai 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.

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 socio-economic dimensions of the Marrano dispersion, including Lurianic Kabbalah and the messianic movement of Shabbetai 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.

This course offers an introduction of the Jesus of art, music, film, and literature. While not restricted to sophomores, the seminars offer an interdisciplinary study within an interdisciplinary context. For description, see NES 296 under Near Eastern Archaeology.

This course offers an introduction of Jesus the historical figure, 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 moves us from the reconstruction of this historical Jesus to the Jesus Christ imagined by various Christians, Jews, and Muslims. Here we look closely at the chistological 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 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, its discourse community, its modes of knowledge, and its 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.

This course offers an introduction of the emergence of Judaism, Christianity, and Islam, and established a comparative approach to monotheistic religious culture, we examine some of the provocative ways in text, image, and film) in which Jews, Christians, and Muslims imagined both each other as well as other members of their own traditions in late antiquity, the Middle Ages, and in more recent times. For example: polemics among Jews and Christians in late antiquity and the Middle Ages, images of Muslims in American cinema, and the modern political situation in and over Jerusalem, particularly as it relates to shared and parallel traditions about "holly places."

The approach is comparative, analyzing literary and historical aspects of shared and parallel narrative traditions and textual hermeneutics. The class also discusses the religious concept of revelation, prophecy, and community, attitudes toward gender, and notions of history, the "End of Days, and messianism set forth in the respective scriptures and in the Jewish, Christian, and Islamic literatures which followed. The problematic nature of revealed scripture in monotheistic religion will be discussed. In addition we study why the idea of "influence" should be replaced with the concept of "dialogue" between religious communities in the Near Eastern context.

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 socio-economic dimensions of the Marrano dispersion, including Lurianic Kabbalah and the messianic movement of Shabbetai 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.

This course offers an introduction of the Jesus of art, music, film, and literature. While not restricted to sophomores, the seminars offer an interdisciplinary study within an interdisciplinary context. For description, see NES 296 under Near Eastern Archaeology.

This course offers an introduction of Jesus the historical figure, 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 moves us from the reconstruction of this historical Jesus to the Jesus Christ imagined by various Christians, Jews, and Muslims. Here we look closely at the chistological 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.

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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 (Mashruq), Egypt, and the former Ottoman Empire, particularly 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. Thematic discussions 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 novels, ethnography, films, memoirs, and scholarly texts.

### NES 397 History of the Israeli-Palestinian Conflict (also JWST 397 and GOVT 397) (III) (HA)

Spring. 4 credits. M. Campos.

This course surveys the history of Palestine in the nineteenth and twentieth centuries, the emergence of the state of Israel in 1948, and the ongoing Israeli-Palestinian struggle over this territory. The course covers such themes as: society and economy, political, religious, and local identities, Western involvement in the Holy Land, the birth of the Zionist movement as well as of a local Palestinian-Arab movement; state building; the 1948 war and the creation of the Palestinian refugee problem; the 1967 war, the Palestinian Intifada; the Arab responses in the conflict; and the structure and culture of occupation.

We will use extensive primary and secondary sources, including scholarly research, memoirs, novels, and film.

### NES 418 Seminar in Islamic History: 600-750 (also HIST 461-671, NES 618, RELST 418) @ (III) (HA)

Spring. 4 credits. D. Powers.

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 Caliphate, 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)

Spring. 4 credits. S. Buck-Mors.

For description, see GOVT 466.

### NES 494 Seminar: Catholicism and Interreligious Dialogue (also RELST 494) (III) (GA)

Spring. 4 credits. W. T. Dickens.

An examination of the possibility, purposes, and practice of inter-religious dialogue. The course begins with an overview of the historical background to contemporary interest in inter-religious dialogue. We then examine Western and Eastern attitudes toward religious pluralism and proselytization. We then examine some of the key concepts that structure inter-religious dialogue, including “tolerance,” “pluralism,” “relativism,” “dialogue,” and “religion.” On the basis of this historical and conceptual orientation, we proceed in the second section of the course to examine examples of the three most common approaches (inclusivist, pluralist, and exclusivist) to such dialogue. The course concludes with four contemporary case studies of inter-religious dialogue: Jewish-Christian, Muslim-Christian, Buddhist-Christian, and Hindu-Christian. Our sources include ancient and contemporary philosophers, religious and non-religious scholars, historians, and theologians.

### NES 498 Comparative Semitics (also JWST 498) (HA)

Fall. 4 credits. A. Rahmouni.

This course is an introduction to comparative Semitics. It covers the development of various Semitic languages and dialects, both ancient and modern, to understand the development of the Semitic language family from its hypothetical proto-Semitic origin to the Semitic languages in use today. Knowledge of a Semitic language is useful but not essential.

### NES 213 Classical Arabic Texts (also RELST 213) @ (IV) (LA)

Fall. 3 credits. G. Rendsburg.

This is the first course of a two-semester sequence. The main goal is to introduce students to the literature of the Hebrew Bible, which is accomplished by concentrating on the Torah and the historical material in Joshua through Samuel, that is, the material which covers the period from Israel's origins through King David. Emphasis is placed on literary, historical, and theological matters. Special use is made of the numerous archaeological discoveries which have advanced our knowledge of ancient Israel. As such, the Bible is studied against the backdrop of ancient Near Eastern literature, history, religion, mythology, and law.

### NES 224 Introduction to the Bible II (also JWST 224, RELST 224) @ (IV) (LA)

Spring. 3 credits. G. Rendsburg.

This is the second course of a two-semester sequence. The main goal is to introduce students to the literature of the Hebrew Bible. This is accomplished by concentrating on the historical material in Kings, the books of the Prophets, and the book of Job, that is, the material which covers the period from King Solomon through the end of the biblical era. Emphasis is placed on literary, historical, and theological matters. Special use is made of the numerous archaeological discoveries which have advanced our knowledge of ancient Israel. As such, the Bible is studied against the backdrop of ancient Near Eastern literature, history, religion, and mythology. (Note: students who have taken NES 227, Introduction to the Prophets are ineligible to take this course. NES 224 is intended to replace NES 227. Students interested in a one-credit option, reading the texts covered in class in the original Hebrew, should also enroll in NES 255.)
[NES 229] Introduction to the New Testament (also RELST 229 and JWST 229) @ # (IV) (HA)
Fall. 3 credits. Not offered 2003-2004.
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 the Roman Empire 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 320.)

[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 2003-2004.
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 literary works and films by Jews from Arab countries; Israelis from a variety of backgrounds; Palestinians, including those in Palestinian territories; 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 covered 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 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)
Spring. 3 credits. S. 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 archangel Gabriel. That book is now 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 circumstances 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)
Fall. 4 credits. Limited to 15 students.
D. Stuhr.
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 and also are available on reserve.

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[NES 299] Hebrew Bible and Arabic Quran in Comparative Perspective (also RELST 299, COM L 299, JWST 299) @ # (IV) (LA)
R. Brann.
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 Mistrers, the Maqamat of al-Hariri and al-Hamadhanii, the Arabic biographical and autobiographical traditions, encyclopedic writing by al-Mas'oudi, and the travel accounts of Ibn Battuta. We also complement our readings of early narrative with contemporary interventions, e.g. the work(s) of Djebra, Kilito, Wannus, and others. We pay special attention to gender, tradition, satire, and irony.

[NES 315] 1001 Nights and Other Arabic Writing (also RELST 615) @ # (IV) (LA)
S. Toorawa.
In this course, we explore the rich diversity of the early Islamic novel, by reading the magical tales of the Thousand and One Nights, as well as other tales of the Middle East. We complement our readings of early narrative with contemporary interventions, e.g. the work(s) of Djebra, Kilito, Wannus, and others. 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) (CA)
S. 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 Daif's Dear Mister Kawabata. We complement the readings with three films.

[NES 320] Women in the Hebrew Bible (also JWST 320, RELST 316, and FGSS 322) @ # (IV) (LA)
G. Rendsburg.
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 (foreign woman, prostitute, seductress, widow, etc.), and we discuss the social and historical reality behind the literary representation of women. All texts in English translation. In addition there is a one-credit option for reading the texts in Hebrew (NES 326).

[NES 323] Reinventing Biblical Narrative (also JWST 323, RELST 323) @ # (IV) (HA)
K. Haines-Eitzen.

[NES 325] Introduction to the Hebrew Bible—Seminar (also JWST 325, RELST 318)
Fall. 1 credit. Spring. 1 credit.
G. Rendsburg.
This is a one-credit option for students who wish to meet one day each week to read the texts covered in class in the original Hebrew. Must be concurrently enrolled in NES 223 or NES 224.

[NES 326] Women in the Hebrew Bible—Seminar (also JWST 326, FGSS 326)
G. Rendsburg.
This is a one-credit option for students who wish to meet one hour each week to read the texts in the Hebrew original. Must be concurrently enrolled in NES 320.

[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 2003-2004.
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 339/639) @ # (IV) (CA)
R. Brann.
For description, see NES Civilization.
The shifting symbolism of the Exodus narrative. This course examines literary representations of Jewish cultural production during the Hellenistic, Late Roman, and Early Christian periods. We will trace the assimilation of religious, mythological, and historical narratives in the Bible through a close reading of 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 394 Gender, Sexuality, and the Body in Early Christianity (also RELST 399, FGSS 394, JWST 394) @ IV (CA)
Beliefs about gender, sexuality, and the human body were remarkably intertwined 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 androgyne, 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 399 Catholic Rituals, the Formation of Community, and Biblical Interpretation (also RELST 399) @ IV (CA)
A seminar exploring the roles that the Catholic Church’s rituals play in forming and transforming communal identities, and, therewith, shaping the ways Catholics interpret biblical texts. In the first part of the course, we rely on cultural anthropologists, sociologists of religion, cultural critics, and specialists in ritual studies to develop working definitions of "ritual," "community," "symbol," "text," and "ritual." We then examine various interpretive methods (historical-critical, literary-critical, reader response, and authorial discourse) so as to appreciate, among other things, the influence one’s interpretive purposes have on the meanings one derives from a given text. Finally, we examine several rituals in order to discern their consequences for interpreting the Bible. We give particular attention in this part to magisterial authority, dissent within the Catholic Church, and the cultural diversity of liturgical practices and understandings. Our sources in this final section include Church documents and works by liturgical and feminist theologians.

Nes 400 Seminar in Advanced Hebrew (also JWST 400) @ (LA)
Fall. 4 credits. Prerequisite: NES 312/JWST 312, or permission of instructor. Enrollment limited to 15 students. The course may be repeated for credit with permission of instructor. Not offered 2003-2004. S. M. Toorawa.
Continuation of work done in NES/JWST 312, 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 @
Spring. 4 credits. Prerequisite: NES 320/JWST 320, or permission of instructor. Enrollment limited to 15 students. D. Starr.
Literature has held a privileged place in the revival of modern Hebrew and the formation of Israeli culture. This course affords students the opportunity of reading and analyzing this exciting literature. Each semester will feature a different theme, topic, or period in the development of Hebrew literature. Readings may include short stories, novels, poetry, and drama. All materials will be in Hebrew. Because topics vary each semester, the course may be repeated for credit with permission of instructor.

Nes 409 Seasons of Migration (also JWST 409, RELST 409) @ IV (IV)

Nes 414 Readings in Arabic Literature (IV/LA)
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. 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. Offered in fall 2004. 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. Prerequisite: 1 year of biblical or modern Hebrew. Course may be repeated for credit. Not offered 2003-2004. G. Rendsburg.
An advanced course in reading selected portions of the Hebrew Bible. Emphasis is placed on the philological method, with attention to literary, historical, and comparative concerns.

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. G. Rendsburg.
Advanced course in reading 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.
of al-Andalus (Islamic Spain) from 711, when
This course examines the culture and society
We pay special attention to gender, tradition,
work(s) of Djebar, Kilito, Wannus, and others.
complement our readings of early narrative
Islamic culture.
subcultural adaptations of Andalusi Arabo-
Mozarabic Christian and Andalusi Jewish
various confessional and ethnic communities
of lyric poetry, the relationships among the
cultural identity of medieval "Spain." Among
thinking regarding the social, political, and
demise of Nasrid Granada. Through extensive
classical and medieval Arabic literature in
Caribbean Alexandria (also
JWST 493, COM L 406) @ (IV) (CA)
D. Starr.
In the first half of the twentieth century the
Mediterranean port city of Alexandria
supported a multi-lingual, 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. Variable credit.
Prerequisite: permission of instructor. Staff.
NES 615 1001 Nights and Other Arabic
Writing (also NES 315)
S. Toorawa.
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 Ma'asry, the Magamat
of al-Hariri and al-Hamadhani, the Arabic
biographical and autobiographical traditions,
encycledic writing by al-Mas'udi, and the
travel accounts of Ibn Battuta. We also
complement our readings of early narrative
with contemporary interventions, e.g. the
works of Djebar, Kilito, Wannus, and others.
We pay special attention to gender, tradition,
satire, and irony.

NES 639 Islamic Spain: Culture and
Society (also NES 339, JWST 339,
COM L 334, RELST 334, SPAN L
339/699)
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 Andalusi Jewish
subcultural adaptations of Andalusi 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
English
Feminist, Gender, and Sexuality Studies
German Studies
Government
History
History of Art
Linguistics
Medieval Studies
Music
Philosophy
Religious Studies
Romance Studies
Russian Literature
Society for the Humanities
Sociology

NEPALI
See Department of Asian Studies.

PALI
See Department of Asian Studies.

PHILOSOPHY
Gail Fine (chair), R. N. Boyd (on leave spring
2004), C. Brittain, A. Chignell, M. Farah,
G. Fine, D. Graff (on leave 2003–2004),
B. Heille, H. Hodges, T. Irwin, S. MacDonald
(on leave fall 2003), R. W. Miller (on leave fall
2003), M. Moody-Adams (on leave 2003–
2004), N. Sethi, H. Shue (on leave 2003–2004),
N. Sturgeon, Z. Szabo (on leave 2003–2004),
Emeritus: C. A. Ginet, S. Shoemaker.
The study of philosophy provides students
with an opportunity to become familiar with
some of the ideas and texts in the history of
thought while developing analytical skills that
are valuable in practical as well as academic
affairs. It affords the excitement and
satisfaction that come from understanding and
working toward solutions of intellectual
problems. The curriculum includes offerings
in the history of philosophy, logic, philosophy
of science, ethics, social and political
philosophy, metaphysics, and theory of
knowledge. Any philosophy course numbered
in the 100s or 200s is suitable for beginning
study in the field. Sections of Philosophy 100
are part of the freshman writing seminar
who want a broad introduction to philosophy
may take Philosophy 101, but many students
with special interests may find that the best
introduction to philosophy is a 200-level
course in some particular area of philosophy,
such courses have no prerequisites and are
usually open to first year students.

The Major
Students expecting to major in philosophy
should begin their study of it in their
freshman or sophomore year. Admission to the
major is granted by the director of
dergraduate studies of the department on
the basis of a student's work during the first
two years. Normally the student must have
completed two philosophy courses with
grades of B or better. Eight philosophy
courses, taken for a letter grade, are required
for the major. They must include at least one
course in ancient philosophy (PHIL 211, or a
course with a large component on Plato or
Aristotle), at least one course in classical
modern metaphysics and epistemology from
Descartes through Kant (e.g., PHIL 212 or a
course on the empiricists, the rationalists,
or Kant), and a minimum of three courses
numbered above 300. Students admitted to the
major (after fall 1990) are required to take a
minimum of six philosophy courses numbered
above 200, and may not count more than one
section of Philosophy 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 credits of course work in related subjects
approved by their major advisers. Occasional
majors may serve as teaching or research aides,
working with faculty members
programs.

Honors. A candidate for honors in philosophy
must be a philosophy major with an average of
B+ or better for all work in the
College of Arts and Sciences and an average
of B+ or better for all courses in philosophy.
In either or both terms of the senior year a
candidate for honors enrolls in PHIL 490 and
undertakes research leading to the writing of
an honors essay by the end of the final term.
Honors students normally need to take PHIL
490 both terms of their senior year in order
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.

Freshman 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:
M. Farah; spring: N. Sturgeon.
Fall: An introduction to several problems of philosophy, and to the techniques philosophers use for addressing them. Problems to be addressed include some of the following: 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?

Spring: This course deals with a number of the central problems of philosophy, such as the existence of God, our knowledge of the external world, the mind-body problem, free will, and the foundations of morality.

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 131 Logic, Evidence and Argument
Not offered 2003–2004.]

[PHIL 142 Appropriation and Alienation
IV (KCM)
Not offered 2003–2004.]

PHIL 145 Contemporary Moral Issues (IV) (KCM)
Spring, summer. 3 credits. Spring, T. J. Berry; summer (6-week session), S. Sundareson.

Spring: This course examines some central moral issues in American politics, including abortion, cloning, physician-assisted suicide, gun control, reparations for slavery, and world hunger. Students learn to distinguish consequentialist and deontological approaches to moral questions. At least one class meeting per week is devoted to student discussion.

Summer: We examine some of the central moral questions in American politics today. Some of the questions may include: At what point, if any, is abortion wrong, and in what circumstances should it be legal? What should be done to reduce economic, racial, and sexual inequalities? For example, is there a moral justification for affirmative-action programs? For welfare programs? What are the limits of the right to free speech? Do they protect pornography? Racist speech? When is it right to go to war? What obligations do U. S. citizens have to help people in poor countries? What restrictions on immigration are justifiable? We analyze the answers and arguments of moral philosophers, political leaders, and judges through both lectures and discussion sections.

PHIL 151 Philosophy of Sport (IV) (KCM)
Fall. 3 credits. T. J. Berry.

This course examines philosophical issues that arise in sport. The course is divided into three parts. In the first part, we consider the nature of sport and how we can demarcate sport from other human pursuits. Do high altitude mountaineering, Olympic figure skating, and track and field share some feature(s) that an activity such as chess lacks? The second part concerns ethical issues that arise in sport. Is winning everything in sport good? Ought one to seek competitive advantage resulting from errors by judging officials? In the third part, we consider issues concerning the integration of sport into society. Ought there to be gender equity in sport, and if so, how ought we to judge that such equity has been achieved? What does the academic mission of institutions of higher education imply about the proper role of athletics within those institutions?

PHIL 181 Introduction to the Philosophy of Science (IV) (KCM)
Fall. 3 credits. N. Seth.

This course is an introductory survey of contemporary philosophy of science. We attempt to answer such central questions as: What reasons do scientists have for accepting current scientific theories? How can scientists test theories about unobservable entities? Is science a search for truth? Do scientists discover or construct facts about nature? Are scientific claims immune to cultural, social, and subjective influences? The last part of the course focuses on more general issues that scientific and technological developments force us to face.

PHIL 191 Introduction to Cognitive Science (also COGST 101 and PSYCH 102) (III) (KCM)
Fall. 3 or 4 credits. M. Spivey.

See Cognitive Studies for description.

PHIL 193 Inequality, Diversity, and Justice (also CRP 293, GOVT 293, SOC 293) (II or IV) (KCM)
Spring. 4 credits. No prerequisites. Intended primarily for freshmen and sophomores. F. 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 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? Do race and gender 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 environmental and social 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, and legal 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) 0 (II or IV)
Not offered 2003–2004.]

[PHIL 195 Controversies About Inequality and Social Policy (PAM 222, ECON 222, ILRLE 222, and GOVT 222)
Not offered 2003–2004.]

PHIL 201 Philosophical Puzzles (IV) (KCM)
Spring. 4 credits. B. Helle.

Certain concepts, like the concept of truth and the concept of 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 100,000 hairs successively from a man with 100,000 hairs, and none of the pluckings makes him not hairy, then he's still hairy when he has 0 hairs left. We will present the underlying logic of 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. T. Irwin.

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 nature 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. A. Chignell.

A survey of Western philosophy in the 17th and 18th centuries, focused primarily on epistemology and metaphysics. Authors include some of the following: Descartes, Malebranche, Spinoza, Leibniz, Locke, Berkeley, Hume, and Reid.

[PHIL 213 Existentialism (IV)
Not offered 2003–2004.]

[PHIL 216 Sophomore Seminar: Self, Ego, Psycho # (IV) (KCM)
Not offered 2003–2004.]

PHIL 231 Introduction to Deductive Logic (II) (MQR)
Fall, spring, summer. 4 credits. Fall, spring, H. Hodes; summer (3-week session).

Fall, spring: The logic of truth-functional connectives, identity, and the universal and existential quantifiers: a formal language; translation between it and English; constructing "worlds" (and, time permitting, models); constructing proofs. We'll use a textbook accompanied by a software package (Language, Proof, and Logic by J. Barwise and J. Etchemendy).

Summer: This course covers the basics of propositional and first-order logic. We focus on the problem of translating English sentences into a simple, representative formal language and on techniques for showing that a given sentence does or does not follow from other sentences in these logics. The textbook will be Barwise and Etchemendy's Language, Proof, and Logic, which comes with software that allows students to check and submit work via an automated online system. It is important that students have a new copy of this book. Otherwise, they will not be able to use these online services. In
PHIL 241 Ethics (IV) (KCM)
Fall. 4 credits. By petition for breadth requirement. T. Hinton.
This course provides an introduction to the philosophical study of ethics. We examine answers that philosophers have given to four main questions: What is the connection between living well and living morally? What is the role of self-interest in being morally? What makes right acts right? Is it possible to achieve objectivity in ethics? We take up the first question by examining Aristotle's Nicomachean Ethics. To address the second question, we go to Thomas Hobbes' attempt to show that rational self-interest should drive us to behave morally. In considering the third question, we look at two kinds of moral theory—utilitarian and deontological—and then consider one or two issues in practical ethics. Finally, we set up some questions in what is known as "meta-ethics," among them the idea of moral relativism, the view that nothing we do is objectively right or wrong—it all depends on the cultural context in which we do it.

PHIL 242 Social and Political Philosophy (also GOVT 260) (III or IV) (KCM)
Fall. 4 credits. K. Leighton.
A survey of social contract theories, from Hobbes to Rawls, focusing on the dilemma of the liberal political subject, a subject who is both an autonomous individual and a subject of the state. We read works of the main social contract theorists (Hobbes, Locke, and Rousseau), both to understand the variations within the theory and to trace the specific tensions within it, and then later social contract theories, including Kant and Rawls, to trace how social contract theory engenders the development of representational politics. We also consider critiques of social contract theory, particularly in terms of its conceptions of nature and the individual and its influence on theories of democracy. In addition to considering this tradition in its philosophical and historical context, we consider its relation to issues raised by current events.

PHIL 243 Aesthetics (IV)

PHIL 244 Philosophy and Literature (IV)

PHIL 245 Ethics and Health Care (IV) (KCM)
Fall. 4 credits. T. J. Berry.
This course is an introduction to the ethical issues associated with contemporary medicine. No prior course in philosophy is presupposed. The course has two lectures and one discussion section per week. Topics to be covered 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 problems 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 approximately 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&T&S 206) (IV) (KCM)
Spring. 4 credits. Open to all undergraduates; permission of instructor required for freshmen. T. R. 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 then is 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.

PHIL 247 Ethics and Public Life (IV) (KCM)

PHIL 248 Feminism and Philosophy (also FGSS 249) (IV) (KCM)
Fall. 4 credits. N. Sethi.
An introduction to feminist thought using a wide variety of texts (philosophical, historical, literary, legal, and political). Special attention is paid to the interplay between feminism and the social construction of gender, and to how we frame various issues (e.g., the nature of freedom of expression or equal protection).

PHIL 251 Knowledge and Reality (IV) (KCM)
Spring. 4 credits. M. Fara.
This course introduces some central philosophical questions about the nature of the universe and our knowledge of it. This fall, we begin the discussion of the question of reality. What reason do we have to believe in the predictions of science? How do you know you’re not dreaming right now? What is the nature of human freedom? Don’t expect the course to answer these questions. Instead, expect to learn how to think about them and how to distinguish a good philosophical argument from a bad one.

PHIL 252 Philosophy of Mind (IV) (KCM)
Fall. 4 credits. B. Hellie.
We discuss such issues as: what is a person? How do the first-person and third-person perspectives differ? What is a belief? An intention? What is consciousness? What is a mind? Do minds and identity persist across time? What is the relation between mind and matter? What reasons do we have to believe in the predictions of science? How do you know you’re not dreaming right now? What is the nature of human freedom? Don’t expect the course to answer these questions. Instead, expect to learn how to think about them and how to distinguish a good philosophical argument from a bad one.

PHIL 253 Religion and Reason (also RELST 262) (IV) (KCM)
Spring. 4 credits. B. Hellie.
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 (or could) the existence 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 256 Science and Human Nature (also S&T&S 256) (IV) (KCM)
Spring. 4 credits. R. Boyd
Topic for 2003–2004: Darwin, Social Darwinism, and Hume's philosophy. An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena.

Intermediate or Advanced Courses
Some of these courses have prerequisites.

PHIL 308 Hellenistic Philosophy (also CLASS 341) (IV) (KCM)
Fall. 4 credits. Prerequisite: CLASS 231 or one PHIL course. C. Britain.
This course studies the philosophical developments of the Hellenistic period (c. 321–5 B.C.E.), which was 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 Sceptics' responses to them. We also look at some relevant developments in medical theory. Topics include scepticism, the psychology of action, theories of language, concept development and content, determinism and responsibility, personal identity, virtue ethics, and scientific epistemologies. Because most of the work of the Hellenistic philosophers is only available to us through either "fragments" or reports in later texts, we consider the appropriate methods for reconstructing this recently rediscovered and influential (e.g., on 17th century philosophers) part of the history of philosophy.

PHIL 309 Plato (also CLASS 339) # (IV) (KCM)
Fall. 4 credits. Prerequisite: at least one previous course in philosophy at the 200-level or above, or permission of the instructor. G. Fine.
A systematic survey of many of Plato's major dialogues, including the Apology, Meno, Phaedo, Republic, and Theaetetus. The focus of the course will be metaphysics and epistemology, but some attention is also paid to ethics and political theory, especially in looking at the Republic. We consider Plato's views about the nature of justice, the nature and value of art, the nature of the soul, dialectic and recollection, the nature of Platonic forms, and justice and happiness.

PHIL 310 Aristotle (also Class 310) (KCM)

PHIL 312 Modern Empiricism # (IV) (KCM)
Fall. 4 credits. N. Sturgeon.
This course examines the epistemological and metaphysical views of David Hume and Thomas Reid. We read Book I of Hume's Treatise, Reid's Inquiry, and parts of Reid's Essay on the Intellectual Powers of Man. Topics include skepticism, our knowledge of
external things, perception, causation, the nature of mind, and personal identity.

[PHIL 314] Ancient Philosophy (IV) (KCM)

[PHIL 315] Medieval Philosophy (IV) (KCM)

[PHIL 316] Kant (IV) (KCM)
Fall. 4 credits. Prerequisite: at least one course in philosophy at the 200 level or above. A. Chignell.
An introduction to the philosophy of Immanuel Kant. The focus will be on the Critique of Pure Reason, but there will also be some discussion of Kant's ethics.

[PHIL 317] Hegel (IV)

[PHIL 318] Origins of Twentieth-Century Philosophy (IV)

[PHIL 319] Twentieth-Century Analytic Philosophy (IV)
Spring. 4 credits. B. Hellie.
What Wittgenstein's Tractatus Logico-Philosophicus wrought. Carnap, the Vienna Circle, and the dawn of neopragmatism.

[PHIL 320] 17th Century Women Philosophers (also FGSS 319) (IV)

[PHIL 331] Deductive Logic (also MATH 201) (II) (MQR)
Fall. 4 credits. Prerequisite: PHIL 231 or permission of instructor. M. Fara.
This course introduces some metatheoretical results in mathematical logic. Topics covered include: basic set theory; computability and recursive functions; decidability and undecidability; soundness and completeness; compactness and the Lowenheim-Skolem theorem; representability in arithmetic; definability and Godel's First Incompleteness Theorem; provability and Godel's Second Incompleteness Theorem.

[PHIL 332] Philosophy of Language (IV)
Fall and spring. 4 credits. Prerequisite: one previous course in philosophy. H. Hodes.
A survey of certain concepts and issues in contemporary philosophy of language: grammaticality; linguistic understanding, the "ingredients" of meaning, singular reference, predicate, indexicality, truth, speaker's intentions, propositional attitudes.

[PHIL 333] Problems in Semantics (also LING 333 and COGST 333) (III or IV) (KCM)
Spring. 4 credits. Prerequisite: logic or semantics course or permission of instructor. 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 is 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.

[PHIL 334] Pragmatics (also LING 425) (III or IV)

[PHIL 341] Ethical Theory (IV) (KCM)

[PHIL 342] Law, Society, and Morality (IV) (KCM)
Spring. 4 credits. T. J. Berry.
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 legal thought to the question of political intention in, for instance, the institution of slavery and its aftermath.

[PHIL 343] Resistance and Responsibility (also LAW 676) (IV)

[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 462) (III or IV) (KCM)
Fall. 4 credits. T. Hinton.
In this course we examine some major contemporary theories of justice, focusing in particular on the work of John Rawls. The following questions give structure to our discussions: What basic rights and freedoms ought to be guaranteed to all citizens? What, if anything, justifies the existence of economic inequality? What values can we appeal to in justifying the laws that shape our political lives? What does the ideal of political equality require of us? The view of Rawls in his earlier work is both liberal and egalitarian, and he defends that view by appealing to the idea of a social contract. He proposes that justice requires, first, that each citizen has a robust set of basic rights and, second, that economic inequalities work to the greatest advantage for the worst-off citizens. We consider various objections that have been leveled against Rawls. In his later work, Rawls expounds the doctrine of political liberalism, and for him, the key difficulty facing citizens in modern liberal democracies is the existence of deep but reasonable disagreements about how to live. In light of these disagreements, Rawls believes the principles of justice have to be formulated in a way that does not depend on any particular view about the best way to live. Last, we focus our attention on some questions in democratic theory.

[PHIL 347] Global Justice (also GOVT 368) (III or IV) (KCM)
Spring. 4 credits. R. 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 kinds of wars are just, and what conduct in war is morally permissible? What is the moral significance of nationality and the aspiration to self-determination? To what extent can just international institutions and decision-making processes 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)

[PHIL 364] Metaphysics (IV) (KCM)

[PHIL 381] Philosophy of Science: Knowledge and Objectivity (also S&TS 381) (IV) (KCM)

[PHIL 382] Philosophy and Psychology (IV)

[PHIL 383] Choice, Chance and Reason (II) (MQR)

[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 400] German Philosophical Texts (IV)

[PHIL 410] Latin Philosophical Texts (IV) (KCM)
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 413) (IV) (KCM)
Fall and spring. Variable credit. Prerequisites: knowledge of Greek and permission of instructor. T. Irvan and C. Brittain.
Reading of philosophical texts in the original Greek.

[PHIL 413] Topics in Ancient Philosophy (also CLASS 413) (IV) (KCM)

[PHIL 414] German Philosophy after Kant (IV)

[PHIL 415] Topics in the History of Philosophy (also S HUM 415)
Fall. 4 credits. S. MacDonald.
Topic: Baptisting Aristotelian Science?
Aristotle's sophisticated ideas about knowledge and science were introduced into European culture by medieval Christian thinkers. Aristotle challenged their assumptions and they responded, dramatically transforming Western science, philosophy, and theology. We read foundational texts (in English translation) by thinkers such as Robert Grosseteste and Thomas Aquinas and examine how the interaction of powerful secular and
PHIL 418 Modern Philosophy # (IV) (KCM)
Spring. 4 credits. Prerequisite: PHIL 212, PHIL 316, or the equivalent. A. Chignell.
A seminar on Kant's metaphysics and epistemology as they relate to his philosophy of
religion. Primary readings come from the pre-critical period, the critiques, Religion
within the Limits of Reason Alone, and the lectures.

PHIL 432 Topics in Logic (also MATH 482) (II) (MQR)

PHIL 433 Philosophy of Logic (IV) (KCM)

PHIL 435 Pragmatics (also LING 425) (III or IV) (KCM)
Fall. 4 credits. Prerequisite: LING 201, PHIL 231, or permission of instructor.
D. Abusch.
An introduction to aspects of linguistic meaning that have to do with context and 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.

PHIL 436 Intensional Logic (II) (MQR)

PHIL 441 Contemporary Ethical Theory
(IV) (KCM)
Fall. 4 credits. N. Sturgeon.
Topic: Moral Realism and Its Critics.

PHIL 447 Contemporary Political Philosophy (also GOVT 465) (III or IV) (KCM)
Spring. 4 credits. Prerequisite: one previous course in political philosophy or
permission of instructor. T. Hinton.
In this seminar, we consider the two main areas of debate in contemporary political
philosophy: the first concerns the nature and extent of distributive equality. What kind of
equality is of real concern to egalitarians? How equal do people have to be? Our other
focus is on the foundations of liberalism: Why, if at all, should liberalism aspire to be
neutral between varying conceptions of the good? What is to be said for so-called
"perfectionist" alternatives to liberal neutrality?
The two main texts for the seminar are Ronald
Dworkin's Sovereign Virtue: The Theory and
Practice of Equality and Joseph Raz's The
Morality of Freedom.

PHIL 448 International Justice (also GOVT 482) (III or IV) (KCM)

PHIL 460 Epistemology (IV)

PHIL 462 Philosophy of Mind (IV) (KCM)

PHIL 464 Metaphysics (IV) (KCM)
Spring. 4 credits. Prerequisites: two
philosophy classes at the 300-level or
above. M. Farah.
An advanced survey of a topic in
contemporary metaphysics. Topic to be
announced at a later date.

PHIL 481 Problems in the Philosophy of Science (IV) (KCM)

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
Philosophy section.

PHIL 611 Ancient Philosophy (also CLASS 671)
Spring. 4 credits. Prerequisite: open to
graduate students in philosophy, and to
others only by permission of the instructor.
G. Fine.
Topic to be announced.

PHIL 612 Medieval Philosophy

PHIL 633 Philosophy of Language

PHIL 641 Ethics and Value Theory
Spring. 4 credits. T. Irwin.
Topic to be announced.

PHIL 642 Moral Psychology

PHIL 662 Philosophy of Perception
Fall. 4 credits. B. Hellie.
A graduate-level discussion of philosophical
issues concerning perception, especially the
role of perception in establishing thought
about bodies in the environment and their
features and the nature of our knowledge of
our own perceptual and sensational
properties.

PHIL 664 Metaphysics

PHIL 665 Metaphysics

PHIL 681 Philosophy of Science
Fall. 4 credits. R. Boyd.
Topic to be announced.

PHIL 700 Informal Study
Fall or spring. Credit TBA.
To be taken by graduate students only in
exceptional circumstances and by arrangement
with the student and his or her Special
Committee and the faculty member who has
agreed to direct the study.

PHYSICS
G. P. Lepage, chair (109 Clark Hall, 255–6016),
R. S. Galik, acting director of undergraduate
studies (101 Clark Hall, 255–8158). 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 out experimental 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 full 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 316 (Modern Physics I); 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
director of undergraduate studies, as should
students requesting transfer credit for physics
courses taken at another college.

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
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, Astronomy 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&E P 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 which 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 325, respectively.

Students with an astronomy concentration who might continue in that field in graduate school should use ASTR 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.

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.

| PHYSICS 101, 112, 116, 207 |
| PHYSICS 102, 208, 213, 217 |
| PHYSICS 214, 218 |
| PHYSICS 314, 318 |
| PHYSICS 323, 327 |
| PHYSICS 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 programs different from those suggested by the prerequisite ordering are

| 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 | 213 |
| 4th - Spring | 316, 3x0 | 316, 3x0 | 3x0 | 24 |
| 5th - Fall | 317, 327, 3x0 | 317, 327, 3x0 | 316 | 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 112–213–218 is difficult. PHYS 207 may be substituted for PHYS 112. Students taking 217 after 112 must coregister 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 come to 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, ASTR 332 or 431–432, and A&E P 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.
urgently 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 those who either feel insecure about taking PHYS 112 or simply want to develop their problem-solving skills. Emphasis is on getting the student to develop a deep understanding of basic concepts in mechanics. Most class time is spent solving problems and applications.

**PHYS 013 PHYS 213 Supplement**
Fall. 1 credit. S-U only. R. Lieberman. Provides backup instruction for PHYS 213. Description is the same as for PHYS 012, except the material covered is electricity and magnetism.

**PHYS 101 General Physics I (I) (PBS)**
Fall, summer (8-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 introductory lec R Aug. 28 or M Sept. 1. D. Fitchen.

**PHYS 101** emphasizes quantitative and conceptual understanding of the topics of introductory physics developed without the use of calculus. The course is mostly self-paced in a mastery-oriented format including eight subject units and a final retention (review) unit. Most instruction occurs in the learning center with personal tutoring by staff, assigned readings, problems, laboratory exercises, videotaped lectures, 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 101: kinematics, forces and dynamics, momentum, energy, fluid mechanics, waves and sound, thermal physics, kinetic theory, and thermodynamics.

**PHYS 102 General Physics II (I) (PBS)**
Spring, summer (8-weeks or 4-weeks for those doing PHYS 101 as well). 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 introductory lec M Jan. 20. Staff.

**PHYS 101-102** emphasizes quantitative and conceptual understanding of the topics of introductory physics developed without the 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 1st edition by Giambattista, Richardson, and Richardson.

**PHYS 103 General Physics (I) (PBS)**
Summer. 4 credits. Prerequisite: 3 years of high school including introductory 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 nonmajors in 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; sound waves. Text at the level of College Physics 1st 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: coregistration in MATH 192 (or 194 or 112), or substantial previous contact with introductory calculus combined with coregistration in MATH 111 or 119. Lect, T R, rec, lab. Two rec weekly and one lab session approximately every other week. Evening exams. Fall, P. McEuen; spring, P. McEuen.

Course covers the mechanics of particles with focus on mechanics, dynamics, conservation laws, central force fields, periodic motion. Mechanics of many-particle systems: center of mass, rotational mechanics of a rigid body, and static equilibrium. At the level of University Physics, Vol. 1, by Young and Freedman.

**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 for those majoring in physics, astronomy majors, or those doing PHYS 101 as well). 4 credits. Prerequisite for 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. Lect M W F. Fall, D. Ralph; spring, J. Rogers.

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 215 or 213 or 217 is required. For freshmen who plan to major in physics, applied and engineering physics, or astronomy. Lect, W. A. Sadoff.

This course is intended for freshmen who plan to major in physics or a closely related field (i.e., applied and engineering physics or astronomy) and would like to learn about the concepts of modern physics early in their physics education. Possible topics of discussion are methodology, symmetry and conservation laws, quantum theory, the unification of forces and matter, and big-bang cosmology.

**PHYS 190 Supplemental Introductory Laboratory**
Fall, spring. 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 of a 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 complete the lecture-related course credit acquired elsewhere. Those wishing to take 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. Lect, 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 there are a few computational problems assigned, the purpose is to help students to understand the concepts rather than to master problem-solving techniques. At the level of Physics Concepts and Connections by Hobson.

**PHYS 202 Energy (I) (PBS)**
Fall. 3 credits. For non-science 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 2003--2004.

The course will cover (1) the basic science of different kinds of energy (mechanical, electrical, chemical, 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.

**PHYS 203 Physics of the Heavens and the Earth—A Synthesis (I) (PBS)**
Spring. 3 credits. Prerequisite: none; uses high school algebra and geometry. For nonscience majors. Lect T R; sec W. H. Padamsee.

This course shows how the unification of apparently distinct areas of physics leads to an explosion in the growth of our knowledge and understanding. The material is divided into three parts: the physics of motion on earth and motion in the heavens, showing how the two evolved separately, from the ideas of the ancient Greeks to the dynamics...
and telescopic discoveries of Galileo; the final melding of these two topics with Newton's Universal Gravitation; and Einstein's theories of relativity followed by an exploration of this "new" physics and its impact. There is an emphasis throughout on "how do we know the laws?" These are the stories of breakthrough discoveries and brilliant insights made by Fascinating People, offering a humanistic perspective.

**PHYS 204** Physics of Musical Sound (I) (PBS)
Spring. 3 credits. Intended for nonscientists. Prerequisites: high school algebra. E. Cassel. Many features of the production, propagation, and perception of musical sound can be understood in terms of important concepts in physics. Topics covered include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales, and tuning; some basic principles of room acoustics; and the reproduction of sound and aspects of the mechanism of hearing. In addition to homework assignments and exams, students will write a research paper investigating a topic in the physics of sound that interests them. At the level of The Science of Sound, by Boosing, Moore, and Wheeler.

**PHYS 205** Reasoning about Luck (II) (MQR)
Fall. 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. E. Cassel. Many features of the production, propagation, and perception of musical sound can be understood in terms of important concepts in physics. Topics covered include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales, and tuning; some basic principles of room acoustics; and the reproduction of sound and aspects of the mechanism of hearing. In addition to homework assignments and exams, students will write a research paper investigating a topic in the physics of sound that interests them. At the level of The Science of Sound, by Boosing, Moore, and Wheeler.

**PHYS 206** Physics in the News (I) (PBS)
Spring. 3 credits. Prerequisite: high school algebra. Intended for non-science majors. Does not serve as a prerequisite for further physics courses. "Physics in the News" examines the physics concepts behind the everyday 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 non-science 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 webpages. At the level of Physics, Concepts and Connections, 2nd edition, by Art Hobson.

**PHYS 207** Fundamentals of Physics I (I) (PBS)
Fall. 4 credits. Prerequisites: high school physics plus MATH 111, 190, or 191, or substantial previous contact with introductory calculus, combined with coregistration in a math course approved by instructor. E. Cassel. Many features of the production, propagation, and perception of musical sound can be understood in terms of important concepts in physics. Topics covered include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales, and tuning; some basic principles of room acoustics; and the reproduction of sound and aspects of the mechanism of hearing. In addition to homework assignments and exams, students will write a research paper investigating a topic in the physics of sound that interests them. At the level of The Science of Sound, by Boosing, Moore, and Wheeler.

**PHYS 208** Fundamentals of Physics II (I) (PBS)
Spring. 4 credits. Prerequisites for PHYS 208: PHYS 207 or 112 or 101; 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. E. Cassel. Many features of the production, propagation, and perception of musical sound can be understood in terms of important concepts in physics. Topics covered include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales, and tuning; some basic principles of room acoustics; and the reproduction of sound and aspects of the mechanism of hearing. In addition to homework assignments and exams, students will write a research paper investigating a topic in the physics of sound that interests them. At the level of The Science of Sound, by Boosing, Moore, and Wheeler.

**PHYS 209** Relativity and Chaos (II) (MQR)
Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but uses high school algebra. E. Cassel. Many features of the production, propagation, and perception of musical sound can be understood in terms of important concepts in physics. Topics covered include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales, and tuning; some basic principles of room acoustics; and the reproduction of sound and aspects of the mechanism of hearing. In addition to homework assignments and exams, students will write a research paper investigating a topic in the physics of sound that interests them. At the level of The Science of Sound, by Boosing, Moore, and Wheeler.
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 concentration outside of physics or astronomy; PHYS 318 covers similar material at a more analytical level. Lec M W; lab, T. G. Dugan. 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. 3 credits. Prerequisites: PHYS 214 or 218 and coregistration in at least MATH 294 or equivalent. It is assumed that majors registering in PHYS 316 will continue with PHYS 317. Lec, M W F; rec, J. C. Davis. Course topics include: breakdown of classical concepts in microphysics; light quanta and matter waves; Schrödinger equation and solutions for square well, harmonic oscillator, and the hydrogen atom, 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, T. G. Dogan. Course covers a number 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, superconductivity, 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 junior 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 coordinate systems; Euler's equations, Lagrange and Hamilton formulations; normal modes and small vibrations; introduction to chaos. At the level of Classical Mechanics by Goldstein, Classical Dynamics by Marion and 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. Course topics include: electro/magnetostatics, boundary value problems, potential; energy and charge; Maxwell's Equations, electromagnetic waves, and sources of electromagnetic radiation. At the level of Introduction to Electrodynamics by Griffiths.

PHYS 323 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. Csaki. 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, electromagnetics in media, and special relativity-transformations, four vectors, particle kinematics and dynamics, relativistic electrodynamic. 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, M W F; lab, M. T. M. Wang. A practical laboratory course in basic and modern optics. The 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 components and the instructor's ability to stimulate the students and instructors with hands-on experience in practical laboratory techniques currently employed in physics, chemistry, biology, and engineering. Students are also introduced to digital imaging and image processing techniques. At the level of Optics by Hecht.

PHYS 341 Thermodynamics and Statistical Physics (I) (PBS)

Spring. 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 or circuit 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 or T R. Fall, F. 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 include computer interfaces, computer input/output, 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. D. Hartill. 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. Lab T W. D. Hartill. Selected topics in experimental concepts and techniques. About 60 different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and electronics, 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&AP 321 or appropriate course(s) in mathematics, coregistration in PHYS 314 or 318, or permission of instructor. Assumes prior experience in linear algebra, differential equations, and Fourier transforms. Lec, M W F, rec, F. S. 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 Nuclear and High-Energy Particle Physics (I) (PBS)**
Spring. 4 credits. Prerequisite: PHYS 443 or permission of instructor. Lec, M W F, rec, F. Behavior of high-energy particles and radiation; elementary particles; basic properties of accelerators and detectors; general symmetries and conservation laws. At the level of Elementary Particles by Griffiths or Modern Elementary Particle Physics by Kane.

**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, T R. Not offered 2003–2004.

**PHYS 454 Introductory Solid-State Physics (also A&AP 450) (I) (PBS)**
Fall. 4 credits. Prerequisite: PHYS 443, A&AP 361, or CHEM 793 is highly desirable but not required. Lec, M W F. Computer lab. W or F. R. Wise.

An introduction to modern solid-state physics, including crystal structure, lattice vibrations, electron theory of metals and semiconductors, and selected topics from magnetic properties, optical properties, superconductivity, and defects. At the level of Introduction to Solid State Physics, by Kittel, and Solid State Physics, by Ashcroft and Mermin.

**PHYS 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. Lec, T R. B. Greene.

**PHYS 456 Introduction to Accelerator Physics and Technology (also PHYS 656) (I) (PBS)**
Fall. 3 credits. Prerequisites: Intermediate E&M (PHYS 323 or 327) and Classical Mechanics (PHYS 314 or 318). Lec, T R. G. Hofstaetter.

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 657) (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. Not offered 2003–2004. 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 visitor lectures on specialized topics on radiation from insertion devices (i.e., wigglers and undulators), x-ray optics, coupling to beams, and coherence in 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 690) (I) (PBS)**
Spring. 3 credits. S-U grades 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). 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 which won Walter Kohn and John Pople the Nobel prize in Chemistry in 1998.

**PHYS 481 Quantum Information Processing (also PHYS 681 and COM S 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 487 Selected Topics in Accelerator Technology (also PHYS 687) (I) (PBS)**
Fall. 2 credits. S-U only. Prerequisites: intermediate E&M (PHYS 323 or 327). Lec, T R. Not offered 2003–2004. 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. Course 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 eight PHYS 490 credits to the physics major. Prerequisite: permission required of professor who will direct proposed work. A copy of the Request for Independent Study form must be submitted to the 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 student's special requirements. D. Hartill.

**PHYS 510 Advanced Experimental Physics**
Fall. spring, summer. Variable to 3 credits. Lab, T W. An optional lecture associated with PHYS 410, M is available. D. Hartill.

About 60 different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, and nuclear physics. Students perform three to four experiments selected to meet individual needs. Independent work is stressed. Lectures include techniques used in experiments in the advanced laboratory and on current research topics.

**PHYS 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 modern topical 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)**

This course covers the formation of compact objects, neutrino 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 phenomena, mass flow in binary systems; spherical and disc accretion, high-temperature
radiation processes, compact X-ray sources; Gamma-Ray bursts; and high energy processes near supermassive 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 451)**
Spring. 3 credits. Not offered 2003-2004. For description, see PHYS 451.

**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. Offered alternate years, next offered fall 2004.LEC, T R. J. York.
An introductory study of Einstein's theory using methods of vector analysis, differential geometry, and tensor calculus. Topics include moving frames, torsions and curvature, equivalence principle, variational principle, electromodynamics, 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. 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. S. Teukolsky.
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, random walks, diffusion equations, and the fluctuation-dissipation theorem. We cover Bose-Einstein and Fermi statistics, black-body radiation, Bose condensation, superfluidity, metals, and white dwarves. 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. At the level of *Statistical Mechanics* (2nd edition) by Pathria and *Statistical Mechanics of Phase Transition* by Yeomans.

**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: hydrogen atom, including fine and hyperfine structure, the deuteron; and atomic transitions. Theory of angular momentum, symmetries, perturbations and collisions are deuterium. Phenomena displayed by these systems. At the level of *Modern Quantum Mechanics* by Sakurai. 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 for fermions, 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. Prerequisites: a good undergraduate solid-state physics course, such as PHYS 545, as well as familiarity with graduate-level quantum mechanics. N. Ashcroft.
A survey of the physics of solids: crystal structures, x-ray diffraction, phonons, and electrons. Selected topics from semiconductors, magnetism, superconductivity, disordered materials, defect properties, and mesoscopic physics. At the level of *Solid State Physics* by Ashcroft and Mermin.

**PHYS 636 Solid-State Physics II**
Spring. 4 credits. Prerequisite: PHYS 635. P. Brouwer.
A continuation of PHYS 635. Topics from quantum physics not included in that course, which may include: Fermi Liquid Theory, magnetism, superconductivity, broken symmetries, elementary excitations, topological defects, superfluids, the quantum Hall effect, mesoscopic quantum transport theory, Anderson localization, and other metal insulator transitions.

**PHYS 645 High-Energy Particle Physics**
Fall. 3 credits.
Course serves as an introduction to physics of baryons, mesons, and leptons.

**PHYS 646 High-Energy Particle Physics**
Spring. 3 credits.
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. Neubert.
Topics covered 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 functional integral methods, quantization of non-abelian gauge theories, the renormalization group, spontaneous symmetry breaking, and anomalies. Applications to the electroweak theory and quantum chromodynamics are emphasized. Topics in grand unification, supersymmetry or instantons may be included. 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. V. E. Elser.
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, and random matrix theory 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 studied at zero and finite temperatures. Formalisms such as thermodynamic Green's functions are introduced and applied to such topics as normal and superconducting Fermi systems, magnetism, dynamical impurity problems, and Luttinger Liquids.

**PHYS 656 Introduction to Accelerator Physics and Technology (also PHYS 456)**
See PHYS 456 for description.

**PHYS 657 The Storage Ring as a Source of Synchrotron Radiation (also PHYS 457)**

**PHYS 661 Advanced Topics in High Energy Particle Theory**
Fall. 3 credits. Prerequisites: PHYS 652, S-U grades only. M. Neubert.
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)**
Not offered 2003-2004. 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)**

See PHYS 481 for description.

[PHYS 687 Selected Topics in Accelerator Technology (also PHYS 487)]


**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.

**POLISH**

See Department of Russian.

**PORTUGUESE**

See Department of Romance Studies.

**PSYCHOLOGY**


The major areas of psychology represented in the department are perceptual and cognitive psychology, biopsychology, and personality and social psychology. These areas are very broadly defined, and the courses are quite diverse. Biopsychology includes such things as 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, and Social Construction of Gender), as well as courses in fieldwork and psychopathology. In addition to the three major areas mentioned above, the department also emphasizes the statistical and logical analysis of psychological data and problems.

**The Major**

Admission to the major is usually granted to any student in good standing in the college who has passed three or more psychology courses with grades of C+ or better. Provisional admission requires two such courses. To apply to the major and receive an adviser, a major application form must be obtained from the department office (211 Uris Hall) and should be completed and taken to one of the faculty members whose name is listed on the form.

Requirements for the major are:

1) A total of 40 credits in psychology (including prerequisites), from which students majoring in psychology are expected to choose, in consultation with their advisers, a range of courses that covers the basic processes in psychology (laboratory and/or field experience is recommended); and

2) Demonstration of proficiency in statistics before the beginning of the senior year. (See the section below on the statistics requirement.)

Normally it is expected that all undergraduate psychology majors will take at least one course in each of the following three areas of psychology:

1) **Perceptual and cognitive psychology**

2) **Biopsychology**

3) **Social, personality, and abnormal psychology**

The following classification of Department of Psychology offerings is intended to help students and their advisers choose courses that will ensure that such breadth is achieved.

1) **Perceptual and cognitive psychology:**


2) **Biopsychology:**


3) **Social, personality, and abnormal psychology:**

PSYCH 128, 265, 275, 277, 280, 281, 325, 327, 328, 402, 404, 450, 481, 489, 491, 492.

4) **Other courses:**

PSYCH 101, 199, 347, 350, 410, 440, 441, 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 PSYCH 350.

2) Passing an approved course or course sequence in statistics in some other department at Cornell. The approved list of courses and courses 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 course 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 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 grounding, students in the concentration will be permitted to include some major courses in 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: 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 planning on a graduate education in psychology or other academic fields should consider the honors program seriously. The program offers most students the closest contact and consultation with faculty 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 the student 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 psychology with the exception of PSYCH 225, 307, 322, 324, 326, 332, 350, 361, 396, 410, 420, 422, 424, 431, 440, 441, 470, 471, 472, 473, 475, 478, 479, 491, 492.

Note: The Department of Psychology has listed all days and times for each course that we offer. 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 website, comp9.psych.cornell.edu.

Courses

**PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry (III) (SBA)**

Fall. 3 credits. 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, and behavior, psychotherapy, social psychology, and other aspects of applied psychology. Emphasis is on developing skills to critically evaluate claims made about human behavior.

**PSYCH 102 Introduction to Cognitive Science and Context Laboratory (also COGST 201 and COM S 201) (III) (KCM)**

Spring. Students after PSYCH 102/COG ST 101/COM S 101/LING 170/PHIL 191. Introduction to Cognitive Science. Knowledge of programming languages is not assumed. Limited to 24 students. Disc and demos, M W; lab, M W; plus additional hours TBA. Urs Hall 259. Not offered 2003-2004. D. Field and staff. Laboratory course that explores the theories of cognitive science and provides direct experience with the methodologies of cognitive science, in relation to the full range of both present and anticipated future activities in the workplace, the classroom, and in everyday life. Discussions of laboratory exercise results, supplementation of laboratory topics, and analyses of challenging primary research literature are 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, electronic 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 problems. Students are expected to come to each discussion meeting having read and thought about assigned materials, and to come to scheduled laboratory meetings fully prepared to perform the laboratory exercises. Laboratory facilities are available to students at all times so that presentations of data, preparation of laboratory reports, and collection of experimental data are facilitated.

**PSYCH 103 Introductory Psychology Seminars**

Fall. 1 credit. Limited to 300 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 topic. 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 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. M W F. E. Adkins Regan and R. Hoy. 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 Developmental Psychology (also COGST 214) (III) (KCM)**

Fall. 3 or 4 credits (the 4-credit option involves some participation in COGST 501/PSYCH 614). Sophomore standing required. Limited to 150 students. Graduate students, see PSYCH 614. M W F. S. Edelman. The course serves as a broad overview of problems arising in the study of cognition and of the information-processing, or computational, approaches to solving these problems, in natural and artificial cognitive systems. Theoretical and experimental challenges posed by the understanding of perception, attention, memory, thought, and language are discussed and analyzed. Participants acquire conceptual tools essential for following the current debates on the nature of mind and its relationship to the brain.

**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, its form, the 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 223 Introduction to Biopsychology (I) (Supplementary I) 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. Owren. 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 none 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 265 Psychology and Law (III) (SBA) Fall. 3 credits. M W F. D. A. Dunning. This course examines the implications of psychological theory and research for the 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 of 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. Recommended: 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 psychometric concepts and the methods for measuring personality are covered, as will 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 2003–2004. S. L. Bem. PSYCH/FGSS 277 is an interdisciplinary course that addresses two critical questions: How an individual's gender and sexuality constructed? And how are 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 some of the many topics discussed are the importance of looking at biology in context, the "parental instinct," androcentrism in law, sexual orientation cross-culturally, culturally, egalitarian relationships, gender-liberated child-rearing, and homophobia.

PSYCH 280 Introduction to Social Psychology (III) (SBA) Spring. 3 credits. T. R. T. D. Gilovich and D. T. Regan. An introduction to research and theory in social psychology. Topics include social influence, persuasion, and attitude change; social interaction and group phenomena; altruism and aggression; stereotyping and prejudice; and everyday reasoning and judgment.

PSYCH 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 field work within 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 which 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) Spring. 4 credits. Prerequisites: one 200-level course in psychology. M. W. Section meetings on Friday. Not offered 2003–2004. U. Neisser. 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 205 or permission of instructor. M. W. F. Not offered 2003–2004. J. E. Cutting. A detailed examination of pictures and their comparison to the real world. Linear perspective in Renaissance art, photography, cinema, and video are discussed in light of contemporary research in perception and cognition.

PSYCH 311 Introduction to Human Memory (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 2003–2004. 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, retrieval processes, practice and habit acquisition, organization 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) Fall. 3 credits. Prerequisite: HD 115 or PSYCH 101. HD 216 recommended. M. W. Not offered 2003–2004. J. Haugard. 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) Fall. 3 credits. Prerequisite: HD 115 or PSYCH 101. HD 216 recommended. M. W. C. L. Krumhansl. A course that covers the major topics in auditory perception including: physics of sound; structure and function of the auditory system; perception of loudness, pitch, and spatial location; with applications to speech production and perception; and music and environmental sounds.

PSYCH 322 Hormones and Behavior (also BIONB 322) (I) (PBS) 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) BIONB 222, or (d) one year of introductory biology plus one course in psychology. Letter grade only. Graduate students see PSYCH 722. M. W. F. Not offered 2003–2004. E. Adkins Regan.
The major focuses of the course are 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, age-related learning and memory, and biological rhythms.

[PSYCH 324 Biopsychology Laboratory (also BIONB 324) (I) (PBS)]
Fall. 4 credits. Limited to 20 juniors and seniors. Prerequisites: PSYCH 223 or BIONB 221 or 222, and permission of instructor. T. R. Not offered 2003-2004. T. J. DeVoogd.
Experiments designed to provide experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included.

PSYCH 325 Adult Psychopathology (also BIONB 379) (H) (II) (SBA)
Spring. 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 (II)
Spring. 4 credits. Prerequisite: PSYCH 223, or an introductory biology course, or an introductory anthropology course.
Graduate students, see PSYCH 626. T. R. E. Johnson.
A broad comparative approach to the behavior of animals and humans with special emphasis on the evolution 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 behavior and organization, cooperation and altruism, sexual behavior, mating and marriage systems, aggression, and warfare.

PSYCH 327 Field Practicum I (also HD 327) (III) (SBA)
Fall only. 3 credits. Prerequisites: PSYCH 325 or HD 370 (or taken concurrently) and permission of instructor. No S-U grades. Enrollment is limited. M. W. H. Segal.
This course is composed of three components which 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)
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) (I) (PBS)
Fall. 3 credits. Limited to 25 students. Prerequisites: BIONB 222 or permission of instructor. S-U grades Optional. Lecs T R 2:55-4:10. Offered alternate years. C. Linster.
This course will cover 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.

PSYCH 332 Biopsychology of Learning and Memory (also BIONB 328) (I) (PBS)
Spring. 3 credits. Prerequisites: 1 year of biology and either a biopsychology class or BIONB 222. Limited to 60 students.
Graduate students, see PSYCH 632. M. W. F. T. J. DeVoogd.
This course surveys the approaches that have been or are currently being used in order to understand the biological bases for learning and memory. Topics include: invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, and human pathology. Many of the readings are from primary literature.

PSYCH 340 Autobiographical Memory
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)
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 covered include: "three-dimensional" display systems, color theory, spatial and temporal limitations of the visual systems, attempts at subliminal communication, and "visual" effects in film and television.

PSYCH 347 Psychology of Visual Communications (also VISST 347) (III) (SBA)
Spring. 3 credits. Limited to 15 students.
Prerequisites: PSYCH 101 and permission of instructor. R. J. B. Maas.
An exploration of the theories of education, communication, perception, attitude, and behavior change as they relate to the effectiveness of visually based communication systems. Emphasis is on the use of photography and computer graphics to deliver educational messages.

PSYCH 350 Statistics and Research Design (II) (MQR)
Fall. 4 credits. Limited to 120 students. M. W. F. T. D. Gilovich.
Acquaints the student with the elements of statistical description (measures of average, variation, correlation), hypothesis testing, and regression, as well as the design and analysis of experiments. Also important, develops an understanding of statistical inference. Emphasis is placed on those statistical methods of principal relevance to psychology and related behavioral sciences.

PSYCH 361 Biopsychology of Normal and Abnormal Behavior (also NS 361)
Fall. 3 credits. Limited to 50 students in psychology and 50 students in nutritional sciences.
Prerequisites: an introductory biology course and an introductory psychology course, or permission of instructor. S-U grades optional. Juniors and seniors only. M. W. F. B. J. Strupp.
A critical evaluation of factors thought to underlie normal and abnormal behavior and/or cognitive functioning. Psychological, biological, and societal influences are integrated. Topics include: psychological and biopsychological approaches to learning and memory; nutritional influences on behavior/cognition (e.g., sugar, food additives, caffeine); cognitive dysfunction (e.g., amnesia, Alzheimer's disease); developmental exposure to environmental toxins and drugs of abuse; and psychiatric disorders (depression, eating disorders).

PSYCH 380 Social Cognition (III) (SBA)
Fall. 4 credits. Limited to juniors and seniors.
Prerequisites: PSYCH 280. T. R. M. Ferguson.
What are the causes and consequences of our own and other's judgments, feelings, attitudes, and behaviors? This course introduces students to social cognition, which is a research perspective that uses both cognitive and social psychological theories and methodologies to explain such social phenomena.

[PSYCH 398 Introduction to Sensory Systems (also BIONB 398) (I) (PBS)]
Spring. 4 credits. Limited to 25 students.
Prerequisites: an introductory course in biology or biopsychology, plus a second course in behavior, biopsychology, cognitive science, or neuroscience, or perception. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Offered alternate years. Not offered 2003-2004. Class meetings, M. W. F. B. P. Halpem.
This course covers both those characteristics of sensory systems that are common across living organisms and those sensory properties that represent adaptations of animals to particular habitats, environments, or niches. The principal topics of major papers 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 assigned original literature 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 email to the course's electronic mailing 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 web site or term papers 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. Gersler; The Retina, by J. E. Dowling. courseinfo.cit.cornell.edu/courses/psych_nbb_625

[PSYCH 401 Theoretical Approaches to Psychopathology and Treatment (III) Fall. 3 credits. Limited to 20 students. Prerequisites: PSYCH 281 or 325. TBA. Not offered 2003–2004. Staff. This course is designed to provide students with an overview of major theoretical approaches to psychopathology and psychotherapy. It also aims to develop students' capacities to think in theoretical terms about psychological practice. We examine the theoretical and practical implications of major contemporary models of psychotherapy and explore the conceptual traditions on which they draw. Observation of the work of children and adolescents, audio-visual demonstrations, case presentations and discussions are included to advance students' understanding of the application of theory to practice. At the end of the course, students should be prepared to take a particular case and discuss the theoretical, practice, and research issues it raises, including intervention strategies. This course is not intended to provide students simply with an understanding of methods. It is organized around theory, research, and practice relevant to the treatment of several of the Disorders of Childhood as well as specific disorders of Adults on Axis I and Axis II of DSM IV. Special attention is given to the work of: Daniel Stern, M.D. and Otto Kernberg, M.D.—Psychoanalytic revisionists; Lorna Benjamin, Ph.D.—Interpersonal Theory; Aaron Beck, M.D.—Cognitive Theory; and Marsha Linehan, Ph.D.—Behavioral and Cognitive-Behavioral Treatment.]

[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 2003–2004. Staff. Current research and theory on the nature and etiology of depression. Approaches from various perspectives (biological, psychological, socio-cultural) 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 2003–2004. 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 anxiety, depression, psychosis, 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 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: statistics and 1 course in cognition or perception is recommended. Graduate students, see PSYCH 612. Not offered 2003–2004. M. W. D. J. Field. A laboratory course is designed to introduce students to experimental methods in perception and cognitive psychology. Students take part in a number of classic experiments and develop at least one independent project. Computerized data are available and used in many of the experiments although computer literacy is not required. Projects are selected from the areas of visual perception, pattern recognition, memory, and concept learning.]

[PSYCH 413 Information Processing: Conscious and Nonconscious (III) Spring. 4 credits. Prerequisites: at least 1 course in human experimental and permission of instructor; PSYCH 350 or equivalent will be useful for evaluating empirical articles. R. Not offered 2003–2004. 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 and empirical justification of the distinction 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; and write a term paper on a topic of their interest. Students should be prepared to read extensively.]
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 perceptual and cognitive 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, computer science, linguistics, physics, anthropology, biology, and related disciplines. Some music background is desirable but no specific musical skills (e.g., reading music) are required. In the current offering, the required textbook is Music: A Very Short Introduction (2nd ed.), by G. McBurney. A course that covers the major topics in the psychology of music treated from a scientific perspective. It reviews recent developments in the field and integrates music, psychology, engineering, computer science, and biology. Prerequisites: a course in introductory music psychology, an upper-division course in cognitive and biological psychology. A., or permission of instructor. Limited to 15 students. Graduate students, see PSYCH 618. M. W. C. L. Krumhansl.

PSYCH 419 Neural Networks Laboratory
Spring. 4 credits. Prerequisites: at least 1 year of calculus, and permission of instructor. Limited to 15 students. Graduate students, see PSYCH 619. T. R. Not offered 2003–2004. D. J. Field.

This course takes a hands-on approach to understanding the limitations and successful applications of neural networks to problems in cognitive and biological psychology. A variety of neural network architectures are discussed and explored using computer simulations. Applications of networks to perceptual recognition and representation are emphasized. We consider the class of problems that artificial neural networks can solve and consider the accuracy with which they model real nervous systems. Students complete weekly lab reports and develop one independent project demonstrating the application of a neural network to a problem discussed in the course.

PSYCH 420 Neuroethology (also BIONB 424) (I) (PBS)

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 specialization at just a few mammalian species? Can we hope to understand how animals with specialized behaviors have specialized nervous systems? What is the sensory world of a real animal and how does it vary from species to species? These and other questions drive this introductory survey of neuroethology: exitus senses; amazing motor programs; surprising integration.

PSYCH 425 Cognitive Neuroscience (III) (KCM)
Fall. 4 credits. Prerequisites: a course in introductory biology and a course in psychological and computational neuroscience (such as PSYCH 223 or BIONB 221). Graduate students, see PSYCH 625. M. W. F. B. L. Finlay.

We study the relation 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 issues in cognitive neuroscience including: mechanisms of perception, particularly vision, and the neuropsychology of everyday acts involving complex cognitive skills such as recognition of individuals, navigation in the world, language, memory, social interaction and consciousness.

PSYCH 427 Evolution of Language (also COGST 427 and PSYCH 627)
Fall. 3 credits. Prerequisites: sophomores, juniors, and seniors. Prerequisite: any one course in Psychology or Human Development. M. Christiansen.

This seminar surveys a cross-section of modern theories that attempt to explain the origin and evolution of language. We consider evidence from psychology, the cognitive sciences, comparative psychology, and computational modeling of evolutionary processes. Topics for discussion may include: What does the fossil record tell us about language evolution? What can we learn from comparative perspectives on neuropsychology and behavior? Can apes really learn language? Did language come about through natural selection? What were the potential preadaptations for language? What is the relationship between phylogeny and ontogeny?

PSYCH 428 Connectionist Psycholinguistics (also COGST 428) (III)
Fall. 3 credits. Seniors status or permission of instructor. Graduate students see PSYCH 628. T. M. Christiansen.

Connectionist psycholinguistics involves using (artificial) Neural networks, which are inspired by biological neural networks, 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 methodology 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 Olfaction and Taste: Structure and Function (also BIONB 429) (I) (PBS)
Spring. 3 or 4 credits (4-credit option requires a term paper, web site, or research project. The research project can, but does not need to, study nonhuman vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Fall. 4 credits. Prerequisites: BIONB 101–102 and permission of instructor. Limited to 15 students. Graduate students, see PSYCH 629. T. R. B. P. Halpern.

The structural and functional characteristics of olfaction and taste are explored with nonhuman information included. The emphasis is on especially air-breathing vertebrates in the case of olfaction. Species-specific, as well as general, mechanisms are examined. At the level of The Neurobiology of Taste and Smell, 2nd edition, edited by T. E. Firestein, D. Restrepo, Mechanisms of Taste Transduction, edited by S. A. Simon and S. D. Roper and Neuroscience, 2nd edition, Purves et al.

PSYCH 431 Effects of Aging on Sensory and Perceptual Systems (also BIONB 431) (I) (PBS)
Fall. 3 or 4 credits. The 4-credit option involves a term paper or creation of a relevant web site. Limited to 30 students. Prerequisites: an introductory course in biology or psychology, plus a second course in psycholinguistics, cognitive science, or biopsychology. B. L. Finlay.

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. Preference given to senior psychology and biology majors and graduate students. Prerequisites: an introductory course in biology or psychology. Limited to 15 students. Graduate students, see PSYCH 631. B. L. Finlay.

This course uses 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.cornell.edu/courses/psych431nbh421/, from Internet sites, from a course packet, and from
materials on reserve. 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. 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 may vary from year to year but include evaluation of and advertisement for mates, aggression and territorial behavior, parental-young interactions, social recognition (species, sex, individual, kin reproductive state, status), memory for odors, odor and endocrine interactions, innate and learned homing and navigation. Basic aspects of the structure and function of the olfactory system 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 data obtained 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 437.)

PSYCH 437 Lab Course: Language Development (also COGST 450, HD 437, and LING 450) (in conjunction with COGST/HD/LING 436, Language Development Seminar) Spring. 2 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 introduction to 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 BIOLN 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 explores the neural structures and systems that shape sleep and the biological functions of sleep. Emphasis is placed on the neurobiological and psychological correlates of sleep and the role of sleep in learning and memory. H. S. Porte.

PSYCH 441 Laboratory in Sleep Research
Spring. 4 credits. Prerequisite: permission of the instructor during preregistration. Laboratory fee: $25. Graduate students, see PSYCH 641. S. Edelman.
This laboratory course introduces students to the laboratory study of human sleep and its psychological correlates. Using both self-report and physiological measures of behavioral state, using computerized data analysis, students complete weekly laboratory reports and conduct 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 grade only. M. S. Bem.
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...and consent of instructor by written application. Letter grade 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 dysregulation; the special case of child abuse and its effects on development, overlaps between PTSD and other psychiatric disorders including borderline personality; and trauma's interface with gender and sexuality.

PSYCH 460 Human Neuroanatomy (also BIOLN 420, sec 02) (I or III) (PBS)
Spring. 3 or 4 credits (4 credits with one discussion/lab per week in which students dissect sheep brains, read original research papers and write a term paper). Prerequisites: PSYCH 223, or BIOLN 222, or permission of the instructor. Permission required for 4-credit option. Limited to juniors, seniors and graduate students. S-U grades and auditing not permitted. Lees, M. W. F.; discussion section to be arranged. S. Newman.
Neuroanatomy is the substrate for the functional organization of the human nervous system. This course introduces the brain nuclei and major connecting pathways of functional neural systems: sensory, motor, and integrative. Our understanding of the functions of these systems is based in part on their dysfunction, on the symptoms of neurological and psychiatric diseases that damage or inactivate selected pathways. This course also highlights neuroanatomical pathways and networks that are abnormal, or hypothesized, to be dysfunctional in a variety of nervous system disorders.

PSYCH 465 Topics in High-Level Vision (also COGST 465 and COM S 392) (III) (KCM)
Spring. 4 credits. Graduate students see PSYCH 665. 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 the collection of research publications, linked by a common thread, from the diverse perspectives offered by the different disciplines. Students write bi-weekly commentaries on the assigned papers and a term paper integrating the material covered in class.

PSYCH 470 Undergraduate Research in Psychology
Fall or spring. 1-4 credits. S-U grades optional. Written permission from the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology. Staff.

PSYCH 471 Advanced Undergraduate Research in Psychology
Fall or spring. 1-4 credits. S-U grades optional. Written permission of the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology. Staff.
Advanced experience in planning, conducting, and reporting independent laboratory, field, and/or library research. One, and preferably two, semesters of PSYCH 470 is required. The research should be more independent and/or involve more demanding technical skills than that carried out in PSYCH 470.

**PSYCH 472 Multiple Regression**
Spring, weeks 1–7, 2 credits. Prerequisite: 1 solid semester of introductory statistics. Analysis of variance is helpful but not required. M W F. R. B. Darlington.
Course covers uses and pitfalls of multiple regression in causal analysis, path analysis, and prediction. Emphasis is on analyzing data collected under uncontrolled conditions. Includes collinearity, indicator variables, sets, adjusted and shrunken $R^2$, suppressors, hierarchical analysis, overcontrol, and experimental design. Students may use the Mystat, Minitab, SPSS, or Systat statistics packages.

**PSYCH 473 General Linear Model**
Spring, weeks 8–14, 2 credits. Prerequisite: PSYCH 472 or equivalent. M W F. R. B. Darlington.
Course topics include multivariate categorical variables, comparison G.s for multiple tests, diagnostic methods, nonlinear relationships, interaction, main and simple effects, and basic power analysis. Student may use Mystat, Minitab, SPSS or Systat.

**PSYCH 475 Multivariate Analysis of Psychological Data**
Fall, 2 credits. Prerequisite: PSYCH 473 or permission of instructor. R. Not offered 2003–2004. R. B. Darlington.
Students vote on topics to cover, choosing among time series, cluster analysis, multidimensional scaling, component analysis, factor analysis, MANOVA, canonical correlation, repeated measures, logistic regression, log-linear models, ANOVA with empty cells, meta-analysis, and other topics. First class sketches all these topics before vote.

**PSYCH 481 Advanced Social Psychology (III)**
Fall, 4 credits. Limited to 15 students, by application. Senior psychology majors have priority. Graduate students, see PSYCH 681. T R. D. T. Regan.
Selected topics in social psychology are examined in depth with an emphasis on the relationship between experimental research and the development of theory. Readings are mostly primary sources. Among the theoretical approaches to social behavior we may discuss are social comparison theory, cognitive dissonance, attribution processes and social judgment, dramaturgy and impression management, and evolutionary perspectives.

**PSYCH 489 Seminar: Beliefs, Attitudes, and Ideologies (also PSYCH 689, FGSS 488/688) (III) (CA)**
Fall, 4 credits. Prerequisites: admission is by application during the spring pre-registration period for the fall semester. Seniors and graduate students are given priority. Not offered 2003–2004. M. D. J. Bern.
This course in cultural analysis examines the properties of beliefs and attitudes, how they are formed and changed, the psychological functions they serve, and how they get organized into ideologies. Several specific issues involved in America’s “culture wars” are examined, such as abortion, gender, sexual orientation, and affirmative action. Other topics include the culture of childhood, deaf culture, and the ideologies of science.
Participants write weekly commentaries on the readings and a term paper examining a particular ideology.

**PSYCH 491 Research Methods in Psychology**
Spring, 4 credits. Enrollment limited to 20 students. Recommended: permission of instructor, PSYCH 350, experience in upper-division psychology courses, or graduate standing. Graduate students, see PSYCH 691. T R. D. A. 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.

**PSYCH 492 Sensory Function (also BIONB 492, VISST 492) (II) (PBS)**
Spring, 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. Graduate students, see PSYCH 692. M W F. Offered alternate years. Not offered 2003–2004.
B. P. Halpern and H. C. Howland.
In general, this course has covered classical topics in sensory function such as vision, hearing, touch, and balance, as well as some more modern topics like sensory processing, location of stimulus sources in space, the development of sensory system, and nonclassical topics such as electroreception and internal chemoreceptors.

**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 Uris Hall). The following courses may be offered either term and carry four credits unless otherwise indicated.

**PSYCH 510–511 Perception**

**PSYCH 512–514 Visual Perception**

**PSYCH 518 Topics in Psycholinguistics**

**PSYCH 519–520 Cognition**

**PSYCH 521 Psychology (Developmental Seminar)**

**PSYCH 522 Topics in Perception and Cognition**

**PSYCH 523 Hormones and Behavior**

**PSYCH 527 Topics in Biopsychology**

**PSYCH 530 Representation of Structure in Vision and Language (also COGST 530 and LING 530)**
Spring, 4 credits. Graduate seminar. Prerequisites: a course each in cognitive psychology, linguistics, computer science, or permission of instructor. Enrollment limited to 20 graduate students. Offered alternate years. S. Edelman.
The seminar concentrates on the nature of the representation of visual objects and scenes in the brain and compare 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.

**PSYCH 531 Topics in Cognitive Studies: Neuroscience as the Quest for Perfect Self-Knowledge (also COGST 531 and LING 531)**
Spring, 4 credits. Prerequisites: COGST 501, PSYCH 614, or permission of instructor. Open to undergraduates, but with the permission of instructor. Seniors and graduate students are given priority in enrollment. S. Edelman.
In 1936 Jorge Luis Borges published a review of a nonexistent book whose fictional author, Mir Bahadur Ali, documents the search by an unnamed hero for Al-Mutasim, the enigmatic embodiment of moral and intellectual perfection in humankind. This seminar surveys the state of the art in theoretical neuroscience, whose real ultimate goal—finding the mind in the brain—is considered by many to be no less elusive than Ali's imagined quest. Our journey through the literature on minds and brains—factual, fictional, and fantastic—begins and ends with the short story by Borges, "The Approach to Al-Mutasim." For more information, see http://kybele.psych.cornell.edu/~edelman/Cog-531-Spring-2004.

**PSYCH 535 Evolutionary Perspectives on Behavior**

**PSYCH 541 Statistics in Current Psychological Research**

**PSYCH 550 Special Topics in Cognitive Science**

**PSYCH 560 Experimental Social Psychology**

**PSYCH 600 General Research Seminar**
Fall or spring. No credit.

**PSYCH 601 Computational Models of Language**
Spring, 4 credits. Prerequisites: consent of instructor. R. Not offered spring 2004. M. Spivey.
This seminar involves in-depth discussion of a range of computational approaches to language representation, processing, and acquisition. We cover phrase-structure grammars, context-free grammars, connectionist model semantics, statistical natural language processing, and dynamical systems, to name just a few. There is also some hands-on experience writing models in a computer lab using the MATLAB programming environment.
[**PSYCH 605** Perception (also PSYCH 205)]
Spring. 4 credits. Non-arts graduate students only. T. R. J. E. Cutting.

[**PSYCH 607** Chemosensory Perception (also PSYCH 307)]

[**PSYCH 611** Introduction to Human Memory (also PSYCH 311)]

[**PSYCH 612** Laboratory in Cognition and Perception (also PSYCH 412)]

[**PSYCH 613** Obesity and the Regulation of Body Weight (also NS 315)]
Spring. 3 credits. Limited to 30 students. Prerequisites: 1 course in psychology 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 615** Concepts, Categories, and Word Meaning (also PSYCH 415)]

[**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)]
Spring. 4 credits. M. W. C. Krumbholz.

[**PSYCH 619** Neural Networks Laboratory (also PSYCH 419)]

[**PSYCH 622** Developmental Biopsychology (also PSYCH 422)]

[**PSYCH 625** Cognitive Neuroscience (also PSYCH 425)]
Fall. 4 credits. M. W. F. B. L. Finlay.

[**PSYCH 626** Evolution of Human Behavior (also PSYCH 326)]
Spring. 4 credits. T. R. 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 429)]
Fall. 4 credits. W. M. Christiansen.

[**PSYCH 629** Offal and Taste: Structure and Function (also PSYCH 429 and BIONB 429)]
Spring. 4 credits. T. R. B. P. Halpern.

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[**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. DeVoeogd.

[**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.

[**PSYCH 642** Human Perception: Applications to Computer Graphics, Art, and Visual Display (also PSYCH 342 and COGST 342)]
Fall. T. R. D. J. Field.

[**PSYCH 650** Gender and Clinical Psychology (also PSYCH 450 and FGSS 450 and 650)]
Fall. 4 credits. W. S. L. Bern.

[**PSYCH 652** Trauma and Treatment (also PSYCH 452, FGSS 452, and FGSS 652)]
Spring. 4 credits. S. Bern.

[**PSYCH 665** Topics in High-Level Vision (also PSYCH 465, COGST 465, and COMS 392)]
Spring. 4 credits. S. Edelman.

[**PSYCH 681** Advanced Social Psychology (also PSYCH 481)]
Fall. 4 credits. T. R. D. T. Regan.

[**PSYCH 689** Seminar: Beliefs, Attitudes, and Ideologies (also PSYCH 489)]

[**PSYCH 691** Research Methods in Psychology (also PSYCH 491)]
Spring. 4 credits. T. R. D. A. Dunning.

[**PSYCH 692** Sensory Function (also PSYCH 492 and BIONB 492)]

[**PSYCH 696** Introduction to Sensory Systems (also PSYCH 396 and BIONB 396)]

[**PSYCH 700** Research in Biopsychology]

[**PSYCH 709** Developmental Psychology (also PSYCH 209)]
Spring. 4 credits. M. W. N. Nicastro.

[**PSYCH 710** Research in Human Experimental Psychology]

[**PSYCH 711** The Origins of Thought and Knowledge (also PSYCH 417)]

[**PSYCH 720** Research in Social Psychology and Personality]

[**PSYCH 722** Hormones and Behavior (also PSYCH 322 and BIONB 322)]

[**PSYCH 775** Proseminar in Social Psychology]
Fall. 2 credits. Limited to 10 graduate students in social psychology. Prerequisite: permission of instructors. D. Dunning, M. Ferguson, T. Gilovich, and D. Regan.

This is the first term of a year-long discussion-seminar course intended to give graduate students an in-depth understanding of current research and theory in social psychology. The course will emphasize social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, and emotional experience, etc., are covered.

[**PSYCH 776** Proseminar in Social Psychology II]

This is the second half of a year-long 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


The Religious Studies Program, an academic unit providing a major in the scholarly study of religion through the College of Arts and Sciences, offers a wide variety of courses. In addition to courses addressing various approaches to, and topics in, the study of religion, we have integrated curricula within our program for in-depth studies of Judaism, Christianity, the Hindu tradition, and Buddhism. We also offer an increasing number of courses on Islam:

The Religious Studies Program is designed to (1) develop a deeper understanding and appreciation of the complex ways in which religious traditions, with their individual, communal, and doctrinal dimensions, form 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 discipline. As opposed to the confessional purview, 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 and students throughout the academic year to foster a sense of intellectual community among our students and faculty.

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. An appointment with the program director. Here is the process:

1) Schedule an appointment with Professor Jane-Marie Law, Director of Religious Studies: please contact her by e-mail: jml16@cornell.edu.

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 Professor Law all of these forms, which are available in the Religious Studies office:

   a) a completed Religious Studies Major Application Form (available in 409 White Hall)
   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/Adviser 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 who cross-list courses with RELST can serve as an RELST adviser. 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 ensure some familiarity with two or more different religions, religious traditions, or religious phenomena. These courses may be at the introductory or advanced levels. 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/COLM 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 262), “Myth, Ritual, and Symbol” (RELST 320 also ANTH 320), and “Muhammad and Mysticism” (RELST 254 also NES 250/COLM 250) to gain a sense of the mental 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 religion or one group of closely related religions, religious traditions, or religious phenomena. An illustrative case described above, the student might combine “Indian Religious Worlds” (RELST 351 also ASIAN 351) with “Tantric Traditions” (RELST 374, also ASIAN 374) 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 Asian Religions” with one or more courses dealing with Buddhism, such as “Indian Buddhism” (RELST 354/654 also ASIAN 354/654) or “Theravada Buddhism” (RELST 363 also ASIAN 350), 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 proficiency 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 Greek or Roman religions); of Hebrew or Aramaic for Judaism; of Sanskrit or Hindi for Hinduism; of Pali or Chinese or Japanese for Buddhism. Religious phenomena like shamanism or totemism, though less firmly rooted in literary traditions, have generated substantial important scholarship in French and German, and an undergraduate major concentrating in this area of Religious Studies should be equipped to make independent use of such material.

Most courses approved for the major are offered by cooperating departments within the College of Arts and Sciences; a comprehensive up-to-date list of these courses is maintained at the office of the Religious Studies Program, 409 White Hall.

Graduating with Honors in Religious Studies:

GENERAL INFORMATION

1. Eligibility. 3.0 cumulative average and 3.5 average inside the major with no grade in the major below B-. Program Director notifies eligible candidates during the spring semester of the junior year, or prior to commencement of final year.

2. Honors Courses. Candidates must sign into RELST 489 (Senior Honors Essay) for up to eight credits (two courses) for two semesters with variable credit. This two-semester sequence is recommended but not required. After the first term, an R in the transcript indicates that the credit is an R (usually 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 a result of the conviction/belief that earning more than eight credits for a single “piece” of your undergraduate education is unwise.) You submit your honors proposal (with and according to the program’s instructions/cover sheet) to the Religious Studies advisor 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 your signing into the honors courses.

3. Honors Committee—three faculty members. While you are required to have three faculty members on your committee at the time of the submission of the final draft, we only require that two of them be identified when you submit your proposal. 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 you over the year and to be the supervisor/grade of your project is chair of the committee.

b. Your Religious Studies major adviser (not optional)

c. Another knowledgeable faculty member

Sometimes your adviser is the supervisor/grade. If that is the case, you need two additional knowledgeable professors for your committee of three.

Courses Approved for the Major
Sponsored by Religious Studies

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELST 123-124</td>
<td>Introduction to Biblical Hebrew I and II (also NES 123-124, JWST 123-124)</td>
<td>123, 124</td>
<td></td>
<td>R. L. Moore</td>
</tr>
<tr>
<td>RELST 130</td>
<td>Elementary Pali (also Pali 130-132)</td>
<td>3</td>
<td>Fall</td>
<td>D. Powers</td>
</tr>
<tr>
<td>RELST 133-134</td>
<td>Intro to Qur'anic and Classical Arabic I and II (also NES 133-134)</td>
<td>133, 134</td>
<td></td>
<td>D. Boucher</td>
</tr>
<tr>
<td>RELST 201</td>
<td>Issues in Catholic Thought (also NES 298)</td>
<td>3</td>
<td>Fall</td>
<td>W. Dickens</td>
</tr>
<tr>
<td>RELST 213</td>
<td>Classical Arabic Texts (also NES 213)</td>
<td>4</td>
<td>Spring</td>
<td>D. Powers</td>
</tr>
<tr>
<td>RELST 214</td>
<td>Qur'an and Commentary (also NES 214)</td>
<td>4</td>
<td>Fall</td>
<td>D. Powers</td>
</tr>
<tr>
<td>RELST 220</td>
<td>Buddhism in America (also ASIAN 220)</td>
<td>3</td>
<td>Winter</td>
<td>J. M. Law</td>
</tr>
<tr>
<td>RELST 222-223</td>
<td>Introduction to the Bible I (also NES 222, JWST 223)</td>
<td>3</td>
<td>Fall</td>
<td>G. Rendsburg</td>
</tr>
<tr>
<td>RELST 224</td>
<td>Introduction to the Bible II (also NES 224, JWST 224)</td>
<td>3</td>
<td>Spring</td>
<td>G. Rendsburg</td>
</tr>
<tr>
<td>RELST 227</td>
<td>The Bible and Ancient Near Eastern Civilization (also NES 227, JWST 227, ARKEO 227)</td>
<td>3</td>
<td>Fall</td>
<td>J. Zorn</td>
</tr>
<tr>
<td>RELST 229</td>
<td>Introduction to the New Testament (also NES 229, JWST 229)</td>
<td>3</td>
<td>Fall</td>
<td>K. Haines-Eitzen</td>
</tr>
<tr>
<td>RELST 230</td>
<td>Monuments of Medieval Art (also ART H 230)</td>
<td>4</td>
<td>Fall</td>
<td>P. Morin</td>
</tr>
<tr>
<td>RELST 237</td>
<td>Greek Religion and Mystery Cults (also CLASS 237)</td>
<td>3</td>
<td>Fall</td>
<td>K. Clinton</td>
</tr>
<tr>
<td>RELST 239</td>
<td>Cultural History of Jews of Spain (also NES 239, JWST 239, SPAN L 239)</td>
<td>3</td>
<td>Spring</td>
<td>R. L. Moore</td>
</tr>
<tr>
<td>RELST 242</td>
<td>Religion and Politics in American History (also HIST 242, RELST 242)</td>
<td>4</td>
<td>Spring</td>
<td>D. Boucher</td>
</tr>
<tr>
<td>RELST 244</td>
<td>Introduction to Ancient Judaism (also NES 244, JWST 244)</td>
<td>3</td>
<td>Fall</td>
<td>G. Rendsburg</td>
</tr>
<tr>
<td>RELST 250</td>
<td>Introduction to Asian Religions (also ASIAN 250)</td>
<td>3</td>
<td>Spring</td>
<td>D. Boucher</td>
</tr>
<tr>
<td>RELST 251</td>
<td>Judaism, Christianity, and Islam (also NES 251, JWST 251)</td>
<td>3</td>
<td>Spring</td>
<td>R. Brann, K. Haines-Eitzen</td>
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<tr>
<td>RELST 252</td>
<td>The Sufi Path: Mysticism in Islam (also NES 252)</td>
<td>3</td>
<td>Spring</td>
<td>S. Toorawa</td>
</tr>
<tr>
<td>RELST 253</td>
<td>Black Religious Traditions from Slavery to Freedom (also HIST 251, AM ST 251)</td>
<td>4</td>
<td>Fall</td>
<td>M. Washington</td>
</tr>
<tr>
<td>RELST 254</td>
<td>Muhammad and Mysticism in the Literatures of the Muslim World (also NES 250)</td>
<td>3</td>
<td>Spring</td>
<td>S. Toorawa</td>
</tr>
<tr>
<td>RELST 255</td>
<td>Introduction to Islamic Civilization I (also NES 255, HIST 253)</td>
<td>3</td>
<td>Fall</td>
<td>D. Powers</td>
</tr>
<tr>
<td>RELST 256</td>
<td>Introduction to the Qur'an (also NES 256, JWST 256)</td>
<td>3</td>
<td>Spring</td>
<td>S. Toorawa</td>
</tr>
<tr>
<td>RELST 262</td>
<td>Religion and Reason (also PHIL 263)</td>
<td>4</td>
<td>Spring</td>
<td>S. MacDonald</td>
</tr>
<tr>
<td>RELST 264</td>
<td>Introduction to Biblical History and Archaeology (also NES 263, JWST 263, ARKEO 263)</td>
<td>3</td>
<td>Fall</td>
<td>J. Zorn</td>
</tr>
<tr>
<td>RELST 265</td>
<td>The Middle Ages: An Introduction (also HIST 262)</td>
<td>4</td>
<td>Fall</td>
<td>P. Hyams</td>
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<tr>
<td>RELST 266</td>
<td>Jerusalem Through the Ages (also NES 266, JWST 266)</td>
<td>3</td>
<td>Fall</td>
<td>D. Boucher</td>
</tr>
<tr>
<td>RELST 277</td>
<td>Meditation in Indian Culture (also ASIAN 277)</td>
<td>3</td>
<td>Fall</td>
<td>D. Boucher</td>
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<tr>
<td>RELST 278</td>
<td>History and Archaeology (also NES 278, JWST 278)</td>
<td>3</td>
<td>Fall</td>
<td>D. Boucher</td>
</tr>
<tr>
<td>RELST 305</td>
<td>Zen Buddhism (also ASIAN 306)</td>
<td>4</td>
<td>Spring</td>
<td>D. Boucher</td>
</tr>
<tr>
<td>RELST 315</td>
<td>Medieval Philosophy (also PHIL 315)</td>
<td>4</td>
<td>Spring</td>
<td>S. MacDonald</td>
</tr>
<tr>
<td>RELST 316</td>
<td>Women in the Hebrew Bible (also NES 320, JWST 320)</td>
<td>3</td>
<td>Spring</td>
<td>G. Rendsburg</td>
</tr>
<tr>
<td>RELST 317</td>
<td>Readings in Ancient Jewish Texts (also NES 328, JWST 328)</td>
<td>1</td>
<td>Fall</td>
<td>G. Rendsburg</td>
</tr>
</tbody>
</table>
RELST 318 Introduction to the Hebrew Bible—Seminar (also NES 325, JWST 325)
Fall and spring. 1 credit. G. Rendsburg. For description, see NES 325.

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. J. Fajans. For description, see ANTHR 320.

RELST 321 Heresy and Orthodoxy in Early Christianity (also NES 321)

RELST 322 Reinventing Biblical Narrative Apocrypha and Pseudepigrapha (also NES 323, JWST 323)

RELST 326 Christianity and Judaism (also COM L 326)
Spring. 4 credits. C. Carmichael. 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)
Fall. 3 credits. Prerequisite: concurrent enrollment in RELST 229 and one year of ancient Greek. Not offered 2003–2004. K. Haines-Eitzen. For description, see NES 329.

RELST 332 Medieval Architecture (also ART H 332, ARCH 382)

RELST 333 Greek and Roman Mystery Cults and Early Christianity (also CLASS 333)
Fall. 4 credits. Not offered 2003–2004. K. Clinton. For description, see CLASS 333.

RELST 334 Islamic Spain: Culture and Society (also NES 339/639, JWST 339, COM L 334, SPAN L 339/639)
Fall. 4 credits. Not offered 2003–2004. R. Brann. For description, see NES 339.

RELST 336 Prelude to the Italian Renaissance (also ART H 336)

RELST 337 The Medieval Illuminated Book (also ART H 337)
Fall. 4 credits. Not offered 2003–2004. R. G. Calkins. For description, see ART H 337.

RELST 339 Power, Piety, and Medieval Art (also ART H 330)

RELST 345 Intellectual and Cultural Life of Nineteenth Century Americans (also HIST 345, AM ST 345)
Fall. 4 credits. R. L. Moore. For description, see HIST 345.

RELST 347 Tantric Traditions (also ASIAN 347)

RELST 350/651 Law, Society, and Culture (also NES 351/651, HIST 372/652)

RELST 351 Indian Religious Worlds (also ASIAN 351)

RELST 354 Indian Buddhism (also RELST 654, ASIAN 354/654)

RELST 355 Japanese Religions: A Study of Practice (also ASIAN 355)

RELST 356 Islamic Law and Society (also NES 357)

RELST 357 Chinese Religions (also ASIAN 357)
Fall. 4 credits. D. Boucher. For description, see ASIAN 357.

RELST 359 Japanese Buddhism (also ASIAN 359)
Spring. 4 credits. J. M. Law. For description, see ASIAN 359.

RELST 362 The Culture of the Renaissance II (also COM L 362, ENGL 325, HIST 364, ART H 351, MUSIC 390, FRIT 362)

RELST 368 Marriage and Sexuality in Medieval Europe (also HIST 368, FGSS 368)

RELST 371 A Mediterranean Society and Its Culture: The Jews under Classical Islam (also NES 371, JWST 371, COM L 371)

RELST 381 Anthropology and Religion (also ANTHR 381)

RELST 386 Catholicism in a Global Context (also NES 386)
Spring. 4 credits. T. Dickens. For description, see NES 386.

RELST 393 Jews and Christians in the Modern Middle East (also NES 393)
Fall. 4 credits. M. Campos. For description, see NES 393.

RELST 394 Gender, Sexuality, and the Body in Early Christianity (also NES 394, FGSS 394)

RELST 395 Classical Indian Philosophical Systems (also ASIAN 395, CLASS 395)

RELST 399 Seminar: Catholic Rituals and the Formation of Community (also NES 399)

RELST 409 Seasons of Migration (also S HUM 409, NES 409, JWST 409)

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 411 Sacred Fictions (also S HUM 411, NES 423, JWST 423, CLASS 461, COM L 411)
Fall. 4 credits. K. Haines-Eitzen. For description, see S HUM 411.

RELST 415 Baptizing Aristotelian Science (also S HUM 415, PHIL 415)
Fall. 4 credits. S. MacDonald. For description, see S HUM 415.

RELST 418 Seminar on Islamic History (also NES 418/618, HIST 461/671)
Spring. 4 credits. D. Powers. For description, see NES 418/618.

RELST 420 Readings in the Hebrew Bible (also NES 420, JWST 420)

RELST 421 Religious Reflections on the Human Body (also ANTHR 421)
Spring. 4 credits. J. M. Law. For description, see ASIAN 421.

RELST 422 Dead Sea Scrolls (also NES 422)

RELST 423 Readings in Biblical Hebrew Poetry (also NES 421, JWST 421)
Spring. 4 credits. Prerequisite: one year of Biblical or Modern Hebrew. G. Rendsburg. For description, see NES 421.
RELST 426 New Testament Seminar (also COM L 426)
Spring. 4 credits. C. Carmichael.
For description, see COM L 426.

RELST 427 Biblical Seminar (also COM L 428)
Fall. 4 credits. C. Carmichael.
For description, see COM L 428.

RELST 429 Adam's Rib and other Divine Signs: Reading Biblical Narrative (also ENGL 429)
L. Donaldson.
For description, see ENGL 429.

RELST 430 Gnosticism and Early Christianity (also NES 429, JWST 428)
K. Haines-Eitzen.
For description, see NES 428.

RELST 438/638 Monks, Texts, and Relics (also ASIAN 438/638)
Spring. 4 credits. A. Blackburn.
For description, see ASIAN 438.

RELST 443 Religion and Ritual in Chinese Society and Culture (also ANTHR 443)
S. Sangren.
For description, see ANTHR 443.

RELST 449 History and Methods of the Academic Study of Religion (also ASIAN 449)
For description, see ASIAN 449.

RELST 450 Rescreening the Holocaust (also THETR 450, GER ST 449, COM L 453)
Fall. 4 credits. D. Batrwick.
For description, see THETR 450.

RELST 460 Indian Meditation Texts (also ASIAN 460)
D. Gold.
For description, see ASIAN 460.

RELST 462/662 Religion, Colonialism, and Nationalism in South and Southeast Asia (also ASIAN 462/662)
Spring. 4 credits. A. Blackburn.
For description, see ASIAN 462.

RELST 490-491 Directed Study
490, fall; 491, spring. 2-4 credits each term. For majors in Religious Studies, permission of director required. Staff.

RELST 494 Seminar: Catholicism and Interreligious Dialogue (also NES 494)
Spring. 4 credits. T. Dickens.
For description, see NES 494.

RELST 495 Senior Honors Essay
Fall and spring. Variable up to 8 credits. Required for honors in Religious Studies. Staff.

RELST 496 Seminar: Religion and Science (also NES 496)
W. Dickens.
For description, see NES 496.

RELST 531 Problems in Medieval Art and Architecture (also ART H 531)
R. G. Calkins.
For description, see ART H 531.

RELST 650 Seminar on Asian Religions (also ASIAN 650)
Fall. 4 credits. Graduate students only, limited to 10. Reading knowledge of modern Japanese desirable. J. M. Law.
For description, see ASIAN 650.

RELST 652 Straddling the Himalayas (also ASIAN 652)
Spring. 4 credits. D. Boucher.
For description, see ASIAN 652.

RELST 653 Buddhist Narrative Literature (also ASIAN 653)
Fall. 4 credits. D. Boucher.
For description, see ASIAN 653.

RELST 654 Indian Buddhism (also RELST 354, ASIAN 354/654)
Fall. 3 credits. Not offered 2003-2004.
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, Jane Marie Law.

For completion of the major, a student must:

1. Acquire a sound degree of competence in French language. This competence is demonstrated by the successful completion of FRROM 201, 220, or 221 plus 222 and FRROM 219 or its equivalent by the end of their sophomore year.
2. Take six courses in French literature or civilization at the 300 level or above.
3. Take two connected courses in one of the following related areas: literature, linguistics, comparative literature, history, history of art, visual studies, music, government, or another relevant discipline with a significant French component. Students who are double majors are exempted from this last requirement.

The Literature Option
The major in French, literature option, is designed to give students proficiency in the oral and written language, to acquaint them with French literature and culture, and to develop skills in literary analysis.

Admission
To be admitted to the major, students should have completed FRROM 201, 220, or 221 plus 222 and FRROM 219 or its equivalent by the end of their sophomore year.

The French Area Studies Option
Admission
To be admitted to the major, students should have completed FRROM 201, 220, or 221 plus 222 or its equivalent by the end of their sophomore year.
For completion of the major, a student must:

1. acquire a sound degree of competence in the French language. This competence is demonstrated by the successful completion of FRROM 301-312 or their equivalents, such as properly accredited study abroad or the passing of a special language test (the CASE examination) or the permission of the adviser (this option applies only to 312).

2. take two courses in Romance Studies (literature or civilization) at the 300 level or above.

3. take six courses at the 300 level or above in no more than three areas of interest such as— but not limited to— Africana studies, anthropology, comparative literature, economics, French literature, government, history, history of art, linguistics, music, theater arts, visual studies, and feminism, gender, and sexuality studies. Each area must be represented by at least two courses, and each course must have a significant French component. At least one of these six courses should be at the 400 level.

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 safekeeping.

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 219 or its equivalent in advanced credit or placement by the 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 offered by EDUCO, the program in Paris cosponsored by Cornell and by Emory and Duke University. EDUCO offers advanced students a challenging course of study and the experience of total immersion in French life and culture in Paris. Participants in this program spend the year or semester as fully matriculated students at the University of Paris VII and other institutions of higher learning in Paris and at the Paris Institute of Études Politiques (Science Po), selecting courses in many fields from the regular university course offerings.

Students begin the academic year with an intensive three-week orientation in French history, society, and daily life. While it is possible to enroll in the EDUCO program for one semester, admission will be given first to students planning to study abroad for the full academic year.

EDUCO maintains a center in Paris with appropriate support staff. The resident director, chosen annually from the Cornell, Emory, and Duke faculties, teaches a special seminar each semester, provides academic advice, and helps ensure the quality of the courses. The center, which includes a small library and word-processing facilities, is regularly used by students for special tutorials, seminars, and lectures as well as informal gatherings.

Honors

The honors program encourages well-qualified students majoring in French literature and culture to do independent work in French outside the structure of courses. The preparation of the senior honors essay, generally spread over two terms, provides a unique learning opportunity, since it allows for wide reading and extensive rewriting to a degree not possible in the case of course papers.

To be eligible for the honors program, students must have a general grade point average of at least 3.00 and a grade point average of at least 3.5 in their French major.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty adviser who has agreed to supervise their work. They may receive course credit by enrolling in French 420-430, but these independent study courses must be taken in addition to the courses that meet the minimum requirements for the major. At the end of the senior year, each honors student is examined orally on the honors essay by a jury consisting of his or her faculty adviser and two other faculty members. The senior essay is to be made available for reading by the jury on or before April 15. The awarding of honors is determined by the student's grades in the major and the quality of the honors essay.

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. Further, a student who fails to attend the first three days of class will be automatically dropped from the course to accommodate those on the waiting list.

All French language courses are offered by the Department of Romance Studies, and French linguistics courses are offered by the Department of Linguistics.

Note: Students placed in 200-level courses have the option of taking language and/or literature courses; see listings under "Literature" for descriptions of the literature courses, some of which may be taken concurrently with one of the FRROM 200, 209, or 219.

FRROM 121-122 Elementary French

121, fall; 122, spring, 4 credits each term. Prerequisite for 121. This course is intended for students with no experience in French. Students who have previously studied French must have an LPF score lower than 37, or SAT II lower than 410, to be eligible for FRROM 121. Prerequisite for 122: LPF score 37-44 or SAT II 410-480, FRROM 121. Fall: C. Sparfel (course coordinator), J. Luks, and staff; spring: FRROM 122 C. Sparfel (course coordinator) and J. Luks.

The goal of FRROM 121-122 is to provide a thorough grounding in the language and insights into French language and francophone cultures so that students can function in basic situations in a French-speaking culture. Small classes provide intensive, context-specific practice in speaking, reading, writing, and listening comprehension.

FRROM 123 Continuing French

Fall or spring. Provides language qualification. Prerequisite: LPF score 45-55 or SAT II 490-590. Recommended courses after FRROM 123: FRROM 206 or 209. Fall: K. Proux (course coordinator) and staff, spring: K. Proux.

FRROM 123 is an independent course designed to improve pronunciation, oral-communication, and reading ability; establish a groundwork for correct writing; and provide a substantial grammar review. The approach in the course encourages the student to see the language within the context of its culture.

FRROM 206 French Intermediate Reading and Writing

Fall. 3 credits. Provides language proficiency and satisfies Option I. Prerequisite: FRROM 123, LPF score 56-64, or SAT II 600-680. Conducted in French. Recommended courses after FRROM 206: FRROM 219, FRLIT 220 or FRLIT 221. S. LoBello.

This language course is designed for students who want to focus on their reading and writing skills. Emphasis is placed on grammar review and expansion, vocabulary development, and appreciation of different styles of language. Diverse text types are used, including a contemporary novel and student-selected material.

FRROM 209 French Intermediate Composition and Conversation I

Fall, spring, or summer. 3 credits. Provides language proficiency and satisfies Option I. Prerequisite: FRROM 123, LPF score 56-64, or SAT II 600-680. Recommended courses after FRROM 209: FRROM 219, FRLIT 220 or FRLIT 221. FRROM 219 may be taken concurrently with either FRLIT 220 or FRLIT 221. C. Waldron (course coordinator), S. Tune, and staff; summer: C. Waldron.

The course is designed to strengthen grammatical skills, improve reading, speaking, and writing ability, and help students become independent learners. For more information go to: http://courseinfo.cit.cornell.edu/courses/FRROM209/.

FRROM 219 French Intermediate Composition and Conversation II

Fall or spring. 4 credits. Provides language proficiency and satisfies Option I. Prerequisite: FRROM 206 or 209, or permission of instructor, or Q+ on the Cornell Advanced Standing Examination (CASE). For admission to Cornell Abroad Program, students are required to take either this course or have completed an equivalent level of study. Taught in French. Recommended courses after FRROM 219: FRLIT 220 or 221. S. LoBello (course coordinator) and staff.

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 for writing assignments and class discussions. Themes and emphases may vary from section to section.
FRROM 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.

FRROM 301 Advanced French I
Fall or spring. 4 credits. Satisfies language Option I. Prerequisite: FRROM 219 or Q++ on the Cornell Advanced Standing Examination (CASE). Recommended course after FRROM 301: FRROM 312. FRLIT 220 or FRLIT 221 may be taken concurrently with 301. Fall, S. LoBello and staff; spring, S. LoBello.
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 302 French through Film
Fall or spring. 4 credits. Satisfies language Option I. Prerequisite: FRROM 219, or Q++ on the Cornell Advanced Standing Examination (CASE). Recommended courses after FRROM 302: FRROM 303, 312, 220, or 221. FRLIT 220 or 221 may also be taken concurrently with FRROM 305. C. Waldron.
Analysis of French contemporary films and related readings. Used as a means of studying the language. Particular emphasis is on the culture and historical context as it relates to French contemporary society. Additionally, guest speakers provide enrichment on selected topics.

FRROM 312 Advanced French II
Fall or spring. 4 credits. Satisfies language Option I. Limited to 15 students. Prerequisite: FRROM 301 or permission of instructor, or placement by the Cornell Advanced Standing Examination (CASE). T. Alkire.
Continuation of work done in FRROM 301. The objective of FRROM 301 is to teach students to speak and write correct French; in FRROM 312 students are expected to have a richer, more idiomatic and hopefully elegant command of the language. Formal study of grammar is discontinued, and more attention is devoted to the examination of the stylistics and rhetorical characteristics of texts and to oral presentations by students. Weekly papers as in FRROM 301.

FRROM 630 French for Reading—Graduate Students
Spring. 3 credits. Limited to graduate students. T. Alkire and staff.
Designed for those with little or no background in French, this course's primary aim is to develop skill in reading French. Grammar basics, extensive vocabulary, and strategies for reading in a foreign language are covered. Some flexibility in selecting texts according to fields of interest is offered.

Literature

FRLIT 220 French and Francophone Culture @ (IV) (LA)
Fall or spring. 3 credits. Satisfies language Option I. Prerequisite: SAT II score of 610 or above, or LPP score of 60 or FRROM 206 or 209. Conducted in French. J. Couris.
This course is an introduction to twentieth century Francophone literatures (France, West Africa, Magreb, Madagascar, the Indian Ocean Islands). We study the rise and fall of the French colonial empire in novels, poems, dramas and films. The discussions focus on major topics such as colonization, decolonization, and globalization and their present-day consequences in politics (violence and struggles for liberation), migrations as well as on alienation, identity, quests, and creativity.

FRLIT 221 Modern French Literature (IV) (LA)
Fall or spring. 3 credits. Satisfies language Option I. Prerequisite: SAT II score of 610 or above, or LPP score of 60, or FRROM 206 or 209. Conducted in French. F. A. Berger and staff; spring, R. Klein and staff.
This course is intended as an introduction to French literature of the modern period. Texts are chosen because of their centrality to the traditional literary canon and with an eye to experimentation. The course considers literary genres (poetry, drama, the novel) as solicitations to read texts differently, at different speeds, with diverse claims on our attention. One test may include French script. The course is designed to satisfy a general interest in modern French literature as well as to prepare students to pursue a French major in literature. Readings include works by Balzac, Flaubert, Mallarmé, Beckett, Camus, Cocteau, Gerret, Giraudozox, Ionesco, Koltes, Beza, and Sartre.

FRLIT 222 Early Modern French Literature # (IV) (LA)
Spring. 3 credits. Satisfies language Option I. Prerequisite: FRLIT 222, 221, or permission of the instructor. Conducted in French. F. P. Long.
Study of the classic literature of seventeenth-century France (Corneille, Racine, Molière, Mme de Lafayette, La Fontaine) and of eighteenth-century Enlightenment literature (Voltaire, Rousseau, Diderot, Beaumarchais). Special attention is paid to the ways in which these various works represent or deal with the shift from an aristocratic cultural code of values to modern bourgeois ideology and aesthetics. The course also invites reflection on the status and centrality of female characters in classical and neo-classical French literature. Theater being central to this period, it traces the evolution from the classical tragic heroine to more modern (but no less problematic) representations of women.

FRLIT 224 The French Experience (also HIST 240) (III or IV) (CA)
Fall. 3 credits. Conducted in English. Readings available both in French and in English translation. N. Furman and J. Weiss.
An examination of French society, culture, and institutions through key moments in French history in an attempt to understand what made French culture so distinctive.

Looking attentively at texts, images and contexts, we will attempt to unravel some of the defining enigmas of the French experience. Two lectures a week in English. Readings available in French and in English translation. Discussion sections available in French when possible.

FRLIT 225 Introduction to Modern French Visual Culture (IV) (CA)
Fall or spring. 3 credits. M. C. Vallois and staff.
This course introduces students to the study of visual culture in France. With exposure to material ranging from late nineteenth century painting to films by Chris Marker and Alain Resnais, students learn critical vocabularies and methods specific to the study of different genres (painting, photography, architecture, cinema, and the comic strip) while reflecting on the historical and cultural impact of the images under study. We also consider some of the seminal theoretical essays that have grounded and shaped these kinds of analysis and reflection (Baudrillard, Min, Bataille, Bazin, for example), the relationship between the visual and the literary, and the concept of "visual culture" and the ways "culture" can be read through the visual.

FRLIT 317 Modern French Theater (IV) (LA)
Fall. 4 credits. N. Furman.
A study of twentieth-century plays from realism to the theater of the Absurd, from political "engagement" to the theater of Art. Authors studied will include Anouilh, Beckett, Camus, Cocteau, Genet, Giraudoux, Ionesco, Koltes, Beza, and Sartre.

FRLIT 331 Detours of Desire: Love in Classical France (IV) (LA)
Fall. 4 credits. Prerequisites: FRLIT 221 or permission of instructor. M. Greenberg.
Through the readings of several of Classicism's major dramatic and fictional texts (Corneille, Molière, Racine, de Lafayette), this class will examine the complex construction of French seventeenth-century subjectivity as it emerges during a time of conflicted social, political, religious, and sexual changes. The texts will help us understand the development of what has become the modern subject in and through Classicism's investments in a certain political-sexual ideology that we have as yet not abandoned.

FRLIT 341 Empire and Decolonization in Francophone Literature (IV) (LA)
Spring. 4 credits. Satisfies language Option I. Conducted in French. J. Couris.
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, theater 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.
This course considers representations of religious violence in Western Europe from the Middle Ages to the modern era, with a particular focus on France. From Holy War to religiously motivated resistance, what are the secular mechanisms used to deploy and to deflect religious violence and what is the significance of the ritualistic aspects of such violence for the culture that produces it? How does violence mark the sacred and secular (for example, the dependence of the Catholic Church on state and social authorities for various aspects of enforcement of religious doctrine, from interroagation to execution of heretics)?

While situating the works read within their specific historical and literary context, this course will attempt to address two sets of questions: (1) How does the inscription of literature as a public institution within a phallocentric cultural order affect women authors’ status and writing strategies? (2) To what extent and at what levels does being a woman inform or shape the text produced? In what ways is literary writing concerned with sexual difference? Writers include Mia. de Staël, George Sand, Flora Tristan, Rachilde, and others.

This course considers representations of adornment and other useless artifacts in French literature. Readings include works by Mernée, Diderot, Baudelaire, Gautier, Colette, Mauriac, and Patrick Süsskind.

This course is an introductory survey of French symbolism poetry and its aftermath. Beginning with Baudelaire, the readings include works by Rimbaud, Mallarmé, Verlaine, Valéry, Apollinaire, Tzara, and Breton. Classwork consists of close reading of select texts and seminar discussion of the disruptive and/or subversive turnings of the lyric subject in the last half of the nineteenth century, culminating in its modernist dissolution after World War I.

This course follows the struggle to construct a sphere of social justice and postcolonial world, focusing on the experiences of two francophone regions: Haiti and the Congo/Zaire. While contemporary French and Italian critiques of (political) representation describe a "multitude" that increasingly confronts the institutional bearers of power (postestas) and "justice" in global sites such as Seattle, Genova, and Porto Alegre, is such a critique relevant in postcolonial regions such as Haiti, Rwanda, the Congo, where such institutions are largely nonexistent and where even the barest minimum of social justice and the protection of individual rights remains to be achieved? There we encounter the utter and shocking contradiction between, on the one hand, the politics of emancipation constructed in world-historical events such as the Haitian Revolution and African Decolonization, and, on the other, the profound dereflection of forgotten or mere pawns in the drive to postmodern "empire" and a "new world order." How might Spinozian theories of the "constituent power" of the "multitudes" (Negri) address the violence and terror of Port au Prince, Kigali, and Kinshasa? Conversely, can traditional theories of ethical society (Sittlichkeit) maintain any explanatory and critical purchase in the face of the various poststructuralist critiques? In bringing into dialogue the historical and cultural specificity of these two regions with classical and contemporary French, German, and Italian political theory, we explore the hypothesis that the postcolonial world offers both a limited case for first-world globalization theories, as well as the cultural and theoretical resources to refract those theories in the ongoing effort to construct a postcolonial sphere of social justice in the twenty-first century.

Analysis of the crossover between political, social, and philosophical discourses with particular focus on the shifts between theological and secular models. Topics include authority, freedom, equality, sentiment, reason, libertinism, fanaticism, tolerance. Eighteenth-century readings from Kant, Rousseau, Sade, Voltaire etc.; twentieth-century readings from European and American debates about Enlightenment.
This course deals with the romance and the lyric, facility in reading Old French and appreciation of these two major genres are the primary goals.

FRLIT 451 Marguerite Duras (also French Literature 651) (IV) (LA)
Spring. 4 credits. T. McNulty.
This course examines works representing the many dimensions of Duras' oeuvre: novels, theater, screenplays, films, and nonfiction. We focus on the problems of technique, technology, and time, especially as they inform Duras' attempts to write feminine experience or to tell the story of "the girl." Our close readings of individual works are complemented by critical essays (by Blanchot, Cixous, Deleuze, Freud, Lacan, Heidegger, and others) and selections from some of Duras' most important literary models (Marguerite de Navarre, Stendhal, Kierkegaard, James).

FRLIT 475 Exoticism and Eroticism: Figures of the Other in the French Enlightenment (also FGSS 474) (IV) (LA)
Fall. 4 credits. Satisfies language requirement.
Option 1. Conducted in French. A. Berger.
"To study man, it is necessary to learn how to see into the distance; it is necessary to observe differences in order to discover common properties." (Rousseau, Essai sur l'Origine des Langues). Imagined or theorized, the exotic experiment helped shape modern and contemporary discourses on the cultural and political community, on universalism and particularism, on diversity and identity. Good savages or bad giants, oriental women or despots, Indians, Zoroastrians, Tahitians, Americans (etc.), through these figures of otherness, thinkers and writers of the Enlightenment grasped at the foreign in the familiar, the same in the different, and the desirable in the strange. For exoticism is always eroticized (thus feminized) as the erotic is orientalized. The other may be less far or further than one thinks. How can one be a Persian woman? (Works studied include Montesquieu, Rousseau, Diderot, and de Saint-Pierre).

FRLIT 602 Social Justice and the Postcolonial Francophone World (also FRLIT 402)
Fall. 4 credits. N. Nesbitt.
For description, see FRLIT 402.

FRLIT 607-608 Proseminar (also ITALL 607-608 and SPANL 607-608)
607: fall, 6 credits each term. Fall: M. C. Vallicl. Spring: staff.
The pro-seminar is the place for sustained exchanges between graduate students, faculty, 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 625 The Francophone Postcolonial Discourse (also FRLIT 425)
Fall. 4 credits. J. Coursi.
For description, see FRLIT 425.

FRLIT 627 Cultural Politics of 1968 in Paris and Mexico City (also FRLIT 427, COM L 412/612 and SPANL 427/627)
Spring. 4 credits. B. Boesteek.
For description, see SPANL 427.

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 641 Classical and Modern Art of Rhetoric
Spring. 4 credits. I. Coursei.

FRLIT 643 Exquisite Corpses of the Middle Ages (also FRLIT 443)
Fall. 4 credits. C. Howie.
For description, see FRLIT 443.

FRLIT 645 A Literary History of Saints (also FRLIT 445)
Spring. 4 credits. C. Howie.
For description, see FRLIT 445.

FRLIT 651 Marguerite Duras (also FRLIT 451)
Spring. 4 credits. T. McNulty.
For description, see FRLIT 451.

FRLIT 670 Derrida
Fall. 4 credits. R. Klein.
This course surveys the totality of the career of the contemporary French philosopher and critic Jacques Derrida from his earliest writing in Of Grammatology to his most recent reflections on 9/11. Chosen from among more than fifty books, the readings will focus on works with particular reference to literature and politics. The course is conducted as a seminar, in English. The readings will be available in French and English.

Italian
Faculty: M. Migiel (director), N. Keats, B. Cavarozzi, M. Baraldi, D. Lebel, E. Potter, J. Coursil, S. Stewart-Steinberg, P. Swenson, Emerita: A. Grossvogel.

The Undergraduate Major in Italian
The major in Italian is designed for students who: (1) 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; and (2) may wish to pursue a Ph.D. in Italian.
The prerequisite for official admission to the Italian major is successful completion of either ITAL 216 or ITAL 217 (Introduction to Italian Literature).
Students who wish to major in Italian are advised to consult with the director of undergraduate studies in Italian, Marilyn Migiel (311 Morrill Hall) as early as possible. The director of undergraduate studies, taking 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. In conjunction 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 one-credit Italian Practicum and the one-or two-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 two of these courses other courses that are deemed relevant to the student's study of Italian, e.g., a course in another national literature, a course in critical theory, or a course in European history.

At least twenty credits in courses conducted entirely in Italian. The Italian Practica 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 (as demonstrated by examination or by course work approved by the DUS). ITAL 402, History of the Italian language, and ITAL 403, Linguistic Structure of Italian, may be counted toward the ten courses required for the major. (N.B. An introductory linguistics course is a prerequisite for ITAL 402 and 403.)

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. Further, a student who fails to attend the first three days of class will be automatically dropped from the course to accommodate those on the waiting lists.

ITALA 121-122 Elementary Italian
121, fall, 122, spring. 4 credits each term. Prerequisite: for ITAL 122, ITAL 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 ITAL 122, students who score lower than 56 on the LPI may take ITAL 123, those with 56 or higher on the LPI attain qualification and may enter the 200-level sequence; otherwise ITAL 123 is required for qualification. Evening prelims: Fall: K. Bittig von Wittelsbach (course coordinator), M. Baraldi, F. Cervesi, S. Stewart-Steinberg, and staff; spring: K. Bittig von Wittelsbach (course coordinator), M. Baraldi, F. Cervesi, 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. Fall: T. Aikire and staff; spring: T. Aikire.
ITALA 123 is an all-skills course designed to improve speaking and reading ability, establish a groundwork for correct writing, and provide a substantial grammar review.
ITALA 209 Italian Intermediate Composition and Conversation I
Fall or spring. 3 credits. Satisfies language proficiency and satisfies Option I. Prerequisite: ITALA 125 or LPI 56-58, or SAT II 590-680, or CASE Q. Students wishing to major in Italian and students wishing to study abroad in Italy are strongly encouraged to enroll concurrently in ITALL 214, 215, 216, or 217. F. P. Swenson (course coordinator) and F. Cervesi; spring: T. Alkire. This course provides a guided conversation, composition, reading, pronunciation, and grammar review, emphasizing the development of accurate and idiomatic expression in the language.

ITALA 219 Italian Intermediate Composition and Conversation II
Spring. 3 credits. Satisfies language Option I. 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, 215, 216, or 217. F. P. Swenson. Guided conversation, composition, reading, pronunciation, and grammar review, emphasizing 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; see separate listings under ITALL 214, ITALL 215, and ITALL 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.

Literature

ITALA 214 Literature and Culture
Fall. 3 credits. Satisfies language Option I. Course limited to 28 students. Prerequisite: permission of instructor. Conducted in Italian. M. Migiel. In this seminar, we read, discuss, and write about a variety of global and transnational issues that get debated in the Italian media. Our approach to these cultural issues is grounded in rhetorical and discourse analysis. Students are required to read articles from Italian and English (both U. S. and British) sources. Students who read other languages (e.g., French, Spanish, etc.) are encouraged to offer points of comparison. Topics include: current events; international politics; developments in science and technology; economic and business ventures; literary bestsellers; movies; sports.

ITALA 216-217 Introduction to Italian Literature (IV - VI) [LA]
Fall: 216, spring: 217. 3 credits. Satisfies language Option I. Prerequisite: permission of instructor. ITAL 216 is not a prerequisite to ITAL 217. Conducted in Italian. F. P. Swenson, spring: F. Cervesi. In this course, students develop their language skills in Italian by reading, discussing, and writing about short works of fiction (twentieth-century short stories in ITAL 216; twentieth-century prose works in ITAL 217).

ITALA 321 Seminar on Foscolo and Leopardi (also ITALL 621) (IV - VI) [LA]
Fall. 4 credits. Satisfies language Option I. Prerequisite: permission of instructor. Taught in Italian. T. Campbell. Within Italian Romanticism, Ugo Foscolo and Giacomo Leopardi loom large for contrary reasons. Foscolo's work represents a compendium of classic Romantic themes: the exaltation of passion and "emotion"; a critique of Enlightenment thought; and in Benedetto Croce's words, the foregrounding of Death, Heroism, Beauty, and Imagination. Many consider him to be the first great Italian Romantic in art and life. Leopardi's work represents sustained critiques of a Romantic world-view—hence his privileged and troubling relation to modernity. In this seminar, we undertake a critical reading of the prose works of both writers to elicit Italian Romanticism's chief features, marking its similarities with and its differences from European Romanticism. Texts to be read include Foscolo's Ultime lettere de Jacopo Ortis, highlights from Storia della letteratura italiana, Leopardi's Opere morali, and numerous selections from Zibaldone. Secondary readings are in both English and Italian.

ITALA 351 Machiavelli (also HIST 351) [III - IV] (IV - VI) [LA]
Fall. 4 credits. Conducted in English. J. Najemy. For description, see HIST 351.

ITALA 353 Acts of Translation: Practices and Methodologies (also ITALL 653) [III - IV] (IV - VI) [LA]
Spring. 4 credits. Prerequisite: permission of instructor. M. Migiel. This seminar is writing intensive and focuses primarily on giving students hands-on experience in translating a variety of Italian texts, both literary and nonliterary. Students gain experience in translation proper (e.g., translating from Italian into English or into their own native language should that not be English) and in rendering poetry as prose, rendering early Italian texts into modern Italian. As we translate, we will read selections from translation theory and from the history of translation, we will also compare published translations of Italian texts. These translation experiences and readings will allow us to reflect on questions such as: What is a good translation? What does it mean to preserve the linguistic, rhetorical, psychological, and cultural dimensions of texts? What liberties can translators legitimately take with texts—for example, is it legitimate not only to reword but to rewrite? Is it possible for the translation to be deemed "better" than the original?

ITALA 361 Seminar on Pinocchio (also ITALL 661) (IV - VI) [LA]
Spring. 4 credits. Satisfies language Option I. Conducted in Italian. S. Stewart-Steinberg. Ever since his birth in the early 1880s, the Italian puppet Pinocchio has been understood as a figure that mediates between the real and comprehensive embodies the Italian national character. This course explores the broad range of critical, cultural, and literary and psychoanalytic issues raised by Carlo Collodi's classic The Adventures of Pinocchio. We begin with a close reading of the text itself, and then go on to the extensive critical tradition that the novel has spawned ever since its publication.

ITALA 389 Modern Italian Novel (IV) [LA]
Fall. 4 credits. Satisfies language Option I. Prerequisite: permission of instructor. Students who have taken ITALA 389 previously are permitted to re-take the course for credit, provided that the readings are different. Conducted in Italian. P. Swenson. In this course we read novels by twentieth-century and contemporary novelists such as Ginzburg, Loy, Bassani, and in particular, we consider how the post-war modern novel explores the issues of history, time, memory, and the relationship of the individual to the family, political engagement, and ethical responsibility.

ITALA 419-420 Special Topics in Italian Literature
419, fall: 420, spring. 2-4 credits each term. Prerequisite: permission of instructor. Fall: T. Campbell and M. Migiel; spring: M. Migiel and S. Stewart-Steinberg. Guided independent study of specific topics.

ITALA 427 Dante's Commedia (also ITALL 627) [III - IV] (IV - VI) [LA]
Fall. 4 credits. Satisfies language Option I. Taught in Italian. M. Migiel. In this seminar, dedicated to a close reading of Dante's Commedia (1321), we will consider how Dante's poem explores such issues as: the search for a language adequate to convey experience surpassing human comprehension; the creation of a narrating "I"; the education of the reader; the relation between truth and error; national, political, and religious identities; the place of women in the epic enterprise; the redemption of his own life (and its ability to deceive as well as to enlighten and console); the call to bear witness, both to life and to loss. Particular attention will be dedicated to teaching students how to read and interpret medieval Italian texts. Graduate students are required to attend an extra section each week (time TBA), dedicated to discussion of critical methodology and the secondary literature on Dante.

ITALA 429-430 Honors in Italian Literature
429, fall: 430, spring. 8 credits year-long course. R. fall; letter grade, spring. Limited to seniors. Prerequisite: permission of instructor. M. Migiel and staff.

ITALA 450 Renaissance Poetry (also ITALL 650, COM L 450, and ENGL 422) [III - IV] (IV - VI) [LA]
Spring. 4 credits. W. Kennedy. For description, see ENGL 422.

ITALA 607-608 Proseminar (also FRLIT 607-608 and SPANL 607-608)
607, fall; 608, spring. 2 credits each term. Fall: M. C. Vallios; spring: staff.
The pro-seminar is the place for sustained exchanges between graduate students, faculty, 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.

ITALL 621 Seminar on Foscolo and Leopardi [also ITALL 321]  
Fall. 4 credits. Prerequisite: permission of instructor. T. Campbell.  
For description, see ITALL 321.

ITALL 627 Dante's Commedia [also ITALL 427]  
Fall. 4 credits. Taught in Italian. M. Migiel.  
For description, see ITALL 427.

ITALL 639-640 Special Topics in Italian Literature  
639, fall; 640, spring. 4 credits each term.  
Fall, T. Campbell and M. Migiel; spring, M. Migiel, and S. Stewart-Steinberg.

ITALL 650 Renaissance Poetry [also ITALL 450, COM L 450, and ENGL 422]  
Spring. 4 credits. W. Kennedy.  
For description, see ENGL 422.

ITALL 653 Acts of Translation: Practices and Methodologies [also ITALL 353]  
Spring. 4 credits. Prerequisite: permission of instructor. M. Migiel.  
For description, see ITALL 353.

ITALL 661 Seminar on Pinocchio [also ITALL 361]  
Spring. 4 credits. S. Stewart-Steinberg.  
For description, see ITALL 661.

Portuguese
Faculty: J. Oliveira

PORT 121-122 Elementary Brazilian Portuguese  
121, fall; 122, spring. 4 credits each term.  
Intended for beginners, for students with little or no fluency in Spanish. PORT 122 provides language qualification. 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. 3 credits. Provides language proficiency and satisfies Option 1. Prerequisite: PORT 122 or permission of instructor. J. Oliveira.  
Intended for students who have taken 121-122 and for students who are either native or near-native speakers of Spanish or another Romance language. The course presents a fast-paced review for improving grammatical accuracy and enriching vocabulary. This is an all-skills course designed to establish a groundwork, with particular emphasis on Brazilian Portuguese spoken within the context of its culture. Listening comprehension and speaking activities aim at improving oral communication within its cultural context.

PORT 219 Intermediate Composition: Portuguese for Spanish Speakers  
Spring. 3 credits. Satisfies language Option 1. 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 colloquial communication of Brazilian Portuguese. Includes readings in contemporary Portuguese and Brazilian prose and some writing practice.

PORT 319 Readings in Luso-Brazilian Literature of the 19th Century & (IV) (LA)  
Fall. 4 credits. Prerequisite: permission of instructor. J. Oliveira.  
This course takes a broad approach to selective writings of representatives Luso-Brazilian authors from the nineteenth century to the present: Machado de Assis, Aluísio de Azevedo, Lima Breto, Manuel Antonio de Almeida, Eça de Queiroz, and others. The course is divided into small sections. The students may read all works in Portuguese or in translation. Assignments will include short book reports, and students will select a topic for in-depth research for writing 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.  
This course explores a broad approach to selective writings of contemporary Brazilian and Portuguese authors such as Graciliano Ramos, J. L. do Rego, Jorge Amado, Clarice Lispector, Moacyr Scliar, Fernando Pessoa, João Saramago, and others. The course is divided into small sections. The students may read all works in Portuguese or in translation. Assignments will include short book reports, and students will select a topic for in-depth research for writing a final term paper.

Quechua
Faculty: L. Morató-Perha.

QUECH 121-122 Elementary Quechua  
121, fall; 122, spring. 4 credits each term. Prerequisite for 122: QUECH 121. L. Morató-Perha.  
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-Perha.  
Computer-assisted drill and writing instruction in elementary Quechua.

QUECH 209-219 Continuing Quechua & 209, fall; 219, spring. 3 credits each term. Prerequisites: for QUECH 209: QUECH 122 or equivalent; for QUECH 219: QUECH 209 or equivalent. Satisfies language Option I. L. Morató-Perha.  
An intermediate conversation and reading course. Study of the Huarochari manuscript.

QUECH 300 Directed Studies  
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. L. Morató-Perha.  
Taught on a specialized basis to address particular student needs. Times arranged with instructor.

Spanish
Faculty: C. Rosen.

ROM S 321 History of Romance Languages [also LING 321] # (III) (HA)  
Fall. 4 credits. C. Rosen.  
For description, see LING 321.

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 graduate work in Spanish or other appropriate disciplines, and to satisfy standards for acceptance into 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 Professor Debra Castillo, dac9@cornell.edu, the director of undergraduate studies, in Morrill Hall 323D, who will admit them to the major and assign them an adviser from the Spanish faculty. Spanish majors will then work out a plan of study in consultation with their advisers. 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.

Students interested in majoring in Spanish linguistics should contact the Department of Linguistics.

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 311 and 312.
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 Spanish literature 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

A combination of literature and linguistics.

Area Studies Option (Spanish, Latin American, or U.S. Latino Studies)

The Area Studies Option requires at least 20 credits of courses at the 300 level and above in any of these focus areas beyond the core, and all courses are to be approved through consultation with the major adviser. Courses
should reflect interdisciplinary interests in the area and may include up to three other academic fields of interest. For example, a student interested in Latin American studies may want to include courses on such topics as Latin American history, government, rural sociology, and economics. Students who want to specialize in U.S. Latino issues may want to include such topics as sociology of Latinos, Latino history, and Latino medical issues in addition to courses in literature. Students planning on spending a year or semester in Seville (but not exclusively such students) frequently plan their course work to emphasize Spanish history, art, political economy, and 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 students who achieve excellence in Spanish.

Study Abroad in Spain: Cornell, the University of Michigan, and the University of Pennsylvania offer an academic year in Spain program. Students enrolled in this program spend the first month before the fall semester begins in an orientation session at the University of Seville, where they take courses in local language and culture and take advantage of special lectures and field trips in Andalucía. The College of Arts and Sciences awards three credits for orientation. Once the semester begins, students enroll in regular classes at the University of Seville and at the program's center facility. Center courses are designed for the program and include a seminar offered by the resident director (from the faculty of either Cornell, Michigan, or Pennsylvania). Other center courses may 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 SPAN 219 before departure. Students are strongly encouraged to study abroad for the entire year rather than one semester. Students interested in the study abroad program should visit Cornell Abroad in 474 Uris Hall and take a look at the Cornell Abroad web site: www.einaudi.cornell.edu/cuabroad.

Study Abroad in Bolivia: The summer program in Cochabamba, Bolivia, is sponsored by the Latin American Studies Program and accepts both undergraduate and graduate students. Students live with Bolivian families and normally take two courses with Cornell faculty who participate in this program. In addition to course work in Bolivian culture, politics, and social movements, the program features the opportunity to do an intensive study in Quechua, the native language spoken by many Bolivians, as well as Spanish, and to participate in research and internships 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 select a member 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. Further, a student who fails to attend the first class day will be automatically dropped from the course to accommodate those on the waiting lists.

All Spanish language courses are offered by the Department of Romance Studies, and Spanish linguistics courses are offered by the Department of Linguistics.

SPAN 121-122 Elementary Spanish
121, fall and summer; 122, spring. 4 credits.

SPAN 121 Spanish for English/Spanish Bilinguals (also LSP 202)
Fall or spring. 3 credits.

SPAN 209 Spanish Intermediate Composition and Conversation I
Fall or spring. 3 credits. Provides language proficiency and satisfies Option I.

SPAN 310 Advanced Spanish Conversation and Pronunciation
Spring. 3 credits.

SPAN 311 Advanced Spanish Composition and Conversation I
Fall or spring. 4 credits.

SPAN 312 Advanced Spanish Composition and Conversation II
Fall or spring. 4 credits.
SPANR 314 Hispanic Storytelling Workshop
Fall. 3 credits. Satisfies language Option I. Prerequisite: SPANR 219, or CASE Q+, or permission of the instructor.

During the last twenty years, there has been a revitalization of the ancient art of storytelling, as provided by modern acting and staging techniques. This workshop involves all aspects of presenting an oral story to the public. As an advance language course, it provides students with ample opportunities to develop their reading and listening comprehension (with expansion of vocabulary and of the idiomatic aspects of language) as well as their oral expression (diction, pronunciation, enunciation). There is a natural cultural component in the course, because the assigned readings are stories from the Spanish-speaking world. For writing practice, students work on modifying written stories for oral performance, or create their own stories, or translate stories from the English-speaking world or from other cultures. The course culminates with a public performance by the instructor and members of the class. Preparation for this performance is conducted exclusively in Spanish.

SPANR 366 Spanish in the United States (also LING 366 and LSP 366) (III) (CA)
Spring. 4 credits. M. Suñer.
For description, see LING 366.

SPANR 630 Spanish for Reading
Fall. 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 reading in the target 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. Satisfies language Option I. Prerequisite: SPANR 200, or 207, or 209 or CASE Q+, or permission of coordinator. The course is divided into small sections and is taught in Spanish.

The literature course that normally follows SPANL 218 is either 316 or 318. Conducted in Spanish.

An intermediate course designed to improve reading, writing, speaking, and comprehension skills in Spanish through the reading and discussion of primary literary works of various genres (narrative prose, drama, 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 230 Viewing Modern Barcelona (also COM L 226) (IV) (CA)
Spring. 4 credits. Conducted in English. J. R. Resina.

Since it hosted the 1992 Olympic Games, Barcelona has quickly become one of the world’s most fashionable cities. It not only is a cosmopolitan city, but it is also the capital of Catalonia, home of an old European culture. A bilingual city in which Catalan and Spanish are commonly spoken, Barcelona combines postmodern features with the history of two millennia. This interdisciplinary seminar acquaints students with salient aspects of the history of this city, emphasizing the modern period leading up to the city’s expansion in the mid-nineteenth century and involving city planning; the art nouveau architecture of Gaudí and other architects; the painting of Picasso, Miró, Tàpies, and other artists like Casas and Nonell, and popular and traditional materials. Materials for the course include literary works and films dealing with the city, such as novels by Mercè Rodoreda, Eduardo Mendoza, and others and film directors such as Pedro Almodóvar, Wili Stillman, and Ventura Pons. The seminar will probably include an optional one-week trip to Barcelona, with visits to important sites such as the Picasso museum, the Museum of Modern Art of Catalonia, Meiers’ Center for Contemporary Art, the Park Güell, and a number of other cultural and popular references.

SPANL 246 Contemporary Narratives by Latina Writers (also LSP 246 and FGSS 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 Chicano, Chileno, Cuban, Dominican, and Puerto Rican, and other ethnic groups in the United States and the Americas. 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, among others. We account for regional distinctions and contributions. Readings include works by Julia Alvarez, Elena Cordero, Sandra Cisneros, Judith Ortiz Cofer, Cristina Garcia, Ana Lydia Vega, and others.

SPANL 247 Spanish through Media and Culture
Spring. 3 credits. Prerequisite: SPANR 219, CASE Q++, or permission of instructor. E. Sánchez-Blake.
This course offers hands-on media analysis and production. Students are introduced to students with interest in Spain and Latin America and uses media to support research on topics in their areas of interest. It emphasizes intensive use of Spanish in a cultural context. The course is conducted in a computer classroom with access to electronic media and sources of information in the Spanish World. Students conduct a research project that will be produced and presented as a news media program.

SPANL 301 Hispanic Theater Production
Fall or spring. 1-2 credits. D. Castillo.
Students involved in this course develop a specific dramatic text for full-scale production. The course involves some representation of text, close analysis of the literary aspects of the play, and group evaluation of its representational value and effectiveness. All students signing up for the course are involved in some aspect of production of the play. Read a final paper as a course requirement. Credit is variable depending upon the student’s role in play production: a minimum of 50 hours of work is required for one credit; a maximum of two credits will be awarded for 100 hours or more of work.

SPANL 316 Readings in Modern Spanish Literature (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 218, and either Spanish 311, or placement by CASE exam, or permission of instructor. Fall, C. Lawless and J. M. Rodríguez-García; spring, M. García.
Readings and discussion of representative texts from Spain from the Romantic period to the present. Bécquer, Galdós, Unamuno, García Lorca, Cela, and others.

SPANL 318 Readings in Modern Spanish American Literature (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 218, SPANR 219, or CASE Q++, or permission of instructor. Fall, B. Bosteels and E. Paez-Soldán; spring, B. Bosteels and J. M. Rodríguez-García.
Readings and discussion of representative texts of the nineteenth and twentieth centuries from various regions of Spanish America. Among the authors considered are Sarmiento, Hernández, Martí, Dario, Agustini, Borges, Cortázar, García Márquez, Pontiatowska, and Valenzuela.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 316 and 318 or permission of instructor.

SPANL 319 Renaissance Hispanisms (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 219, SPANR 318, and SPANL 319.
Satisfies language Option 1.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 316 and 318 or permission of instructor.

SPANL 319 Renaissance Hispanisms (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 219, SPANR 318, and SPANL 319.
Satisfies language Option 1.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 316 and 318 or permission of instructor.

SPANL 319 Renaissance Hispanisms (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 219, SPANR 318, and SPANL 319.
Satisfies language Option 1.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 316 and 318 or permission of instructor.

SPANL 319 Renaissance Hispanisms (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 219, SPANR 318, and SPANL 319.
Satisfies language Option 1.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 316 and 318 or permission of instructor.

SPANL 319 Renaissance Hispanisms (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 219, SPANR 318, and SPANL 319.
Satisfies language Option 1.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 316 and 318 or permission of instructor.

SPANL 319 Renaissance Hispanisms (IV) (LA)
Fall or spring. 4 credits. Satisfies language Option I. Conducted in Spanish.
Prerequisite: SPANR 219, SPANR 318, and SPANL 319.
Satisfies language Option 1.

Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 316 and 318 or permission of instructor.
may include texts by Columbus, Garcilaso, Cabeza de Vaca, Cervantes, Inca Garcilaso, Lope de Vega, Sor Juana, Caldeirón and others.

**SPANL 320 Perspectives on Latin America (also LASP 301) @ (IV) (CA)**
Spring. 3 credits. Conducted in English. D. Castillo.
This interdisciplinary, co-taught course is offered every spring through the Latin American Program. It is highly recommended for those concentrating in Latin American Studies. Topics will vary by semester, but readings always focus on current research in various disciplines and regions of Latin America. The range of issues addressed include the economic, social, cultural, and political trends and transitions in the area. In the weekly meetings, instructors and guest lecturers facilitate student discussions. Students taking the course are required to participate in all class discussions and write one research paper in their chosen focus area.

**SPANL 323 Readings in Latin American Civilization # (IV)**
Fall. 4 credits. C. Arroyo.
Topics include: the question of a “national” culture vs. other types of collective culture (women’s studies, religious studies, etc.); discussions on the identity and the problems of Spanish culture in the twentieth century (Unamuno, Ortega y Gasset, Eugenio D’Ors, Lain Entralgo); the present constitution of Spain (“a nation of nations”); from Roman Hispania to the medieval kingdoms; 1492; Don Quixote and Don Juan; the obsession for Europe-ization since 1713; and main names and trends in Spanish art and music.

**SPANL 333 The Spanish-American Short Story (IV) (LA)**
Spring. 4 credits. D. Castillo.
A study of the short narrative genre as it has been practiced in Spanish America during the past two centuries. In addition to representatives of the Romantic, Realist, Modernist, and criollista schools, the course focuses on contemporary writers such as Arreola, Borges, Cortázar, Fuentes, García Márquez, and Rufio.

**SPANL 335 Spanish-American Mystery Fiction (also SPANL 645) @ (IV) (LA)**
Fall. 4 credits. Satisfies language Option 1. Conducted in Spanish. E. Paz-Soldán.
Originally the monotonous, translated import from the Anglo-Saxon tradition, mystery fiction flourished in Spanish America in the twentieth century, albeit on slightly different terms. The course surveys detective stories and novels—in the rational, hard-boiled, and parodic modes—by such leading authors as Borges, Puig, Fuentes, and Vargas Llosa, as well as by young contemporary authors like Leonardo Padura and Patricia Melo.

**SPANL 343 Caribbean Women Writers (also SPANL 643) (CA)**
Fall. 4 credits. Prerequisite: SPAN 318, or permission of instructor. Conducted in Spanish. M. García.
Study of modern Caribbean literature can be complete only if it reflects the culture’s ethnic, racial, and linguistic diversity. Because so much of the Caribbean was at one time colonial territory, life in the Caribbean has traditionally been portrayed in literature from the perspective of European colonials and their descendants, who represent a small portion of the population. Today’s Caribbean authors, however, are seeking to express the tradition of revolt and the struggle to assert freedom that has been such an important part of Caribbean history. While this triumphant Caribbean is being portrayed by new generations of Caribbean writers, the contributions of authors are still being ignored. Only by including the literary works of these Caribbean women writers in our academic curriculum and literary criticism can we reflect the true diversity of the Caribbean. In this course we focus on the works of women writers from the Hispanic Caribbean who have made important contributions to their cultural environments. In their texts they denounce patriarchal oppression, look to history as a means of understanding their imagined community, and attempt to subvert traditional ideas of gender and genre, self and subjectivity. We will concentrate on specific concerns voiced in the texts selected for discussion, including various contestations of history, non-canonical discourses, gender and sexuality, and the uses of popular culture.

**SPANL 370 Fictions of Wonder: Variations of the Marvelous in Hispanic Literatures (IV) (LA)**
Spring. 4 credits. S. Pinti.
Alternating with the course is the consideration of the marvelous in Hispanic literatures (from Bercero to Amadis, Bloy Casares to Peri Rossi, with theoretical texts by Le Goff, Todorov, Carpenter), this course will study the concept and literary representations of the marvelous and establish a continuity between texts from the medieval, early modern, and contemporary periods.

**SPANL 399 Spanish Film (IV) (CA)**
This is a survey of key texts in the Hispanic traditions of life writing, in both the (auto)biographical and the (meta)fictional modes. Readings may include works by such authors as Domingo F. Sarmiento, Gertrudis Gómez de Avellaneda, José María Blanco White, María Teresa León, Carlota O’Neill, Max Aub, Reinaldo Arenas, Juan Goytisolo, Rigoberta Menchú, Miguel Barnet, Camilo José Cela, Carmen Martín Gaite, and José Donoso. A strong emphasis will be placed on important theoretical essays by Philippe Lejeune, Mikhail Bakhtin, Paul de Man, Ronald de la Cueva, and Michel de Certeau. Among others.

**SPANL 412 Polyphonies (also S HUM 412)**
Fall. 4 credits. M. Noone.
Polyphony, a multiplicity of (in)dependent voices, dominated musical life in Spain and its newly acquired dominions in the fifteenth and sixteenth centuries. Through intensive reading and listening we consider Spanish sacred polyphony within the wider cultural, social, and institutional contexts that lend it intelligibility.

**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 427 Cultural Politics of 1968 in Paris and Mexico City (also FRLIT 427/627, COM L 412/612, and SPANL 627) (IV) (CA)**
Spring. 4 credits. B. Bosses.
In a cultural and historical analysis of the events of 1968 in France and Mexico, this course asks what happens when, against the regimes of de Gaulle and Díaz Ordaz, students and intellectuals work to push their struggles out into the streets. Through chronicles, underground tracts, philosophical texts, political theories, movies, and fictional works, we will examine how such events redraw the lines of alliance between art, labor, and knowledge. Among the writers and artists considered are Guy Debord, Louis Althusser, Jean-Paul Sartre, Robert Linhart, Alain Badiou, Nathalie Sarraute, and Jean-Luc Godard; Elena Poniatowska, Octavio Paz, José Revueltas, Carlos Fuentes, Paco Ignacio Taibo II, and Jorge Fons.

**SPANL 429-430 Honors Work in Hispanic Literature**
429, fall; 430, spring. 8 credits. Year-long course. R grade fall semester, letter grade spring semester. Limited to seniors with a superior academic record. Prerequisite: permission of instructor. D. Castillo and staff.

**SPANL 449 Writing in the First Person: Transatlantic Readings (also SPANL 649) (IV) (LA)**
Fall. 4 credits. Permission of instructor. J. M. Rodríguez-García.
This is a survey of key texts in the Hispanic traditions of life writing, in both the (auto)biographical and the (meta)fictional modes. Readings may include works by such authors as Domingo F. Sarmiento, Gertrudis Gómez de Avellaneda, José María Blanco White, María Teresa León, Carlota O’Neill, Max Aub, Reinaldo Arenas, Juan Goytisolo, Rigoberta Menchú, Miguel Barnet, Camilo José Cela, Carmen Martín Gaite, and José Donoso. A strong emphasis will be placed on important theoretical essays by Philippe Lejeune, Mikhail Bakhtin, Paul de Man, Ronald de la Cueva, and Michel de Certeau. Among others.

**SPANL 450 Literature of the Conquest (also SPANL 650 @ (IV) (LA)**
Fall. 4 credits. Satisfies language Option 1. Prerequisites: SPAN 316, 318, and 319. Conducted in Spanish. M. A. García.
This course examines the cultural and psychological impact of the “Discovery” on the literatures of the Old and the New World. In a voyage that takes us from the Caribbean to the missals of Ancient Mexico and the Andean regions of South America, we explore the formation of various discourses on the New World through a close reading of sixteenth- and seventeenth-century European and Amerindian texts. Particular attention is paid to the early European pictorial reactions to, and resulting iconography of, the American Indian and the New World. Reading selections are drawn from Christopher Columbus, Hernán Cortés, Bernardino de Sahagún, and Maya Testimonies on the Conquest, Francisco de Xerez, Pedro Cieza de León, Michel de Montaigne, and Inca Garcilaso de la Vega, among others.

**SPANL 453 Constructed Memories of the Hispanic Caribbean (CA)**
Memory plays an important role in constructing, through literature, a social reality within a political framework. Connection between past and present provides the basis on which storytelling navigates legend and actuality. Storytelling not only expresses a cultural identity but also reinforces the cultural unity it is expressing. History and memory provide a valuable framework for the literary expression of experience. They offer writers the basis for research, assessment, and accountability intrinsic to narrative. The fallibility of memory, however, renders it a accountability intrinsic to narrative. The pro-seminar is the place for sustained exchanges between graduate students, faculty, and visiting lecturers. Activities include reading and discussion of seminal texts, workshops from different perspectives, and articles and essays from visiting lecturers.

SPANL 627 Cultural Politics of 1968 in Paris and Mexico City (also FRLIT 427/627, COM L 412/612, and SPANL 427)
Spring. 4 credits. B. Bosteels.

SPANL 639-640 Special Topics in Hispanic Literature
Fall, 640; spring, 2-4 credits each term.

SPANL 643 Caribbean Women Writers (also SPANL 343)
Fall. 4 credits. Prerequisite: SPANL 316 or SPANL 318 or permission of instructor. Conducted in Spanish. M. Garcia.
For description, see SPANL 343.

SPANL 645 Spanish-American Mystery Fiction (also SPANL 335) @
Fall. 4 credits. Conducted in Spanish. E. Paz-Soldán.
For description, see SPANL 335.

SPANL 649 Writing in the First Person: Transatlantic Readings (also SPANL 449)
Fall. 4 credits. Permission of instructor, J. M. Rodríguez-García.
For description, see SPANL 449.

SPANL 650 Literature of the Conquest (also SPANL 450)
Fall. 4 credits. Prerequisites: Spanish 316, 318, and 319. Conducted in Spanish. M. A. García.
For description, see SPANL 450.

SPANL 655 The Mexican Revolution in Novel and Film
Fall. 4 credits. D. Castillo.
The Mexican Revolution (1919–1920) was one of the great cataclysmic events of the twentieth century and has been the subject of innumerable treatments at all levels of cultural and intellectual engagement. This course proposes to take on an interdisciplinary, culture-studies analytic project using the revolution as its case study. We will read Paz’s classic Laberinto de la soledad, selections from Guzmán, Poniatoswka, and EZLN (subcomandante marcos) documents, along with novels by Puentes, Bullo, Garro, and Castellanos. Concurrently, we will screen films including documentaries like “Vámonos con Pancho villa” and “Viva Zapata,” art films like “Emordanora” and Eisenstein’s “Que viva México,” adaptations of novels including “Pedro Párame” and “Old Gringo,” and popular culture films like “Cuando Lloran los Pueblos.”

SPANL 661 Sin, Crime, and Scandal in Early Modern Hispanic Fiction
Spring. 4 credits. Conducted in Spanish. M. A. García.
Five centuries after its publication, la Celestina continues to be one of the most subversive works in the Spanish language, a work that impovers its crude and disenchanted worldview on its readers. Sin, crime, and scandal not only mark this splendid artistic achievement, but also distinguish other experimental fictions often characterized as “picarresque” because of their marginal subjectivity, their fascination with the erotic, and their transgressions against the law. Beginning with La Celestina, our seminar will explore various dissident works within the context of the societies that produced them, such as the aggressively erotic Lozana andaluza by Francisco Delicado, and some not very exemplary novels by Cervantes and María de Zayas, such as El casamiento engañoso, El coloquio de los perros, and El castigo de la mies, among others. We will end our journey in the New World, with our study of the Vida y sucesos de la monja Alfaré, attributed to the transvestite nun-soldier Catalina de Erauso, and the hybrid chronicle known as El Carrero by Rodríguez Freyle, a denunciation of sexual sins in colonial Nueva Granada. Readings will be supplemented with an ample range of theoretical and critical perspectives.

SPANL 668 Poetry of the Golden Age (also SPANL 468)
Fall. 4 credits. Conducted in Spanish. C. Arroyo.
For description, see SPANL 468.

SPANL 668 After Borges: Literature, Politics, and the Aesthetic Act (also SPANL 468)
Fall. 4 credits. Taught in Spanish. B. Bosteels.
For description, see SPANL 486.

RUSSIAN
N. Pollak, chair, (226F Morrill Hall); P. Carden, director of undergraduate studies, (226B Morrill Hall); S. Paperno, director of Russian language program, (226E Morrill Hall); W. Browne, R. Krivitsky, S. Senderovich (on leave spring and fall 2004), G. Shapiro, V. Tsimberov.

For updated information, consult our web sites: (literature) www.arts.cornell.edu/russian (language) http://russian.cornell.edu

The Russian Major
Russian majors study Russian language, literature, and linguistics and emphasize their specific fields of interest. It is desirable, although not necessary, for prospective majors to complete RUSSA 121–122, RUSSA 203–204, and RUSS 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 Professor Carden as soon as possible. For a major in Russian, students are required to complete (1) RUSSA 206–208 or 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 RUSSL 203 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:
   - In two semesters: RUSSA 121 + RUSSA 122.
   - In three semesters: RUSSA 121 in the fall, RUSSA 122 in the spring.
   - In four semesters: RUSSA 121 in the fall, RUSSA 104 + 121 in the spring.

Further information is available from Prof. R. Krivitsky, S. Paperno, V. Tsimberov.

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 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 Professor Carden 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. 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 the language skills: listening, speaking, reading and writing. Course materials include clips from original Russian films and TV programs. Homework is 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. Prerequisite: RUSSA 122 or placement by the department. Times to be arranged with instructors.* S. Paperno, V. Tsimberov. The emphasis is on reading unabridged articles on a variety of topics from current Russian periodicals and web pages and translating them into English; a certain amount of discussion (in Russian) may also be undertaken. When necessary and feasible, a separate section may be created for native speakers of Russian, with larger reading assignments.

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 203 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

Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor.* 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. Prerequisites: for RUSSA 303, RUSSA 204 or equivalent; for RUSSA 304, RUSSA 303 or equivalent. M W 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.

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.* 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 be different from one year to another depending on the needs and interests of the students.

RUSSA 309-310 Advanced Reading

309, fall; 310, spring. 4 credits each term. RUSSA 310 satisfies Option 1. Prerequisites: for RUSSA 309, RUSSA 204, for RUSSA 310, RUSSA 309 or equivalent. Times to be arranged with instructors.* S. Paperno, V. Tsimberov. Course designed to teach advanced reading skills. Weekly reading assignments include 20-40 pages of material. Reading of larger reading assignments (up to 120-130 pages per week).

RUSSA 401-402 History of the Russian Language (also LING 417-418) (III) (HA)

401, spring; [402]. 4 credits each term. Prerequisites: for RUSSA 401, permission of instructor; for RUSSA 402, RUSSA 401 or equivalent. Offered alternate years. 402 not offered 2003-2004. Times to be arranged with instructor.* W. Browne. Phonoological, morphological, and syntactic developments from old Russian to modern Russian.

RUSSA 403-404 Linguistic Structure of Russian (also LING 443-444) (III) (KCM)

403, fall; [404, spring]. 4 credits each term. Prerequisites: for RUSSA 403, reading knowledge of Russian; for RUSSA 404, RUSSA 403 or equivalent. Offered alternate years. 404 not offered 2003-2004. Times to be arranged with instructor.* W. Browne. A synchronous 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, spring. 1 credit each term. Prerequisite: very good command of Russian language. Not offered 2003-2004. Times to be arranged with instructor.* 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. Prerequisites: for RUSSA 413, RUSSA 404 for equivalent; for RUSSA 414, RUSSA 413 or equivalent. Times to be arranged with instructor.* 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.*
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 641)
Fall. 4 credits. Prerequisite: students must know a Slavic or ancient Indo-European language. This course is a prerequisite for RUSSA 602 and 651. Offered alternate years. Times to be arranged with instructor.** W. Browne.
Grammar and reading of basic texts.

RUSSA 602 Old Russian Texts (also LING 662)
Spring. 4 credits. Prerequisite: RUSSA 601. Offered alternate years. Times to be arranged with instructor.** W. Browne.

RUSSA 632-634 Russian for Russian Specialists
632, fall; 633, spring. 4 credits each term. Prerequisite: 4 years of college Russian or equivalent. For graduates and advanced undergraduates. Times to be arranged with instructor.** W. Browne.
The course is designed for students whose areas of study require advanced active control of the language. Fine points of syntax, usage, and style are discussed and practiced.

RUSSA 651-652 Comparative Slavic Linguistics (also LING 671-672)
651, fall; 652, spring. 4 credits each term. Prerequisite: for RUSSA 651, RUSSA 601 taken previously or simultaneously, or permission of instructor; for RUSSA 652, RUSSA 651 or permission of instructor.
Covers sounds and forms of the Slavic languages and of prehistoric common Slavic and the main historical developments leading to the modern languages.

RUSSA 700 Seminar in Slavic Linguistics
Topics chosen according to the interests of staff and students.

RUSSIAN Literature
A variety of courses are offered in Russian literature: some courses assign readings in English translation, others in the original Russian, others in both; see the course descriptions for details. The connection between Russian history, society, and literature is particularly close, so instruction and discussion in class often encompass culture and intellectual history as well as literature. Some courses are cross-listed with appropriate departments.

RUSS (207)-208 Themes from Russian Culture # (IV) (LA)
Courses deal with various aspects of Russian culture, e.g., literature, art, music, religion, philosophy, and social thought. RUSS 207 extends over the period from the beginning through the eighteenth century. RUSS 208 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. Classics incorporate audiovisual presentations (slides, tapes, film).

RUSS 209 Readings in Russian Prose and Poetry (LA)
Fall. 3 credits. Satisfies language Option I. T R 2:55-4:10. N. Poliak.
Short nineteenth- to early twentieth-century classics including Pushkin, Dostoevsky, Tolstoy, Blok, Pasternak (in Russian).
Conducted in English. For students with 2+ semesters 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.

RUSS 212 Readings in Twentieth-Century Russian Literature (IV) (LA)
Spring. 3 credits. Satisfies language Option I. M W F 1:25-2:15. G. Shapiro.
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.

RUSS 233 Soviet Social and Family Life, WW II (also HIST 233) (III) (CA)
For description, see HIST 233.

RUSS 279 The Russian Connection, 1830-1867 (also COM L 279) # (IV) (LA)
Fall. 4 credits. M W F 10:10-11:00. P. Carden.
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 can be read as 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.

RUSS 280 The Russian Connection, 1870-1960 (also COM L 280) (IV) (LA)
Spring. 4 credits. M W F 10:10-11:00. P. Carden.
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 Sartre.

RUSS 331 Introduction to Russian Poetry # (IV) (LA)
Fall. 4 credits. Prerequisites: 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 2003-2004. S. Senderovich.
A survey of Russian poetry, with primary emphasis on the analysis of individual poems by major poets.

RUSS 332 Russian Drama and Theatre (also THETR 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 crucial moments in the history of Russian theatre. 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.

RUSS 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 2003-2004. N. Poliak.
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. T R 10:10-11:25. P. Carden.
This course is a survey of two centuries of Russian short fiction. 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 relation to his life and to the literature of his time. Readings are in English translation.

[RUSSL 337] Films of Russian Literary Masterpieces (also COM L 338) (IV)
War and Peace and Dr. Zhivago are well-known American films relating to Russian literature of the nineteenth and twentieth centuries. Russian literature has been a matter of great interest both in the West and East. A clear-cut practice of cultural translation is presented by film versions of Russian literary masterpieces. We perform a comparative analysis of these films, providing an excellent opportunity for discussing problems of translation between various media and of cultural translation.

[RUSSL 350] Education and the Philosophical Fantasies (also COM L 350) # (IV) (LA)
A major philosophical tradition has conceived of education as encompassing the whole of our lives. What we should do or be 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 philosophers-fantasists who use the forms of fiction to explore fundamental issues of education. We’ll 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 Western tradition.

[RUSSL 367] The Russian Novel (also COM L 367) # (IV) (LA)
This course considers the rise of the Russian novel in the nineteenth century. May include works by Pushkin, Gogol, Turgeniev, Dostoevsky, Tolstoy, and Chekhov.

[RUSSL 368] Russian Literature from 1917 to the Present (IV) (LA)
All readings in English translation. A survey focusing on the most important writers. Among the themes explored are Russian Modernism, social command, socialist realism, the Thaw, dissident and emigre literature, and post-modernism. Writers include Blok, Mayakovsky, Babel, Olesha, Platonov, Pasternak, Nabokov, Solzhenitsyn, the two Erofeevs, contemporary women poets, and short story writers.

[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 contentious dialogue with the literature and philosophy of the preceding century opens up to the same of the following century. His critique of European culture, his searching examination of the interior life, and his bold experiments with narrative make his work seminal in world fiction. Readings include Notes From Underground, Crime And Punishment, The Idiot, and Brothers Karamazov.

[RUSSL 373] Chekhov in the Context of Contemporary European Literature and Art (also COM L 375) # (IV) (LA)
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 reading in English translation.

[RUSSL 385] Reading Nabokov (also ENGL 379) (IV) (LA)
Fall. 4 credits. 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 (1969), all in English translation, and examine the two widely read novels that he wrote in Ithaca while teaching at Cornell. Lolita (1955) and Pnin (1957).

[RUSSL 393] Honors Essay Tutorial
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. Staff.

[RUSSL 409] Russian Stylistics (IV) (LA)
Fall. 4 credits. Also open to graduate students. Prerequisite: proficiency in Russian or permission of instructor. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. M W F 11:15-12:05. S. Senderovich.
Course goes beyond normative grammar. Provides introduction to the subtleties of idiomatic Russian on the levels of morphology, syntax, vocabulary, and phrasology. Also provides an introduction to the genres of live colloquial and written language. Students develop writing skills through short assignments and their analyses. Introduces first notions of literary stylistics and their practical application.

[RUSSL 415] Post-Symbolist Russian Poetry (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 2003-2004. N. Poliak.
We will examine works by three poets in the first quarter of this century: Amorleshuk, the Symbolist whom Eikhenbaum, Shklovsky, and Jakobson as well as the works they studied. Provides a historical examination of a school that gave rise to some of the most important movements in twentieth-century Western criticism and in other disciplines, such as linguistics and anthropology. Also provides both a look at classics of Russian prose and an approach to literature that has something to offer readers today. Readings in English translation.

[RUSSL 427] Russian Formalism (also COM L 427) (IV) (LA)
A course on Russian Formalism—a trend in literary interpretation that flourished in the 1910s and the early 1920s. We’ll read the writings of such scholars as Tynyanov, Eikhenbaum, Shklovsky, and Jakobson as well as the works they studied. Provides a historical examination of a school that gave rise to some of the most important movements in twentieth-century Western criticism and in other disciplines, such as linguistics and anthropology. Also provides both a look at classics of Russian prose and an approach to literature that has something to offer readers today. Readings in English translation.

[RUSSL 430] Practice in Translation (IV) (LA)
A practical workshop in translation: documents, scholarly papers, literary works (prose and poetry). Translation mostly from Russian to English, partly from English to Russian. Attention is paid to problems and development of skills.

[RUSSL 431] Contemporary Russian Prose (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. Graduate students may audit the course. Not offered 2003-2004. Staff.
This course is designed to acquaint students with the way Russian prose has developed during the past 40 years. Emphasis is on comprehension of the text, but we also discuss literary methods, modern literary history, social and political problems, and the ways life 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. 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 2003-2004. S. Senderovich.
Reading in the original language and discussion of selected works by Pushkin: lyrics, narrative poems, and Eugene Onegin.

[RUSSL 437 A Moralist and a Pornographer (also COM L 437) (IV) (LA)]
Spring. 4 credits. Limited to 15 students. Not offered 2003--2004. S. Senderovich. 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 initially could not even be published in the United States, for it was perceived as a pornographic text.

[RUSSL 485 The World of Anna Karenina (also HIST 485) (III or IV) (CA)]
For description, see HIST 485.

RUSSL 492 Supervised Reading in Russian Literature
Fall or spring. 1–4 credits each term. Prerequisite: proficiency in Russian or permission of instructor. Independent study. Students must find an adviser and submit a plan before signing up. Times to be arranged with instructor. Staff.

RUSSL 493 Anton Chekhov # (IV) (LA)
Fall. 4 credits. Prerequisite: proficiency in Russian or permission of instructor. M W F 10:10–11:00. S. Senderovich. Reading of major works of Chekhov in Russian, with focus on style and use of language. We examine the works in the context of their time and assess their place in the history of Russian literature. Readings include "Anna on the Neck," "Darling," "Steppe," Uncle Vanya, and Seagull.

RUSSL 499 The Avant-Garde in Russian Literature and the Arts (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 2003–2004; next offered 2004–2005. P. Carden. 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]
Fall. 4 credits. Prerequisite: proficiency in Russian or permission of instructor. Not offered 2003–2004. 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. Prerequisite: proficiency in Russian or permission of instructor. Times to be arranged with instructor. Staff.

Related Languages

Czech

CZECH 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Times to be arranged with instructor.** 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. Not offered 2003–2004. Times to be arranged with instructor.** W. Browne. Taught on a specialized basis to address particular student needs.

[HUNGR 427 Structure of Hungarian (also LING 427) (III) (KCM)]
Fall. 4 credits. Prerequisite: LING 101 or equivalent. Offered alternate years. Not offered 2003–2004. Times to be arranged with instructor.** W. Browne. For description, see LING 427.

Polish

[POLISH 131–132 Elementary Polish]
131, fall; 132, spring. 3 credits each term. Prerequisite: for POLISH 132, POLISH 131 or equivalent. This language series (131–132) is not sufficient to satisfy the language requirement. Offered alternate years. Times to be arranged with instructor.** W. Browne. Covers all language skills: speaking, listening comprehension, reading, and writing.

POLISH 133–134 Continuing Polish
133, fall; 134, spring. 3 credits each term. Prerequisites: for POLISH 133, POLISH 132 or equivalent; for POLISH 134, POLISH 133 or equivalent. Offered alternate years. Times to be arranged with instructor.** W. Browne. An intermediate conversation and reading course.

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. M W 1:25–2:15. W. Browne. Covers all language skills: speaking, listening comprehension, reading, and writing. Includes Bosnian.

[Ukrainian]

UKRAN 300 Directed Studies
Fall or spring. 1 credit. Prerequisite: permission of instructor. Times to be arranged with instructor.** W. Browne. Taught on a specialized basis to address particular student needs.

SANSKRIT

See Asian Studies.
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 (S&Ts) addresses such issues through the study of the social aspects of knowledge, especially scientific and technological knowledge. S&Ts explores the practices that shape science and technology, examines their social and cultural context, and analyzes their political and ethical implications. S&Ts provides a strong liberal arts background from which students can go on to careers in law, medicine, environmental policy, business, and a variety of other professions where the social aspects of science and technology loom large.

The Science & Technology Studies Major

S&Ts 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 a completed 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&Ts 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 in history, philosophy, sociology, government, anthropology, economics, or other courses listed in the social sciences/history (Group III) requirement of the College of Arts & Sciences;
(b) the physical or biological science (Group I) requirement of the College of Arts & Sciences;
(c) mathematics or computer science courses in fulfillment of the Arts College Group II requirement.

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&Ts majors must complete the following requirements:

Note: All courses used to fulfill major requirements must be taken for a letter grade.

1. Core: one course in each of the following groups (a-c).
   (a) Foundation (S&Ts 201)
   (b) Ethics (choose from S&Ts 205, 206, 360, or 490)
   (c) History (choose from S&Ts 233, 250, 281, 282, 293, 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&Ts 250, 281-3, 286, 292, 349, 353, 354, 355, 381, 400, 409, 410, 438, 453, 481, 525)


(c) Life in its Environment (S&Ts 205, 206, 233, 281-3, 286, 287, 301, 311, 314, 324, 333, 406, 411, 427, 444, 446, 447, 487, 492)

In consultation with an S&Ts 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: total 34 credit hours in the major, chosen from the general list of S&Ts 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&Ts majors. Students who enroll in the honors program are expected to do independent study and research, with faculty guidance, on issues in science and technology studies. Students who participate in the program should find the experience intellectually stimulating and rewarding whether or not they intend to pursue a research career. S&Ts majors are considered for entry into the honors program at the end of the second semester of their junior year. To qualify for the S&Ts honors program, students must have an overall Cornell cumulative grade point average 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. More information on the honors program is available from the S&Ts 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. 468 of this catalog.

The Concentration in Science & Technology Studies


The concentration (or minor) in Science & Technology Studies (S&Ts) is designed for students who wish to engage in a systematic, interdisciplinary exploration of the role of science and technology in modern societies. The concentration is intended for students with varied academic interests and career goals. Majors in the natural sciences and engineering have an opportunity to explore the social, political, and ethical implications of their selected fields of specialization, while students majoring in the humanities and social sciences have a chance to study the processes, products, and impacts of science and technology from an S&Ts perspective.

To satisfy the requirements for the S&Ts 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&Ts. Interested students may

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

Introductory Course

S&TS 101 Science and Technology in the Public Arena (III) (SBA)
Fall. 3 credits. T. Gillespie.
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 emerging field of Science and Technology Studies (S&TS). As well as serving as an introduction to students who plan to major in Biology & 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. It allows students in science and engineering to reflect critically on their own involvement in science and technology and consider the impact and implications of their work for society. It allows students with backgrounds in the humanities and social sciences to develop a critical understanding of the role of science and technology in the world.
The course is a mixture of lecture, discussion, and other activities. The class meets on Monday and Wednesday for lecture and on Fridays 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 compose the majority of your grade.

Ethics

S&TS 205 Ethical Issues in Health and Medicine (also B&SOC 205) (IV) (KCM)
Fall. 4 credits. Limited to 150. E. McLearc.
For description, see B&SOC 205.
S&TS 206 Ethics and the Environment (also B&SOC 206, PHIL 248) (IV) (KCM)
Spring. 4 credits. Limited to 50. N. Sethi.
For description, see B&SOC 206.
S&TS 200 Technology in Society (also ENGRG 250, ECE 250, HIST 250) (III) (HA)
Fall. 3 credits. R. Kline.
For description, see ENGRG 250.
S&TS 282 Science in Western Civilization (also HIST 280) # (III) (HA)
Fall. 4 credits. P. Dear.
For description, see HIST 282.
S&TS 282 Science in Western Civilization (also HIST 282) # (III) (HA)
Spring. 4 credits. P. Dear.
For description, see HIST 282.

Theme Courses

Minds and Machines

S&TS 250 Technology in Society (also ECE 250, ENGRG 250 and HIST 250) (III) (HA)
Fall. 3 credits. R. Kline.
For description, see ENGRG 250.
S&TS 281 Science in Western Civilization (also HIST 281) # (III) (HA)
Fall. 4 credits. 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) (HA)
Fall. 4 credits. Staff.
S&TS 286 Science and Human Nature (also PHIL 286) (IV) (KCM)
Fall. 4 credits. R. Boyd.
For description, see PHIL 286.
S&TS 292 Inventing 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 (III) (HA)
Spring. 3 credits. T. Gillespie.
From the first attempts at pressing 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 353 Knowledge and Society (also SOC 353) (III) (CA)
S&TS 354 The Sociology of Contemporary Culture (also SOC 352) (III) (CA)
Spring. 4 credits. C. Leuenberger.
For description, see SOC 352.
S&TS 355 Computers: From Babbage to Gates (III) (HA)
Spring. 4 credits. T. Gillespie.
Computers have not always been the ubiquitous beige boxes gracing our desktops: in Victorian London, Charles Babbage attempted to build his analytical engine using brass gears and steel rods; and during World War II the Allied governments used sophisticated electro-mechanical and electronic “brains” to break Axis codes. Machines that once occupied entire rooms now travel in knapsacks. How did this technology, once considered esoteric and useful to only 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 also 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. (No technical knowledge of computer use is presumed or required.)

S&TS 381 Philosophy of Science: Knowledge and Objectivity (also PHIL 381) (IV) (KCM)
For description, see PHIL 381.
An exploration of the history of technology in consumer culture possible, yet at the same time the economic and cultural trends of consumer culture make it difficult to shape the kinds of technology that become available. How is our daily lifestyle in consumer culture shaped by technology? How are everyday technologies shaped by 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 487 Innovation: Theory and Policy (III)
Spring. 4 credits. Open to upper-level undergraduates and interested graduate students. Prerequisite: ECON 102 or permission of the instructor. 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, Below, 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. J. Reppy.
For description, see GOVT 483.

S&TS 487 Seminar in the History of the Environment (III)

S&TS 440 The Sociology of Science (also B&SOC 442, CRP 442, SOC 442) (III)
Fall. 4 credits. Staff.
A view of science less as an autonomous activity than as a social institution. We discuss such issues as controversies in science, analysis of scientific text, gender, and the social shaping of scientific knowledge.

S&TS 350 Atomic Consequences: The Incorporation of Nuclear Weapons in Postwar America (also GOVT 305, AM ST 380) (III) (CA)

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 360 Ethical Issues in Engineering (also ENGRG 360) (III)
Spring. 3 credits. R. Kline.
For description, see ENGRG 360.

S&TS 391 Science in the American Polity, 1960-Now (also GOVT 308, AM ST 388) (III)

S&TS 406 Biotechnology and Law (also B&SOC 406) (III)
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. The final part of the course examines social processes and practices in legal institutions, and relates these to specific cases of scientific and technological controversy. Lectures and assignments are designed to acquaint students with relevant ideas about the relationship between legal, political, and scientific institutions, and to encourage independent thought and research about specific problems covered in the course.

S&TS 411 Knowledge, Technology and Property (III) (SBA)

S&TS 444 Historical Issues of Gender and Science (also FGSS 444) (III)
Spring. 4 credits. Not open to freshmen. M. Rossiter.
For description, see “Life in its Environment” theme.

S&TS 466 Public Communication of Science and Technology (also COMM 466) (III)
Fall. 3 credits. Limited to 15. B. Lewenstein.
For description, see COMM 466.

S&TS 467 Innovation: Theory and Policy (III)
Spring. 4 credits. Open to upper-level undergraduates and interested graduate students. Prerequisite: ECON 102 or permission of the instructor. 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, Below, 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. J. Reppy.
For description, see GOVT 483.

S&TS 487 Seminar in the History of the Environment (III)

S&TS 440 The Sociology of Science (also B&SOC 442, CRP 442, SOC 442) (III)
Fall. 4 credits. Staff.
A view of science less as an autonomous activity than as a social institution. We discuss such issues as controversies in science, analysis of scientific text, gender, and the social shaping of scientific knowledge.

S&TS 444 Historical Issues of Gender and Science (also FGSS 444) (III)
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S&TS 466 Public Communication of Science and Technology (also COMM 466) (III)
Fall. 3 credits. Limited to 15. B. Lewenstein.
For description, see COMM 466.
SCIENCE & TECHNOLOGY STUDIES

S&T 491 Disease and Culture (III)

S&T 492 Politics and the Public Health (III)

S&T 493 Economics Meets Science Studies (III)

S&T 532 Inside Technology: The Social Construction of Technology (also SOC 532)
Fall. 4 credits. T. Gillespie.
Rather than analyze the social impact of technology upon society, in this course we investigate how society gets inside technology. In other words, is it possible that the very design of technologies embody assumptions about the nature of society? And, if so, are alternative technologies, which embody different assumptions about society possible? Do engineers have implicit theories about society? Is technology gendered? How can we understand the interaction of society and technology? Throughout the course the arguments are illustrated by detailed examinations of particular technologies, such as the ballistic missile, the bicycle, the electric car, and the refrigerator.

Life in Its Environment

S&T 205 Ethical Issues in Health and Medicine (also B&SOC 205) (IV) (KCM)
Fall. 4 credits. E. McLeary.
For description, see B&SOC 205.

S&T 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&T 233 Agriculture, History, and Society: From Squanto to Biotechnology (III) (HA)
Fall. 3 credits. M. Rossiter.
This course surveys the major themes in the development of agriculture and agribusiness in the United States in the nineteenth and twentieth centuries. These include particular individuals (such as Liberty Hyde Bailey, Luther Burbank, G. W. Carver, Henry A. Wallace, and Norman Borlaug), the rise of government support and institutions (including U.S.D.A. and Cornell), noteworthy events (the Dust Bowl, World War II, and the environmental movement), and the achievements of the recent Green and "Gene" Revolutions.

S&T 281 Science in Western Civilization (also HIST 281) # (III) (HA)
Fall. 3 credits. P. Dear.
For description, see HIST 281.

S&T 282 Science in Western Civilization (also HIST 282) # (III) (HA)
Spring. 4 credits. P. Dear.
For description, see HIST 282.

S&T 283 The Sciences in the Twentieth Century (also HIST 280) (III) (HA)

For description, see "Minds and Machines" theme.

S&T 285 Communication in the Life Sciences (also COMM 285) (III)
Spring. 3 credits. B. Lewenstein.
For description, see COMM 285.

S&T 286 Science and Human Nature (also PHIL 286) (IV) (KCM)
Fall. 4 credits. R. Boyd.
For description, see PHIL 286.

S&T 287 Evolution (also BIOEE 207 and HIST 287) (I or III) (PBSS)
Fall. 4 credits. W. Provine.
For description, see BIOEE 207.

S&T 301 Life Sciences and Society (also B&SOC 301) (III) (SBA)
Fall. 4 credits. M. Lynch.
For description, see B&SOC 301.

[S&T 311 Sociology of Medicine (III) (SBA)
Spring. 4 credits. Not offered 2003-2004. Staff.]

S&T 314 Environmental Governance (also B&SOC 314, NTRES 314)
Spring. 3 credits. S. Wolf.
For description, see NTRES 314.

S&T 324 Environment and Society (also R SOC 324 and SOC 324) (III) (SBA)
Fall. 3 credits. C. Geisler.
For description, see R SOC 324.

[S&T 333 Genomics and Society (also R SOC 333) (III)
Fall. 3 credits. Not offered 2003-2004. Staff.
For description, see R SOC 333.]

[S&T 406 Biotechnology and Law (also B&SOC 406) (III)
For description, see "Science, Technology and Public Policy" theme.]

[S&T 411 Knowledge, Technology, and Property (III) (SBA)
For description, see "Science, Technology and Public Policy" theme.]

[S&T 444 Historical Issues of Gender and Science (also FGSS 444) (III) (HA)
Spring. 4 credits. Not open to freshmen. M. Rossiter.]

[S&T 446 Biomedical Ethics (also B&SOC 446) (IV) (KCM)
Spring. 4 credits. Not offered 2003-2004. Staff.]

[S&T 447 Seminar in the History of Biology (also B&SOC 447, HIST 415, BIOEE 467) (I or III) (PBSS)
Summer. 4 credits. Limited to 18. S-U grades optional. Staff.
For description, see BIOEE 467.

[S&T 487 Seminar in the History of the Environment (III) (HA)

[S&T 492 Politics and the Public Health (III) (CA)
For description, see "Science, Technology, and Public Policy" theme.]

Independent Study

S&T 399 Undergraduate Independent Study
Fall, spring. 1-4 credits. By permission only. More than 8 hours total of independent study (not including honors) can count toward the S&T requirement.

S&T 498-499 Honors Project I and II
Fall and spring. 3-5 credits each term. Open only to Science & Technology Studies students in their senior year by permission of the department. Applications and information available 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 up to five credits per semester up to a maximum of eight credits in S&T 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. S&T 498 includes the fall honors Seminar. The student and the project supervisor must reach clear agreement at the outset as to what sort of work will need to be completed during the first semester. Minimally, an honors thesis outline and bibliography should be accomplished. At the end of S&T 498, Honors Project I, a letter grade is assigned and the advisers, in consultation with the Director of Undergraduate Studies, evaluate whether or not the student should continue working on an honors project. S&T students who do continue in the honors program for the second semester receive a letter grade at the end of their final term whether or not they complete a thesis and whether or not they are recommended for honors.

Graduate Seminars

S&T 525 Seminar in the History of Technology (also HIST 525)
Spring. 4 credits. R. Kline.
For description, see "Minds and Machines" theme.

S&T 532 Inside Technology: The Social Construction of Technology (also SOC 532)
Fall. 4 credits. T. Gillespie.
Rather than analyze the social impact of technology upon society, in this course we investigate how society gets inside technology. In other words, is it possible that the very design of technologies embody assumptions about the nature of society? And, if so, are alternative technologies, which embody different assumptions about society possible? Do engineers have implicit theories about society? Is technology gendered? How can we understand the interaction of society and technology? Throughout the course the arguments are illustrated by detailed examinations of particular technologies, such as...
as the ballistic missile; the bicycle, the electric car, and the refrigerator.

[S&TS 616 Enlightened Science (also HIST 616)]
Fall. 3 credits. Limited to graduate students. Not offered 2003–2004. P. Dear. For description, see HIST 616.]

[S&TS 620 Intelligibility in Science (also HIST 620)]
Spring. 4 credits. P. Dear. For description, see HIST 620.]

[S&TS 625 Visualization and Discourse in Science]

[S&TS 631 Qualitative Research Methods for Studying Science (also SOC 631)]
Spring. 4 credits. T. Pinch. Much has been learned about the nature of science by sociologists and anthropologists donning lab coats and studying scientists in action. In this course we look at the methods used in this new wave of science studies. We examine what can be learned by interviewing scientists, from videos, and from detailed examinations of scientific texts. Students gain hands-on experience by conducting a mini-project in which they investigate some aspect of scientific culture.

[S&TS 644 Topics in the History of Women in Science (also FGSS 644)]

[S&TS 645 Genetics: Politics and Society in Comparative Perspective (also GOVT 634)]
Fall. 4 credits. Not offered 2003–2004. S. Hilgartner.]

[S&TS 664 Constructionism in Social Science]

[S&TS 680 Seminar in Historiographical Approaches to Sciences (also HIST 680)]
Spring. 4 credits. Not offered 2003–2004. P. Dear. For description, see HIST 680.]

[S&TS 681 Philosophy of Science (also PHIL 681)]
Fall. 4 credits. R. Boyd. For description, see PHIL 681.]

[S&TS 682 Topics in the Scientific Revolution (also HIST 682)]
Fall. 4 credits. Not offered 2003–2004. P. Dear. For description, see HIST 682.]

[S&TS 692 Politics and the Public Health]

[S&TS 700 Special Topic 1: Science Studies and the Politics of Science]
Fall. 4 credits. Prerequisites: S&TS 711 or permission of instructor. Not offered 2003–2004.]

[S&TS 700 Special Topic 2: Technology Transfer Issues]
examining some portrayals of traditional religious people and practice in modern Indian fiction, it will focus on the dynamics of selected modern movements (e.g., the Radhasoami, Sai Baba’s following) that offer ways to experience Indian religious sensibilities in contemporary urban environments. It will also explore some religious dimensions of Hindu nationalism in the context of modern Indian history. Readings will draw on social-scientific analyses and literary sources as well as studies of specific movements.

S HUM 408 Tuscany as a New Jerusalem (also ARCH 696, ART H 417) Fall. 4 credits. Limited to 15 students. T 10:10-12:05. M. Lasansky During the late Middle Ages and the Renaissance, Italy was remapped through a series of architectural constructions, frescoes, site-specific festivities, religious performances, and literary tracts to establish New Jerusalem sites. Through an examination of sites in Bologna, Florence, Rome, San Gimignano, Varallo, and elsewhere, this seminar will provide an opportunity to explore the relationship between architecture, art, spectacle, popular culture, landscape, and religious ritual during the Renaissance.

Permission of the instructor is required.

S HUM 410 Medieval Sin and Confession (also ENGL 411, ENGL 614) Fall. 4 credits. Limited to 15 students. T 12:20-2:15. M. Raskolnikov This course examines the institution of religious confession in its connection with autobiographical writing, querying the boundary between fictional and nonfictional confession. Beginning with some of the earliest Latin autobiographical writings, including St. Augustine’s and Abelard’s, we will trace the transformation of confession and of the notion of the self and discuss different ways of representing sin (as an essential aspect of the self, as an intruder, as a separable entity within a self that also contains virtue). We will then turn to the growth and institutionalization of confessional practices in the thirteenth century, when confession became an annual requirement of all practicing Christians. We consider the connections between the rise of confession and the rise of vernacular literature in Europe, looking at medieval guidebooks for confession, guidebooks which also teach confessors what sins are best unspoken and unnamed. Having examined some of these older forms of confession, we then consider the discourse of confession and the self in the critical debate about Hamlet and the soliloquy as a confessional mode. We conclude with a brief examination of confession in the writings of Descartes and Rousseau.

S HUM 411 Sacred Fictions (also NES 423, RELST 411, JEWST 423, CLASS 481, COM L 411) Fall. 4 credits. Limited to 15 students. T 10:10-12:05 K. Haines-Eitzen A seminar devoted to a wide range of literature from early Judaism and Christianity that can be loosely identified as “fiction,” including Joseph and Aseneth, Judith, Tobit, The Apocryphal Acts of the Apostles, Apocryphal Gospels, and Saints’ Lives. We discuss genre and audience, the notions of truth and imagination, fiction and history, constructions of communal identities, and the intersection of the secular and sacred throughout the course.

S HUM 412 Polyphony (also MUSIC 412, SPANL 412) Fall. 4 credits. Limited to 15 students. T 10:10-12:05. M. Noone. Polyphony, a multiplicity of (in)dependent voices, dominated musical life in Spain and its newly acquired dominions in the fifteenth and sixteenth centuries. Through intensive reading and listening we consider Spanish sacred polyphony within the wider cultural, political, social, and institutional contexts that lend it intelligibility.

S HUM 413 Gendered Nationalism and Violence Fall. 4 credits. Limited to 15 students. R 2:30-4:25. S. Feldman. This course interrogates understandings of the nation and nationalism through a focus on gendered subjectivities, a central aspect of one’s sense of belonging against the backdrop of contestation over religious and secular nationalism in South Asia, we explore the place and meaning of gendered violence in colonial and postcolonial subnational struggles.

S HUM 414 Rereading Enlightenment (also FR 414) Fall. 4 credits. Limited to 15 students. W 2:30-4:25. S. McDonald. Analysis of the crossover between political, social, philosophical, and literary discourses, with particular focus on the shifts between theological and secular models. Topics include authority, freedom, equality, sentiment, reason, libertinism, fanaticism, and tolerance. Eighteenth-century readings from Kant, Rousseau, Sade, Voltaire, and others; eighteenth-century readings from European and American debates about Enlightenment.

S HUM 415 Baptizing Aristotelian Science (also PHIL 415, RELST 415) Fall. 4 credits. Limited to 15 students. R 2:30-4:25. S. McDonald. Aristotle’s sophisticated ideas about knowledge and science were introduced into European culture by medieval Christian thinkers. Aristotle challenged their assumptions and they responded, dramatically transforming Western science, philosophy, and theology. We read foundational texts (in English translation) by thinkers such as Robert Grosseteste and Thomas Aquinas and examine how the interaction of powerful secular and religious movements in the later Middle Ages has shaped our understanding of the world.

S HUM 416 The Catholic Grotesque (also ARCH 696, VISST 416) Spring. 4 credits. Limited to 15 students. R 2:30-4:25. M. Lasansky. This seminar takes as its subject the Italian sacri monti—remote mountain-top shrines built in the Alps between the fifteenth and seventeenth centuries. The sanctuaries provide an opportunity to explore the relationship between architecture/art/spectacle/politics/popular culture and religious ritual during the Renaissance. As pilgrimage destinations that have remained in continuous use since their founding, their study also provides an opportunity to chart the changing attitudes toward religious rite. With this in mind we will address the post-Renaissance interest in these sites by a tourist clientele that simultaneously cultivated Catholic grotesque and the picturesque sublime.
S HUM 417 Sacred Time and Ordinary Time (also ANTHR 418)
This course examines the interpenetration of sacred and ordinary in a variety of cultural settings, from small-scale societies to modern states. The course treats the allocation of labor for the sacred and the inclusionary and exclusionary relations this creates as well as the re-emergence of sacredness within secular states, historicizing and engendering both processes.

S HUM 419 Confessing America
This interdisciplinary course examines the relations between American spiritual autobiography and the arts, particularly the use of spiritual discourse to create oppositional "imaged communities." It includes texts by Annie Dillard, Linda Hogan, Terry Tempest Williams, Black Elk, Dorothy Day, William Apess, Jarena Lee, and John Woolman.

S HUM 420 Hope as a Method (also ANTHRO 425)
In this course, we seek to carve out a space for a new kind of anthropological engagement with philosophy and theology. Following an examination of ways anthropologists have engaged with philosophy and theology, we will examine a full range of philosophical and theological reflections on hope. Texts are drawn from the following traditions: Kantian philosophy, Marxist philosophy, existentialism, pragmatism, political theology, education theory, feminism, and queer theory. The goal of the course is to confront the character of hope in the production of academic knowledge through an investigation of academics' reflection on hope itself.

S HUM 421 Communalism in South Asia
This course examines changes and continuities in expressions of violence justified on the basis of religious difference in South Asia. We query notions of primordial difference and seek alternative explanations for the sustained hostility that has plagued the region for generations. Comparative examples are drawn upon as counterpoint.

S HUM 422 From Spirituals to Swing
This course examines the shifting categorization of "sacred" and "secular" as a means of understanding nineteenth- and twentieth-century African American literature and musical culture. In particular, we will use these categories—understood as fluid and contested—to interrogate notions of African American authenticity and the production of African American modernity.

S HUM 424 Why We (Don't) Need Theater (also COM L 484)
highest national ranking. Faculty members are internationally recognized for their scholarly work, and have received numerous awards, research fellowships, and research grants.

The sixteen or so 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 with employers. 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

A large number of our majors also go onto graduate school and obtain advanced (i.e., Master's and Ph.D.) degrees in such varied fields as sociology, political science, philosophy, economics, and psychology. Many also complete professional degrees in education, law, medicine, social work, and business administration.

Requirements for the Major

In addition to the academic requirements established by the College of Arts and Sciences, you must also fulfill requirements towards a specified major. There are 10 courses required in the sociology major. All courses towards the major must be taken for a letter grade and students must maintain at least a 2.0 grade point average while enrolled in the major. The 10 courses required for the major are divided into the following categories:

- Sociology 101
- Sociology 375
- two research methods courses (SOC 301 and 303)
- one advanced-level sociology course (400-level or higher)
- five additional (i.e., elective) courses in sociology

Declaring the Sociology Major

If you are a student in the College of Arts and Sciences and wish to declare a major in sociology, it is in your best interest to do so as soon as possible. If you are not currently in the College of Arts and Sciences, you need to be admitted to A&S before you can declare. In order 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).
- Make an appointment for advising with the Undergraduate Coordinator, Susan Meyer, or visit her during her office hours (in 316 Uris Hall). During your meeting with her, you will fill out a major declaration form.
- Leave this form and your transcript with the Undergraduate Coordinator. Your declaration will be reviewed by the Director of Undergraduate Studies, Szonja Szelenyi, and sent on to the College of Arts and Sciences for official notification that you have declared a major. Please allow two weeks for your declaration to be approved and entered into the campus computer.

A student file will be set up to maintain your records in the department. Once you are officially recognized as a major in sociology, the Sociology Department will receive a copy of your transcript at the end of each semester, which will be kept in your student file at 316 Uris Hall. Your records will be maintained until five years after you graduate.

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.

Undergraduate Program Coordinator: The Undergraduate Program Coordinator (Susan Meyer) in the Sociology Department is located in Room 316, Uris Hall. She is available to provide assistance with the following:

- the process of declaring the sociology major.
- forms related to transferring courses from other universities and/or other departments.
- other administrative matters or concerns (e.g., forms, adding and dropping courses).

Director of Undergraduate Studies: The Director of Undergraduate Studies (Szonja Szelenyi) is located in Room 346, Uris Hall. She is there to:

- 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 advisers 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 adviser; 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. Faculty advisers are there to:

- discuss your education, career goals, and graduate school opportunities.
- meet with you to talk about courses and plan your program of study within the department.
- go over your academic program each semester and provide you with your Personal Identification Number (PIN) so that you can register for courses via the campus computer.

Sociology Peer Advisers: There are approximately 10 advanced sociology majors who serve as peer advisers in the department. These advisers change from year to year, but a complete list of their names and email addresses is available to you from the Undergraduate Program Coordinator in the sociology office (Room 316, Uris Hall). Peer advisers do not provide you with academic counseling; they are there to help you adjust to life in the major, as well as to let you know about the department's many support services and activities.

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
The Sociology Honors Program

Honsors 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 adviser's 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 year-long 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 10- to 15-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 50 pages except by permission of the honors adviser. Two copies of the honors thesis are due to the Undergraduate Program Coordinator (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 management, 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 any two of the three core courses in the concentration: SOC 105 and SOC 305/ILROB 171, SOC 395, and
- complete four additional courses from the following list: SOC 120/ILROB 170, 203, 215, 304, 311, 526/526, 340, 357, 415, 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 Program Coordinator), or Szonja Szelenyi (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. Fall, S. Szelenyi; spring, S. Szelenyi.

The purpose of this course is to introduce 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 groups, and nation states. This approach also provides new insights into such topics as different types of 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 103 Self and Society (also R SOC 103) (III) (SBA)]


This course is an introduction to micro-sociology, focusing on social processes within small groups, including the family. Emphasis is on leadership, conformity, social influence, cooperation and competition, distributive justice, and micro analyses of interaction.

SOC 105 Introduction to Economic Sociology (also R SOC 105) (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 from Karl Marx and Max Weber to Karl Polanyi focused their writings on emergent capitalist economies and societies. Contemporary social theorists likewise have sought to understand the interaction between capitalism and the social forces reacting against and emerging from modern economic development. From exchange and other theories to network analysis and institutional theory, a central theme in contemporary social thought has been the relationship between the economy and society, economic action and social structure, and rationality and fundamental social processes. This course provides an introduction to social thought and research seeking to understand and explain the relationship between economy and society in the modern era.

[SOC 108 Introduction to Social Inequality (III) (SBA)]


This course examines the nature and processes of social and economic inequality in industrial societies. The principal focus is on the contemporary United States, with some comparisons to other industrial societies with different educational and class structures. We examine how social and economic institutions encourage or discourage the use of ascription (i.e., inherited or unchangeable traits) vs. achievement and how choice theories regarding individuals, and we consider how individuals make choices as they face different decision points in their schooling and work. Throughout the course we focus on the varied mechanisms of stratification that sort people into schools and workplaces, and we also consider how to judge the "fairness" of these mechanisms. The readings include theoretical and empirical materials on stratification along race, class, and gender lines, and several book-length ethnographies of work settings.

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 Moore, Morris, and Bellamy, and the dystopias of Huxley, Orwell, and Zamaït. We also examine real social experiments, including nineteenth-century intentional communities, twentieth-century socialisms and religious cults, and modern ecological, political, and millennial movements. Throughout, the emphasis is on two sociological questions: What kinds of social relationships appear as ideal? How can we tell societies that might work from those that cannot?

SOC 120 Micro Organizational Behavior (also ILROB 170)

Fall. 3 credits. Staff.

For course description, see ILROB 170.

General Education Courses

SOC 202 Population Dynamics (also R SOC 201) (III) (CA)

Spring. 3 credits. P. Elouendon-Enqueye.

For course description, see R SOC 201.

[SOC 203 Work and Family (also FGSS 203) (III) (SBA)]


Family life is often portrayed in the popular media as a haven away from the harsh realities of public life, suggesting that work and family constitute separate and distinct.
spheres. By contrast, many sociologists point out the links between work and family, and how these links have different consequences for men and women. This course highlights the responses of individuals, employers, and governments, both in the United States and internationally, to the dilemmas posed by the interface between work and family.}

**SOC 206 International Development** (also R SOC 205) (III) (HA)
Spring. 3 credits. Staff.
For course description, see R SOC 205.

**SOC 207 Problems in Contemporary Society** (III) (SBA)
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. By 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 legitimate, natural, or desirable. We address questions of the following kind: What are the major forms of stratification in human history? Are inequality and poverty inevitable? How many social classes are there in advanced industrial societies? Is there a “ruling class”? Are lifestyles, attitudes, and personalities shaped fundamentally by class membership? Can individuals progress into poverty or readily escape their class origins and move upward in the class structure? Are social contacts and “luck” important forces in matching individuals to jobs and class positions? What types of social forces make it more difficult 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 course description, see S&T S 201.

**[SOC 215 Organizations: An Introduction** (III) (SBA)
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 project teams to multinational firms. Main issues include socialization and group processes within work settings; management from the perspective of the manager and the managed; the organization as a site of inequality and mobility; organizational decision-making, efforts to modify organizations by reforming bureaucracy and hierarchy; and comparisons across nations.

**SOC 217 The Sociology of Markets** (III) (SBA)
The exchange of goods and services is a central topic in economics, but it has many social dimensions as well. This course examines how economic exchange is affected by the social and cultural contexts within which it occurs. Central themes of the course include: How do patterns of market exchange emerge? What types of social institutions are necessary to make economic exchange predictable and safe? Why do some services cost money in capitalist societies and others do not? How is “market value” determined? How do resources and institutions shape the nature and consequences of economic exchange? How do social norms, hierarchies, and markets shape the development and distribution of goods and services? This course explores these and other questions of the following kind: What are the promises and limitations of the market as a tool for understanding the sources and consequences of social inequality? 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.

**SOC 221 Inequality and Social Science** (III) (SBA)
Fall. 4 credits. Enrollment limited to 20 students. 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, IRLRB 222, PHIL 195, R SOC 222 and GOVT 222)
Spring. 1–3 credits. D. Grusky.
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, investigating authors for 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 coursework relevant to issues of inequality.

**SOC 226 Drugs and Society** (III) (SBA)
The course focuses on drug use and abuse as a social rather than a medical or psychopathological phenomenon. Specifically, the course deals with the history of drug use and regulatory attempts in the United States and around the world; the relationship between drug use and racism/class conflict, pharmacology and use patterns related to specific drugs; perspectives on the etiology of drug use/abuse; AIDS prevention and harm reduction interventions; drug-use subcultures; drug policy, drug legislation, and drug enforcement; and the promotion and condemnation of drug-activities in the mass media.

**SOC 248 Politics and Culture** (also GOVT 363) (III) (HA)
Fall. 4 credits. M. Berezin.
The course focuses on currently salient themes of nationalism, multi-culturalism and democracy. It explores such questions as: 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 political science, but applicable from political science and history. Journalistic accounts, films, and web site research will supplement readings.

**SOC 251 Families and the Life Course** (also HD 251) (III)
Spring. 3 credits. E. Wethington.
For course description, see HD 250.

**SOC 255 Latinos in the U.S.** (also LSP 201 and R SOC 265) (III) (SBA)
Spring. 3 credits (4-credit option available). H. Velez.
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 293 Inequality, Diversity, and Justice** (also CRP 293, GOVT 293, PHIL 193) (III or IV) (KCM)
Spring. 4 credits. No prerequisites 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? 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 argument, 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 researchers in philosophy, political theory, the social sciences, and law.

**Methods and Statistics Courses**

**SOC 301 Evaluating Statistical Evidence** (II) (MQR)
Fall. 4 credits. M. Clarkberg.
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.
SOC 303 Design and Measurement (III) (SBA)
Spring. 4 credits. Staff.
This course covers the foundations of sociological analysis: issues arising from using humans as data sources; the quality of our primary data; methods of data collection; research designs in wide use and their limitations; and pragmatic considerations in doing research on humans, organizations, communities, and nations.

SOC 304 Social Networks and Social Processes (II) (SBA)
Fall. 4 credits. D. Strang.
How do groups self-segregate? What leads fashions to rise and fall? How do rumors spread? How do communities form and police themselves on the Internet? 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 course description, see ILROB 171.

Intermediate Courses

SOC 309 The Sociology of Marriage (also SOC 509) (III) (SBA)
Spring. 4 credits. M. Clarkberg.
Theoretical debate on the nature of marriage in the United States and its historical development. We examine the historical patterns of marriage in the United States, examine the development of organized labor, 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)
Spring. 4 credits. M. Macy.
What is the correct group that you belong to? What makes it important? What holds the group together, and how might it fall apart? How does the group recruit new members? Select leaders? Make and enforce rules? Do some members end up doing most of the work while others get a free ride? We explore these questions from an interdisciplinary perspective, drawing on sociology, economics, and psychology. We study the nature of collective action, the social psychology of cooperation and conflict, the role of institutions in social life, and the relationship between law and politics.

SOC 316 Gender Inequality (also FGSS 316) (III) (SBA)
Fall. 4 credits. S. Szelenyi.
This course offers a comprehensive overview of historical and contemporary patterns of gender stratification. The first few weeks are devoted to theoretical and empirical investigations of four substantive areas: the historical development of gender stratification, the nature of gender inequality in contemporary societies, 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 racial and cross-national variations in gender inequality. Each section includes examination of key theoretical debates and a survey of recent feminist research in these areas.

SOC 320 Globalization and Inequality (III) (SBA)
S. Szelenyi.
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, the structure of class relationships, gender inequality, racial and ethnic relations, migration, poverty, social networks, and indigenous world cultures.

SOC 323 Service Learning (also ILROB 323)
Fall. 4 credits. M. Lounsbury.
For course description, see ILROB 322.

SOC 324 Environment and Society (also S&TS 324 and R SOC 324) (III) (SBA)
Spring. 3 credits. Staff.
For course description, see R 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 institutional and intellectual force signals the accelerating importance 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, among them welfare, poverty, housing, crime, and health. The policy research sector itself—people, values, institutions—is also surveyed.

SOC 330 Sociology of Sport
Spring. T. Sorek.
For course description, see department office.

SOC 340 Health, Behavior, and Health Policy (III)
S. Caldwell.
This course examines the social contexts of physical and mental health, illness and medical care; its purpose is to explore the contributions of social science to health promotion and health policy. Topics include: the social context of health, disease and illness; the social organization of health services; use of health services; effectiveness of health service use; health promotion and disease prevention; and national health care policies.

SOC 341 Modern European Society and Politics (also GOVT 341) (III) (SBA)
Fall. 4 credits. V. Bunce and J. Pontusson.
For course description, see GOVT 341.

SOC 346 Economic Sociology (also SOC 546)
Spring. 4 credits. R. Swedberg.
For course description, see SOC 546.

SOC 352 The Sociology of Contemporary Culture (also S&TS 354) (III) (CA)
Spring. 4 credits. C. Leuenberger.
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 emergence of the tourist industry, the significance of consumption in modern life, narratives in popular films, the culture of music and art, the use of rhetoric in social life, cultural analyses of science, and the social construction of self, bodies, and identities.

SOC 356 Law and Society (also SOC 556) (III) (SBA)
R. Swedberg.
The phrase "law and society" misleadingly suggests that we are speaking of two discrete entities: 'law' and 'society'. But law is itself part of society, its basic processes are social processes, and it contains within its own internal workings social dimensions worthy of study by the sociologist.

In this course we will examine law in society. The "classical" sociological models of law—those of Marx, Weber and Durkheim—are well-represented. The works of several significant American and European critical legal theorists—those of the American Legal Realists, the Frankfurt School, Michel Foucault, Roberto Unger, Duncan Kennedy, and Jurgen Habermas—are also well-represented, not only to facilitate and understanding of the bases for the attacks on the liberal Rule of Law, but also to facilitate an understanding of the relationship between law and politics and the potential for revitalizing the Rule of Law through democracy. The major themes in "classical" and contemporary legal anthropology, e.g., hegemony v. resistance, rule-centered v. perspective-centered paradigms, are reviewed. We also consider the extent to which the various perspectives on law in society have been appropriated internationally.

SOC 357 Schools, Race, and Public Policy (III) (SBA)
Spring. 4 credits. S. Morgan.
This course examines the social contexts of physical and mental health, illness and medical care; its purpose is to explore the contributions of social science to health promotion and health policy. Topics include: the social context of health, disease and illness; the social organization of health services; use of health services; effectiveness of health service use; health promotion and disease prevention; and national health care policies.

SOC 358 Immigration, Capitalism, and Inequality
Spring. 3 credits. V. Nee.
For course description, see department office.
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.

**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 one introductory course plus 301 (or an equivalent statistics course). Students who are not sure whether their background is sufficient for a particular course should consult the professor.

**SOC 408 Qualitative Methods (also SOC 508) (III) (SBA)**

Spring. 4 credits. M. Berezin.

This course aims to acquaint students with the practice of non-quantitative research methods. It does not offer a broad list of techniques, rather it asks students to think about how particular methods are more or less suited to the answering of particular types of research questions. The course is divided into four parts: (1) a general discussion of theory, methods and evidence in social science; (2) a series of readings and exercises on particular methods; (3) an analysis of full-length works to see how they were put together; (4) discussion of student projects.
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programs. Theoretical perspectives include functionalism, social exchange, and interactionism.

SOC 505 Research Methods I: The Logic of Social Inference
Fall. 4 credits. Prerequisite: a first course in statistics and probability. M. Clarkberg. 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 credible assumption that the most important fundamentals of data analysis techniques can be taught in the context of simple multivariate linear models. Accordingly, the course provides a relatively formal treatment of the identification and estimation of single equation OLS and GLS regression models, instrumental variable models, traditional path models, and multiple indicator models. But supplemented with this material, the course addresses complications of regression modeling for the practicing researcher including: missing data problems, measurement error, regression diagnostics, weighting, and inference for surveys. The course concludes with a brief introduction to nonlinear regression, counterfactual models of causality, Bayesian inference, and hierarchical models.

SOC 507 Research Methods III
Fall. 4 credits. D. Grusky, D. Strang. 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 who have 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 504 Economy and Family (also SOC 404)
4 credits. Not offered 2003-2004. M. Clarkberg. For course description, see SOC 404.1

SOC 508 Qualitative Methods (also SOC 408)
Spring. 4 credits. M. Berezin. For course description, see SOC 408.

SOC 509 The Sociology of Marriage (also SOC 309, WOMNS 309, WOMNS 509)
Spring. 4 credits. M. Clarkberg. For course description, see SOC 309.

(SOC 510 Seminar on Comparative Societal Analysis
3 credits. Open to advanced graduate students through the department before each term. 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 enrolled for credit write critiques of papers presented at the seminar by faculty members and other graduate students, and work on their own project. Some weeks are devoted to collective reading and analysis of background work. Students may enroll for more than one semester.

SOC 518 Social Inequality: Contemporary Theories, Debates, and Methods
Fall. 4 credits. D. Grusky/S. Morgan. This course serves as an introduction to contemporary theories, debates, and models regarding the structure of social classes, the determinants of social mobility, the sources and causes of racial, ethnic, and gender-based inequality, and the putative rise of postmodern forms of stratification. The twofold objective is to both review contemporary theorizing and to identify areas in which new theories, hypotheses, and research agendas might be fruitfully developed.

SOC 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 520 Social Policy (also SOC 326)
Spring. 4 credits. S. Fishell. For course description, see SOC 326.

SOC 522 Artificial Societies
Spring. 4 credits. M. Macy. This seminar is an introduction to computer simulation. The course covers the history of social simulation and introduces students to complexity theory, game theory, and evolutionary models of social change. The remainder of the course (nine weeks) teaches students to program in Delphi and gives them simulation programs to modify as a class project.

SOC 528 Conflict and the Nation-State
Spring. 4 credits. D. Strang.

SOC 532 Inside Technology: The Social Construction of Technology (also S&T 532)
Fall. 4 credits. G. Gillespie. For course description, see S&T 532.

SOC 546 Economic Sociology
Spring. 4 credits. R. Swedberg. This course introduces the field of economic sociology and covers major topics addressed by sociologists studying the intersection of economy and society. We begin with classic statements on economic sociology and then move to the invigoration of the field in recent years, reading works that have been instrumental in this invigoration. Consideration is given to the several variants of 'institutionalism' that have informed the sociological study of markets, organizations, and economic exchange.

SOC 550 Seminar on Max Weber and Joseph Schumpeter
Spring. 4 credits. M. Clarkberg. For course description, see department office.

SOC 552 New Institutionalism in Economic Sociology
Fall. 4 credits. M. Clarkberg. 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 557 Theories of the Family and the Life Course (also SOC 470)
Spring. 4 credits. M. Clarkberg. For course description, see department office.

SOC 558 Simulating Social Dilemmas (also SOC 480)

SOC 559 Special Topics: Research Methods
4 credits. Not offered 2003-2004. M. Macy, D. Strang. This course covers special topics in the analysis of quantitative and qualitative data. The topics covered vary from year to year, but are typically chosen from such possibilities as: networks, social simulation, Bayesian methods, game theory, qualitative research methods, and laboratory experimentation. Emphasis is on understanding the conflict and congruence between existing theoretical frameworks, and on translating theoretical issues into empirical research questions.

SOC 560 Simulating Social Dilemmas (also SOC 480)

SOC 561 Qualitative Research Methods for Studying Science (also S&T 631)
Spring. 4 credits. T. Pinch. For course description, see S&T 631.

SOC 562 Proseminar in Sociology
Fall and spring. 2-4 credits. This seminar is offered irregularly. Topics, credit, and instructors vary from semester to semester. Students should look at the department's bulletin board at the beginning of each semester for current offerings.

SOC 566-567 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 568 Proseminar in Sociology
Fall. 1 credit. Enrollment restricted to first-semester sociology graduate students. Staff. Discussion of the graduate state of sociology and of the research interests of members of the graduate field; taught by all members of the field.

SOC 569 Qualitative Research Methods for Studying Science (also S&T 631)
Spring. 4 credits. T. Pinch. For course description, see S&T 631.
the American Institutes of Bangladesh, Indian, Pakistan, and Sri Lankan studies. For details on the major, see the Department of Asian Studies listing in this volume. For courses available in South Asian studies, or for further information on research opportunities, direct questions to the South Asia Program Office, 170 Uris Hall, 255-8493. www.einaudi.cornell.edu/SouthAsia.

**SOUTHEAST ASIA PROGRAM**


Southeast Asia studies at Cornell is included within the framework of the Department of Asian Studies. Seventeen 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), Cebuano (Bisayan), Indonesian, Javanese, Tagalog, Thai, and Vietnamese. In addition, faculty from other disciplines also provide area instruction on Southeast Asia. The formal program of study is enriched by a diverse range of extracurricular activities, including an information weekly brown bag seminar, art exhibits at the Johnson Museum, and concerts of the Gamelan Ensemble. The George McT. Kahin Center for Advanced Research on Southeast Asia is also the site for public lectures as well as publication and outreach activities related to this area. The John M. Echols Collection on Southeast Asia, in Kroch Library, is the most comprehensive collection on this region in America.

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 Asia studies with any other major by completing 18 credits of course work. Graduate students may work toward an M.A. degree in Southeast Asian studies or pursue a Master of Professional Studies in another school with a concentration in Southeast Asian studies. Ph.D. students specializing in Southeast Asia receive a doctorate in a discipline such as history, history of art, anthropology, government, music, economics, or city and regional planning. Academic Year and Summer Foreign Language and Area Studies scholarships are available to graduate students who are U.S. citizens or permanent residents.

For courses available in Southeast Asian studies and details on the major, see the Department of Asian Studies listing in this volume. Additional information is available on the Internet at:

www.einaudi.cornell.edu/southeastasia.

Inquiries for further information should be directed to the program office, 180 Uris Hall, (607) 255–2578 or SEAP@cornell.edu.

**SPANISH**

See Department of Romance Studies.

**STATISTICAL SCIENCE DEPARTMENT**

The university-wide Department of Statistical Science coordinates undergraduate and graduate study in statistics and probability. A list of suitable courses can be found in the section, "Interdisciplinary Centers, Programs, and Studies," in the front of this catalog.

**SWAHILI**

See Africana Studies and Research Center.

**SWEDISH**

See Department of German Studies.

**TAGALOG**

See Department of Asian Studies.

**THAI**

See Department of Asian Studies.

**THEATRE, FILM & DANCE**

D. Barthick, R. Archer, S. Berinstein, S. Brookhouse, J. Chu, S. Cole; D. Feldshuh, A. Fogelsanger, (director of the undergraduate program in dance); D. Frederiksen, (director of the undergraduate program in film); J. E. Gaither (on leave 2003–2004) (director of undergraduate studies); K. Goetz (chair); S. Haenni, D. Hall, E. Intemann, J. Kovar, B. Levitt, P. Lillard, R. MacPike, B. Milles (on leave fall 2003), J. Morgenroth, M. Rivchin, J. Self, B. Suber, A. Van Dyke (director of graduate studies); A. Villarejo (on leave 2003–2004), E. Winet

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.
ARTS AND SCIENCES - 2003–2004

Theatre Arts Major

D. Bathrick, R. Archer, S. Bernstein, S. Brookhouse, S. Cole, D. Feldshuh, J. E. Gainor (on leave 2003–2004) (director of graduate studies); K. Goetz, chair; D. Hall, E. Intemann, B. Levitt, P. Lillard, R. MacPike, B. Milles (on leave fall 2003), A. Van Dyke (director of undergraduate studies), E. Winet

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

THETR 250 Introduction to Theatre Design and Technology 4

THETR 280 Introduction to Acting 3

2) Four laboratory courses distributed as follows: 1-3

THETR 151 Production Lab I

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: 1-3

course one must be at 300 level

course one must be at 400 level

one additional course at the 300 or above level

one of the four 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 qualify for admission to the Advanced Undergraduate Theatre Program (described below) may also be used to fulfill this requirement.

5) Courses in which a student receives a grade below “C” cannot be used to fulfill the requirements for a Theatre major.

Honors

The theatre honors program is for majors who have demonstrated exceptional ability in the major and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original research. To be part of the honors program the student must maintain a GPA of 3.5 in classes for the theatre major and an average of 3.0 in all courses. Students must consult with their advising faculty in the spring of their junior year in order 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. Students interested in the Advanced Undergraduate Theatre Program (ALTP) are invited by the 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. Independent study in theatre, film or dance allows students the opportunity to pursue special interests not treated in regularly scheduled courses. Students interested in Independent Study must have a faculty adviser, 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.

THETR 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 be concentrators in the department. Students are responsible for arranging their own internships in consultation with the faculty in their area of choice prior to preregistration for the semester in which the internship is planned to take place. To receive credit within this course, the internship must be unpaid. Students must follow the rules and procedures stated in the departmental internship form.

THETR 495 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 students 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.

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.

An introduction to theatrical production for the nonmajor. Students develop a 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 301 Mind and Memory: Exploring Creativity in the Arts and Sciences

Also MUSIC 372, S HUM 301, ENGL 301 (IV)

Spring. 4 credits. J. Morgenroth and staff. Creativity is the attribute of the mind that enables us to make new combinations from often-familiar information to perceive analogies and other linkages in seemingly unlike elements, to seek for synthesis. As is true of all learning, creativity is dependent on memory—a memory that is genetic and collective as well as personal and experimental. This course explores the nature of creativity in science and art, indicating the differing requirements for discovery in the disparate disciplines while demonstrating the commonality that underlies the creative process and binds physicist or mathematician to poet, composer, or visual artist. The course presents lectures by weekly guests from as many disciplines in the arts and sciences as possible, faculty members who discuss the process underlying their research or their work as creative and performing artists. Members of the course are encouraged to enroll in another course or be engaged in an activity (research, artistic production, or performance) in which the insights gained in this class can be applied or tested. In addition, each section engages in a common creative project. To further abet the active participation so necessary to learning, students are asked to keep a journal, one that summarizes their understanding of and response to, the lectures and readings from the required texts. Students are also obliged to attend several public art exhibits or performances and write two papers.

Theatre Studies

THETR 214 Comedy and Humanism (also COM L 211) (IV) (LA)

Spring. 4 credits. S. Donatelli.

See COM L 211 for description.

THETR 223 The Comic Theater (also COM L 223 and CLASS 223) # (IV) (LA)

Spring. 3 credits. J. Rusten.

For description, see CLASS 223.

THETR 240 Introduction to World Theatre I (IV) (LA)

Fall. 4 credits. E. Winet.

A survey of practices, literatures, and themes of theatrical performance in Africa, America, Asia, and Europe from antiquity to around 1600. Case studies drawn from ancient Egypt, Greece, Rome, the Near East, and India; medieval/feudal Indonesia, China, Japan, and England up to the age of European colonialism. Issues of masking and identity, storytelling and ritual, stage and society, tradition and modernity. Lecture will be combined with frequent student projects.

THETR 241 Introduction to World Theatre II # (IV) (LA)

Spring. 4 credits. E. Winet.

A survey of world theatrical performance from around 1600 to the present. Case studies drawn from English and French seventeenth-century theatres; recent traditional theatres of Japan, India, China, and Africa; bourgeois,
realistic and avant-garde theatres of Europe and the United States; postmodern and postcolonial theatres of the past half century. Recurring issues of realism and theatricalism, innovation and nostalgia, globalization and marginalization. Lecture will be combined with frequent student projects.

THETR 278 Desire (also ENGL 276, COM L 276, FGSS 276) (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 "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 this strange narrative of our own. We will 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, psychoanalytical, 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 with frequent student projects.

innovation and nostalgia, globalization and postcolonial theatres of the past half century. Why have theatre artists throughout the world and throughout history represented human identity and agency onstage through mediating objects? What do masks and puppets reveal that are not better known through naked faces and unembellished flesh? Why do theatre artists embrace or reject performing objects? This course surveys approaches to the figure or image of the theatrical actor in relation to performing objects (i.e., masks, puppets and other anthropomorphic stage properties.) We will consider the significance of performing object traditions and imagery throughout theatre history, the association of performing objects with acting and directing theory and anti-actorly prejudice, and the persistence and transformation of performing objects in contemporary culture and performance theory. Readings will range from theatre criticism and history to relevant approaches to performing objects from the arts and social sciences. There will be periodic written assignments and one final paper/project.

THETR 345 The Tragic Theater (also CLASS 345 and COM L 344) # (IV) (LA)

Spring. 4 credits. Limited to 40 students. F. Ali

See CLASS 345 for description.

THETR 347 Visual Ventrilocism: Performing the Body Performing Voice

Spring. 4 credits. J. Frank

This course will examine drama and performance that disrupt, dislocate, multiply, screen, mediatize, or digitize the body and/or voice. We will consider material and figural notions of "the body" in performance—focusing on the history of avant-garde performance as well as contemporary critical race- and gender-theory—and examine how drama and performance function among multiple political and aesthetic sites of intervention. Possible plays may include works by Amiri Baraka, August Wilson, Lorraine Hansberry, Alice Childress, Vinnette Carroll, Adrienne Kennedy, Nozake Shange, Suzan-Lori Parks, Robbie McCauley, and Anna Deavere Smith. Course requirements consist of regular response papers, a presentation, a five- to seven-page essay, and an annotated bibliography with a critical introduction.

THETR 384 Commedia: A Contemporization of Physical Acting Styles and the Comic Approach (IV) (LA)

Spring. 3 credits. Prerequisite: THETR 281 and permission of the instructor. Limited to 10 students. B. Milles

A wholly physical acting class based in the practices of Commedia dell'arte, with characters, physical lazi, improvisation, street theatre-utilizing improvisation, some mask work, clown and viewpoint training. An exploration of how to use the body to illustrate text, and how to mine text to maximize comedy.

THETR 394 Public Discourse, Political Stages: African American Drama and Performance 1950 to Present (also ENGL 394, FGSS 395, AM ST 394) (IV) (LA)

Fall. 4 credits. Juniors and seniors. Limited to 25. J. Frank

Does dramatic representation not only reflect, but also enact and perform politics? Are there aesthetic limitations? We will position our readings of African American drama and performance in the sociohistorical and critical contexts in which they emerged (Black Arts Movement, Civil Right's Movement, Women's Liberation Movement, gender and race theory, theories of political drama and theatre, realist/nonrealist drama, etc.). Moreover, we will broaden our understanding of stages—to include various forms of public discourse—as we consider how drama and performance function among multiple political and aesthetic sites of intervention. Possible plays may include works by Amiri Baraka, August Wilson, Lorraine Hansberry, Alice Childress, Vinnette Carroll, Adrienne Kennedy, Nozake Shange, Suzan-Lori Parks, Robbie McCauley, and Anna Deavere Smith. Course requirements consist of regular response papers, a presentation, a five- to seven-page essay, and an annotated bibliography with a critical introduction.
process of developing theatre pieces based on a variety of sources.

THETR 431 Theory of the Theatre and Drama (also FGSS 433) (IV) (LA)
Fall. 4 credits. Prerequisite: some theatre history and dramatic literature work at the 300 level or permission of instructor. Not offered 2003–2004. D. Barthrick.
A survey of dramatic theory and theories of theatrical representation from Aristotle to the present.

THETR 436 The Female Dramatic Tradition (also FGSS 433) (IV) (LA)
Staff.
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 Hrotsvitha, Aphra Behn, and Caryl Churchill, as well as theory by such critics as Sue Ellen Case and Jill Dolan.

THETR 438 East and West German Drama (also GERST 438 and THETR 648) (IV) (LA)
D. Barthrick.
Course covers major historical and textual developments in German theatre from the end of World War II to the present. Leading dramatists from West and East Germany, Switzerland, and Austria (Brecht, Frisch, Durrenmatt, Weiss, Hochhuth, Muller, Braun, Kroetz, Handke, and others) are treated in the light of the political events and aesthetic-dramaturgical traditions from which they emerge and with which they are taking issue.

THETR 445 Text Analysis for Production: How to Get from the Text onto the Stage (also VISS 445) (IV)
Spring. 4 credits. Prerequisite: THETR 281 or THETR 250 or THETR 398, or permission of instructor. Limited to 15 students. B. Levitt.
This course examines the play as the central, essential source for production decisions made by the actor, the director, the designer, and the dramaturg. Students "present" their conclusions about the performance of studied texts through project work as either an actor, director, designer, or dramaturg, as well as through two to three papers.

THETR 446 Sophomore Seminar: Shakespeare in Context (also VISS 446) (IV) (LA)
Fall. 4 credits. Prerequisites: permission of instructor. Limited to 15 students. B. Levitt.
This course examines how collaboration among stage directors, designers, and actors leads to differing interpretations of the plays. The course focuses on how the texts themselves are blueprints for productions with particular emphasis on the choices available to the actor inherent in the text.
This is a special seminar sponsored by the John S. Knight Institute's Sophomore Seminars Program. Seminars offer discipline-intensive study within an interdisciplinary context. While not restricted to sophomores, the seminars aim at initiating students into the discipline to encourage 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.

THETR 454 American Musical Theatre (also ENGL 454 and MUSIC 490) (IV) (LA)
Fall. 4 credits. Prerequisite: ENGL 272 or THETR 240 and 241 and ability to read music at the level of MUSIC 105.
S. McMillin.
See ENGL 454 for description.

THETR 459 Contemporary British Drama (also ENGL 459) (IV) (LA)
See ENGL 459 for a complete description.

THETR 472 Sondheim and Musical Theatre (also ENGL 473) (IV) (LA)
S. McMillin.
See ENGL 473 for description.

THETR 483 Seminar in Comparative Twentieth-Century Anglophone Drama (also ENGL 483) (IV) (LA)
Fall. 4 credits. Some knowledge of classical and avant-garde theories of drama and theatre would be useful, but is not a prerequisite. T. Not offered 2003–2004.
B. Jeylits.
The course explores twentieth-century Anglophone drama in diverse areas of the English-speaking world. Through works of Irish, African, Caribbean, and U.S. playwrights like Fried, Soyinka, Fugard, Walcott, and Shange, the seminar is organized around two principal issues: the use of folk, ritual, vernacular, and carnivalesque performance idioms to transform the received genre of Western literary drama and themes of empire, colony, and postcolony in the making of the modern world.

THETR 580 Problems in Asian Art: Dancing the Stone: Body, Memory, and Architecture (also ART H 580 and ASIAN 580)
Spring. 4 credits. K. McGowan.
See ART H 580 for description.

THETR 600 Proseminar in Theatre Studies
Spring. 4 credits. Limited to graduate students.
An introduction to the theory and methods involved in the study of the theatre. Attention focuses on pedagogy and the profession in Part I. Part II explores current scholarly trends.

THETR 637 Seminar in Dramatic Theory (also COM L 638)
Fall. 4 credits. Prerequisite: permission of instructor. Staff.
In the past decade, critics have claimed that theatrical interculturalists from rich countries have plundered the traditions of poor countries much as the old colonizers plundered their physical resources. Apologists have countered that interculturalism builds links between parochial theatre cultures. In the first part of this seminar, we will trace the theoretical roots of the interculturalist "apology" of the Western avant-garde (readings may include Voltaire, Goethe, Yeats, Craig, Artaud, and Brecht), and of its "criticism" in postmodern theatre (readings may include Foucault, Fanon, Said, Bhabha, Trinh, Gomez-Pena, Roach, Bharucha). In the second part of this seminar, we will examine case studies of intercultural and postcolonial plays and productions from around the world (including Peter Brook's Mahabharata, and possibly works by Cesaire, Mouchkine, Barba, Suzuki, Bharucha, Rendra, Zimmerman and Thiyam).

THETR 648 East and West German Drama: Post-1945 (also THETR 438 and GERST 438)
D. Barthrick.

THETR 679 Bertolt Brecht in Context (also GERST 479)
See GERST 679 for description.

THETR 680 Brecht, Müller, and Avant-Garde (also GERST 680 and COM L 676)
Fall. 4 credits. D. Barthrick.
The course examines the poetic and theoretical work of Bertolt Brecht (1898–1956) and Heinrich Müller (1929–1995) in light of the cultural contexts in which they emerged and were received. Brecht's own interest in the 1920s with movements such as German Expressionism, Berlin-Dada, Russian Constructivism, and Neue Sachlichkeit was vital for his own theories of epic theater and estrangement. We explore these influences as well as Brecht's response to them. The East German Heinrich Muller developed his own theatrical theory and practice as much under the influence of as in rebellion against the theories and practice of Brecht himself. Living in the GDR, the context of his creative activity consisted in part of a cultural-political environment highly disapproving of forms of avant-gardism. In asserting his aesthetic agenda, Muller can be seen in dialogue with and also strongly shaped by "the historical avant-garde" of the 1920s, surrealism, Artaudianism, theater of the absurd, poststructuralism, Wilson's theater of images, postmodernism, and performance theater. Our treatment of the influences of these movements will focus both on their impact upon these two writers' own work as well as on their importance for understanding contemporary debates around a theory and practice of the avant-garde.

THETR 703 Theorizing Film (also ENGL 703 and FRLIT 605)
T. Murray.
See ENGL 703 for description.

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. D. Barthrick.
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...
The study, development, and performance of The focus of the class depends on the needs of a particular production (history, choreography, textwork, dramaturgy, etc.).

**Theater, Film & Dance**

**THEATRE 205 Rehearsal Workshop**
Fall or spring. 2 credits. Limited to 30 students. Prerequisites: participation in a particular department production; and by permission. Staff. This course enables 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 (history, choreography, textwork, dramaturgy, etc.).

**THEATRE 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 the 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.

**THEATRE 281 Acting I (IV) (LA)**
Fall or spring. 3 credits. Each section is limited to 14 students. Prerequisites: THEATRE 280 and audition. Registration only through roster in the 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.

**THEATRE 282 Standard American Stage Speech (IV) (LA)**
Fall. 3 credits. Prerequisites: THEATRE 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 Speech using the International Phonetic Alphabet (IPA) as a way to designate the vowel, diphthong, and consonant sounds of spoken English. The goal of this course is to learn speech for use in performing Shakespeare, Shaw, Chekov, Moliere, etc.

**THEATRE 283 Voice and Speech for Performance (IV) (LA)**
Fall. 3 credits. Limited to 12 students. Primarily for department majors. Prerequisite: permission of instructor. Not offered 2003-2004. Staff. Registration only through department roster 225 Schwartz Center. Development of the speaking voice with additional emphasis on dramatic interpretation.

**THEATRE 284 Speech and Dialects for Performance (IV) (LA)**
Spring. 3 credits. Limited to 10 students. Primarily for department majors. Prerequisites: THEATRE 281 and permission of instructor. A. Van Dyke. Development of speech and dialects in dramatic text.

**THEATRE 380 Acting II (IV) (LA)**
Fall. 3 credits. Prerequisite: THEATRE 281 and audition. Limited to 12 students. S. Cole. A continuation of Acting I. Special consideration is given to a physical approach to characterization.

**THEATRE 381 Acting III: Advanced Scene Study (IV) (LA)**
Spring. 3 credits. Prerequisite: audition. Strong preference given to those who have taken THEATRE 446. Limited to 10 students. B. Levitt. This course focuses on advanced problems in the stage. Monologues and scenes are drawn from Shakespeare and classical sources.

**THEATRE 385 Advanced Studies in Acting Techniques (IV) (LA)**
Fall. 3 credits. Prerequisites: THEATRE 281 and permission of instructor. Limited to 10 students. Not offered 2003-2004. Faculty. Physical skills for the actor are developed through work with LeCoq-based Neutral Mask corporeal mime, and physical acting techniques.

**THEATRE 387 Movement for the Actor**
Fall. 3 credits. Prerequisites: THEATRE 281 and permission of instructor. Limited to 10 students. Not offered 2003-2004. Faculty. Physical skills for the actor are developed through work with LeCoq-based Neutral Mask corporeal mime, and physical acting techniques.

**DIRECTING**

**THEATRE 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 THEATRE 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.

**THEATRE 398 Fundamentals of Directing I (also VISST 398) (IV) (LA)**
Fall. 3 credits. Limited to 9 students. Prerequisite: permission of instructor. Special consideration is given to students who have completed THEATRE 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.

**THEATRE 498 Fundamentals of Directing II (IV) (LA)**
Spring. 4 credits. Enrollment strictly limited. Prerequisite: THEATRE 398 and, and permission of instructor. Special consideration is given to students who have completed THEATRE 280 or are intending to continue in the area of stage or screen directing. Recommended: THEATRE 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.

**THEATRE 499 Practicum in Directing**
Fall or spring. 1-4 credits. Prerequisites: THEATRE 240, 250, 280, 398, 498, 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 a director of a faculty or guest director.

**Playwriting**

**THEATRE 348 Playwriting (IV) (LA)**
Fall. 4 credits. Limited to 12 students. Prerequisite: permission of instructor. Not offered 2003-2004. Faculty. 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.

**THEATRE 349 Advanced Playwriting (IV) (LA)**
Spring. 4 credits. Prerequisite: THEATRE 348 or permission of instructor. Not offered 2003-2004. Staff. A continuation of THEATRE 348, emphasizing advanced techniques and culminating in the completion of a full-length play.

**THEATRE 497 Seminar in Playwriting**
1-4 credits. Prerequisite: THEATRE 348 and 349 and permission of instructor. Not offered 2003-2004. Staff. This class is an extension of THEATRE 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**

**THEATRE 250 Fundamentals of Theatre Design and Technology (IV) (LA)**
Fall and spring. 4 credits. Not open to first-year freshmen. Limited to 12 students. Registration only through department roster 225 Schwartz Center. A minimum of one credit of Production Lab (THEATRE 151 or 251) is strongly recommended concurrently. K. Goetz, W. Cross, E. Intemann, S. Bernstein. Lectures, discussion, and project work introduce the principles of designing scenery, costumes, lighting and sound, and the technical process of realizing designs on stage. Students are required to purchase materials, which the instructors will specify (approximate cost, $50).

**THEATRE 254 Theatrical Makeup Studio**
Spring. 3 credits. Prerequisite: THEATRE 280 or 250. Limited to 10 students. Students are required to purchase makeup kits which the instructor will provide (approx. cost $50). S. Bernstein.
Basic techniques of make-up for the stage including corrective, old age, likeness, and fantasy; use of three-dimensional make-up, wigs and hair pieces.

[THETR 223] CAD Studio for the Theatre
Spring. 3 credits. Limited to 8 students. Prerequisite: permission of instructor. Not offered 2003–2004. K. Goetz and selected theatre production faculty and staff.

Students use commercially available 3-D modeling and rendering software to explore the process of designing scenery and lighting for the live theatre. Vectorworks and Photoshop are the primary applications used. Former theatre experience is helpful but not essential.

[THETR 319] Music, Dance, and Light (also DANCE 319, VISST 319) (IV) (LA)

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 personal, social, religious, political, and regional reasons for why and how clothing evolved.

THETR 362 Lighting Design Studio I: Lighting in the Performing Arts (IV) (LA)
Fall. 4 credits. Prerequisite: THETR 250 or permission of instructor. Limited to 6 students. E. Intemann.

The theory and practice of lighting design as a medium for artistic expression. This course equips the student with the aesthetic and mechanical aspects of light and their application in the theatre. 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 which the instructor will specify (approximate cost: $50.00). K. Goetz.

An exploration of the process of designing scenery for the live theatre. Projects employ various media to explore dramatic use of architecture, the scenic space, and elements of interior design. Experience in theatre production and graphic skills is helpful but not essential.

THETR 366 Costume Design Studio (IV) (LA)
Spring. 3 credits. Students are required to purchase materials which the instructor will specify (approximate cost: $50).

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 Studio (IV) (LA)
Fall. 3 credits. Limited enrollment to 6 students. Prerequisite: THETR 250 or 252 or permission of instructor. Students are required to purchase supplies (approximate cost $20). W. Cross.

The use of sound as a medium for the theatre; research and creation of the theatrical sound score, digital recording and basic audio engineering techniques with projects in post production studio engineering and live recording. Emphasis is on producing viable sound designs for live theatre events.

THETR 369 Digital Audio Studio (IV) (LA)
Spring. 3 credits. Prerequisite: THETR 368. Limited to 6 students. By permission of instructor only. W. Cross.

A project oriented course focusing on current techniques in digital audio recording, editing, and processing for theatre, and video production. Students explore Digidesign's Pro Tools multitrack environment, MOTU's Digital Performer including basic MIDI operation and methods of synching audio to video. Some experience with audio recording, music, or video production is helpful but not necessary.

THETR 371 Costume Design Studio II (IV) (LA)
Fall. 3 credits. Prerequisite: THETR 250 or 366, or permission of instructor. Students are required to purchase materials which the instructor will specify (approx. cost $50) Limited to 10 students. S. Bernstein.

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 non-human subjects (animals, plants, machines, magical creatures, etc.), 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 372 Lighting Design Studio II (IV) (LA)
Spring. 4 credits. Prerequisite: THETR 362 or permission of instructor. Limited to 6 students. E. Intemann.

This course concentrates on designing lighting for different genres in various venues, developing the lighting designer as a versatile artist. Personal style and artistic commitment are stressed.

THETR 374 Scene Design Studio II (IV) (LA)
Spring. 4 credits. Prerequisite: THETR 364 or permission of instructor. Students are required to purchase materials which 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.

Technology

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 which the instructor will specify (approximate cost $50). Prerequisite: THETR 250 or permission of instructor. Additional hands-on time in prop and paint shops required, to be discussed. A. Mansfield.

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 $25 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 $50 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 other) and are interested in acquiring skills beyond the basic techniques. The objective is to introduce students to areas of costuming that are not taught presently, such as millinery, fabric modification, corsetry, and underpinnings—skills that make a costume student more marketable upon graduation. Areas of focus for each semester may be determined by particular production needs. Along with the pieces constructed, students are asked to research and record their findings.

Stage Management  

THETR 153 Stage Management Production Laboratory I  
Fall and spring. 1–2 credits. May be repeated for credit. Before registering, students must attend an orientation meeting 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. 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 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 in the Kiplinger Theatre at the Schwartz Center on the first Tuesday of classes. Prerequisite: permission of the instructor. P. Lillard. Practical experience in theatrical production as stage manager for a season 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 452 Stage Management Laboratory IV  
Fall and spring. 1–5 credits. May be repeated for credit. Prerequisite: admission to Advanced Undergraduate Theatre Program. P. Lillard. Practical experience in theatrical production as stage manager for a season production under the supervision of the faculty production manager.

Production Laboratories  

THETR 151 Production Laboratory I  
Fall and spring. 1–3 credits. May be repeated for credit. Orientation meeting 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. P. Lillard. Practical experience in theatrical production as a light board operator, sound board operator, sound technician, head dress or scenery/props special project.

THETR 351 Production Laboratory III  
Fall and spring. 1–3 credits. May be repeated for credit. Prerequisite: permission of instructor. P. Lillard, R. Archer, S. Brookhouse, K. Goetz, D. Hall, E. Intemann, F. Sellers. Practical experience in theatrical production as a theater technician, 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, S. Brookhouse, K. Goetz, D. Hall, E. Intemann. Practical experience in theatrical production, in the position of designer, shop manager, technical director or sound engineer.

Independent Study, Internships and Honors  

THETR 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.

THETR 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 be concentrators in the department. Students are responsible for arranging their own internships in consultation with the faculty in their area of choice prior to preregistration for the semester in which the internship is planned to take place. To receive credit within this course, the internship must be unpaid. Students must follow the rules and procedures stated in the departmental internship form.

THETR 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  


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: Africana 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 as historical evidence, film’s efficacy as a rhetorical medium, and film’s contribution to perennial issues in aesthetics, the history of the arts, and studies in cognition. 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 as follows: (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 medium 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 graduate 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 independent of, or in conjunction with, a major in film. Students interested in the visual studies concentration should contact Brett deBary, Asian Studies, 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 274 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 in order to take FILM 274 and 376. Within the "core" required courses, FILM 274, Introduction to Film Analysis, is to be taken during the sophomore year. Note: Prospective majors must earn a grade of B- or higher in FILM 274 in order to enter 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, 378, 493. Enrollment in each of these courses is limited by the nature of the work and by facilities. Enrollment in FILM 377, 378, and 493 depends on the quality of previous work in FILM 274, and/or 376; 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) 4

[FILM 375 History and Theory of Commercial Narrative Film (offered alternate fall semesters; Not offered fall 2003; next offered fall 2004) (prerequisite for film majors: FILM 274)] 4

FILM 376 History and Theory of Documentary and Experimental Film (offered alternate fall semesters; offered fall 2003) (prerequisites for Film majors: FILM 276) 4

FILM 377 Fundamentals of 16mm Filmmaking (offered three semesters in every four; offered fall 2003 and 2004, and spring 2004) 4

2. One of the following theatre courses:

[THETR 250 Fundamentals of Theatre Design/Technology (offered every semester)] 4

[THETR 280 Introduction to Acting (offered every semester)] 3

[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 264 Interpreting Hitchcock (offered yearly; offered fall 2003) 4

[FILM 341 French Film (offered occasionally; not offered 2003-2004)] 4

[FILM 342 The Cinema and the American City (offered occasionally; not offered 2003-2004)] 4

FILM 369 Fast Talking Dames and Sad Ladies: 1940s and Now (offered yearly; offered spring 2004) 4

[FILM 378 Soviet Film of 20s and French Film of 60s (offered occasionally; not offered 2003-2004)] 4

FILM 379 Modern Documentary Film (offered alternate spring semesters; offered spring 2004) 4

FILM 383 Screenwriting (offered every spring semester) 4

[FILM 386 Third Cinema (offered alternate years, not offered spring 2004, next offered spring 2005)] 4

FILM 391 Media Arts Studio I (offered fall 2003) 3

[FILM 395 Video: Art, Theory, and Practice (offered occasionally; not offered 2003-2004)] 4

[FILM 396 German Film (offered occasionally; not offered 2003-2004)] 4

[ASR&SC 435 African Cinema (offered alternate years; not offered 2003-2004)] 4

FILM 450 Rescreening the Holocaust (offered occasionally; offered fall 2003) 4

[FILM 455 History of Modern Polish Cinema (offered alternate spring semesters; not offered spring 2004; next offered spring 2005)] 4

FILM 473 Film and Spiritual Questions (offered alternate spring semesters; offered spring 2004) 4

[FILM 474 Jung, Film, and the Process of Self-Knowledge (offered alternate years; not offered 2003-2004; next offered 2004-2005)] 4

[FILM 475 Seminar in the Cinema I (offered most years; not offered 2003-2004; next offered spring 2005; topic varies; may be repeated for credit)] 4

[FILM 476 Seminar in the Cinema II (offered occasionally; not offered 2003-2004; topic varies; may be repeated for credit)] 4

FILM 477 Intermediate Film and Video Projects: Documentary and Experimental Workshop (offered alternate years; offered fall 2003) 4

FILM 478 Intermediate Film and Video Projects: Narrative Workshop (offered alternate years; not offered 2003-2004; next offered fall 2004) 4

FILM 493 Advanced Film and Video Projects (offered spring 2004) 4

4. 15 credits of related coursework 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 particular interest in film, and will not necessarily be film courses per se. For example, a student interested in the psychology of film, or in ethnographic film, or in film vis-a-vis intellectual 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 in order 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 they are 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 AUFP 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 Melville Shavelson Award to help fund their advanced film projects.

Film Study Abroad

The College of Arts and Sciences, through this department and in consort with 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
John S. Knight Institute's Sophomore Seminars

Heat, Woman in the Window, Metropolis, will be required to attend out-of-class personalized instruction with top university strong thinking and writing and to articulating that knowledge. Enrollment is discipline's outlook, its discourse community, While not restricted to sophomores, the dramas, comedies, even the musical. We look science fiction, social melodramas, historical dramas, comedies, even the musical. We look at some of these key thematic issues, such as the question of modern identity and the structure of the big city, and at how the film industry, film reviews, film advertising, and fan cultures develop their own "languages" to talk about films, in the process not only enabling particular takes on films, but also allowing specific communities to rally around a shared language. And we engage in a bit of ethnographic research about our own movie-going habits. In the end students will be encouraged to develop a project in their own area of interest. Students will be required to attend out-of-class screenings. Films may include Fury, The Big Heat, Woman in the Window, Metropolis, While the Gods Sleep, Rancho Notorious, Tiger of Eschampur, Mean Streets, Taxi Driver, GoodFellas, King of Comedy, The Last Waltz, The Last Temptation of Christ, and The Age of Innocence, and will be accompanied by readings in film history and analysis and cultural history.

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, its discourse community, its modes of knowledge, and its 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.

FILM 202 Sophomore Seminar: Film Style and the Cinema Experience: Fritz Lang and Martin Scorsese (also AM ST 220) (IV) (LA)

Spring. Limited to 15. Preference given to sophomores. S. Haenni. Tracing the careers of directors Fritz Lang and Martin Scorsese across seven decades of film history, this course is designed to gives students a good grounding in film style, film analysis, and writing about film. It also takes up some larger questions: What counts as the "author" of a film? What is the status of the director—and the artist—in a commercial industry? How do various rhetorics—from reviews, to advertising, to Internet sites and chat rooms—shape the ways we experience and respond to cinema? How do we, in fact, make sense of the cinema, and how does it help us make sense of our lives? We look closely at some of the directors' key films, tracing Lang and Scorsese's key "directorial signature" across a wide variety of genres—film noir, detective films, the gangster film, science fiction, social melodramas, historical dramas, comedies, even the musical. We look at some of these key thematic issues, such as the question of modern identity and the structure of the big city, and at how the film industry, film reviews, film advertising, and fan cultures develop their own "languages" to talk about films, in the process not only enabling particular takes on films, but also allowing specific communities to rally around a shared language. And we engage in a bit of ethnographic research about our own movie-going habits. In the end students will be encouraged to develop a project in their own area of interest. Students will be required to attend out-of-class screenings. Films may include Fury, The Big Heat, Woman in the Window, Metropolis, While the Gods Sleep, Rancho Notorious, Tiger of Eschampur, Mean Streets, Taxi Driver, GoodFellas, King of Comedy, The Last Waltz, The Last Temptation of Christ, and The Age of Innocence, and will be accompanied by readings in film history and analysis and cultural history.

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and the connection between documentary film and modernist(s) in the 1920s and 1930s. It also includes analysis of canonical works in the avant-garde/experimental/personal film tradition(s) in Africa, South Asia, Latin America, 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 Fundamentals of 16mm and Digital Filmmaking (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 (or higher-level film studies course) and permission of instructor. Equipment fee, $100 (paid in class). The average cost to each student for materials and processing is $400. Offered fall 2003, fall 2004, and spring 2004. M. Rivkin.

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 non-linear 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 or 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 379 is strongly recommended, but not required. Offered occasionally; Not offered 2003-2004. 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, in the Soviet 1920s; Godard, Truffaut, Resnais, Rohmer, Tati, Roux, 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). Offered alternate spring semesters. D. Fredericksen.

An intensive consideration of canonical documentary films from 1945 to the present. Emphasis is on the documentary film as an artistic form with a distinct history and set of theoretical questions, as a sociopolitical force, and as an extension of other genres of written work, including without a filmmaker's culture, and as a televised medium of persuasion and expression.

**FILM 383 Screenwriting (IV)**
Spring. 3 credits. Prerequisites: FILM 274 and 377, or permission of instructor. Limited to 12 students. Staff.

Exercises in various genres of screenwriting. Note: this class is an intensive writing course that demands a great deal of outside work.

**FILM 386 Third Cinema (also LSP 386, VISST 386) (IV) (LA)**
Spring. 4 credits. Prerequisite: previous coursework in film analysis helpful, though not mandatory. Offered alternate years; not offered spring 2003; next offered spring 2004. A. Villarejo.

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, Latin America, the United States and the United Kingdom (Semebay, Ray, Brocka, etc.). Readings in film and postcolonial theory guide our critical analyses of the films.

**FILM 391 Media Arts Studio I (also ART 391, MUSIC 391, VISST 391) (IV) (LA)**
Spring. 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). 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 music, dance, film, and video. Group projects to investigate and produce interactive work in public spaces on campus.

**FILM 393 International Film of the 1970s (also AM ST 393) (IV) (LA)**
Fall. 4 credits. Some background in film analysis useful but not required. 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 the documentary and 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 re-working and rejuvenation of genre films (neo-noir, western, horror film); European responses to and appropriation of American film genres, film conventions, and subject matter; Asian influences in the United States, particularly the martial arts films; and the emergence of film subcultures, such as black independent film and blaxploitation. Screenings include work by Arthur Penn, Robert Altman, Francis Ford Coppola, Steven Spielberg, Charles Burnett, John Cassavetes, Mario Van Peebles, Gordon Parks, Miloš Forman, Sergio Leone, Michelangelo Antonioni, Lina Wertmüller, Bertrand Blier, Louis Malle, Eric Rohmer, Chantal Akerman, Rainer Werner Fassbinder, Wim Wenders, Nicholas Roeg, and Stanley Kubrick. Readings 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 2003-2004. T. Murray. (For description, see ENGL 395.)

**FILM 396 German Film (also COM L 396 and GERST 396) (IV) (LA)**

This course explores German film from the Weimar and Nazi periods to the present in relation to the cultural-political context of which it was a part. Readings and lectures are devoted to formal and cultural developments historically as well as interpretive analysis of selected individual films.

**FILM 428 Theories of Spectatorship (also S HUM 427 and COM L 414)**
Fall. 4 credits. M. Harris.

Crucial texts on spectatorship since the eighteenth century, with an emphasis on the twentieth century. Topics will include the ethical implication of the spectator in the violent spectacle; historical changes in the conditions of spectatorship; psychoanalytic readings of spectatorship; film spectatorship; and contemporary debates around identification, sexuality, and gender.

**FILM 450 Rescreening the Holocaust (also COM L 450, GERST 449, and RELST 450) (IV) (LA)**
Fall. 4 credits. Offered alternate years. D. Barthrick.

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, Schindler's List, Shoah, Life is Beautiful, Sophie's Choice, Jacob the Liar, 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 narrative strategies and the screening 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 which emphasizes the notion that screenings of the Holocaust are at the same time often re-screenings, to the extent that they are built on, 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 coursework. Offered alternate years; not offered 2003-2004, next 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, Falk, Piwowarski, Bugajski, Krzystek, Kijowski, Zaworski, Kieslowski, and Lozinski. Some attention is given to the development of Polish film theory. The extra-filmic context is set by such works as Norman Davies’ *Hearts 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. 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 Baillie, Gardner, Bergman, Dreyer, Bresson, Godard, Scorsese, Brakhage, Belson, Whitney, Rouquier, Newby, Kubrick, and Bae Yong-Kyun. Special attention is given to the work of Andrei Tarkovsky, the Russian film director and theorist. Readings include Tarkovsky’s *Sculpting in Time*, Grof’s *The Cosmic Game*, Eliade’s *The Sacred and the Profane*, Edinger’s *The Christian Archetype*, Schröder’s *Transcendental Style in Film*, and Warren and Locke’s *Women and the Sacred in Film.*

**FILM 474 Jung, Film, and the Process of Self-Knowledge (also College Scholar Seminar) (IV) (LA)**

Fall or spring. 4 credits. Limited to 20 students. Offered alternate years; not offered 2003-2004; next offered 2004-2005. D. Fredericksen.

“Know thyself” is one of the oldest and most enduring imperatives of the human spirit, and the raison d’être 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 Roeg (Walkabout). 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; not offered 2003-2004; next 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 narration, including films by Robert Gardner, Basil Wright, Leo Hurwitz, Germaine Dulac, Maya Deren, Stan Brakhage, Bruce Baillie, Larry Jordan, Leighton Peirce, Luis Bunuel, Andrei Tarkovsky, and others. May be of particular interest to filmmakers who wish to find models for creating outside “normal” storytelling structures and to analysts interested in the workings of filmic 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 2003-2004.

**FILM 477 Intermediate Film and Video Projects: Documentary and Experimental Workshop (IV) (LA)**

Fall. 4 credits. Limited to 8 students. Prerequisites: FILM 377. 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 (Third Cinema); and permission of instructor based upon project proposals. Equipment fee: $100 (paid in class). Film projects costs: $300–1,000; video $100–200. Next offered spring 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 and Experimental Workshop (also VISST 478) (IV) (LA)**

Fall. 4 credits. Limited to 8 students. Prerequisites: FILM 377 as minimum production; and FILM 383 (Screenwriting) or THETR 398 (Directing I), and permission of instructor based on proposals. Equipment fee: $100 (paid in class). Film projects costs: $500–1,500; video $100–200. Not offered 2003–2004; next offered fall 2004. M. Rivchin.

An intensive course in 16mm filmmaking and digital video in which each student develops a significant, original narrative script project which 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; and analog and nonlinear (AVID and Final Cut Pro) editing.

**FILM 493 Advanced Film and Video Projects (also VISST 493) (IV) (LA)**

Spring. 4 credits. Limited to 6–8 students. Prerequisite: minimum FILM 377, preference to those who have taken 477 or 479; 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 projects working in crews for sync-sound dialog narrative films or documentaries. Readings 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, non-linear (Final Cut Pro and AVID) editing.

**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, full participation in the work of FILM 274, graduate students will read and discuss in tutorials Dudley Andrew’s *The Major Film Theories*, Francesco Casetti’s *Theories of Film 1945–1995* and primary sources in film theory.

**Dance**


The dance program offers courses in dance technique, improvisation, composition, performance, analytical dance 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 periodically offered. 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 their own colleges. Students who wish to enroll in nonintroductory level dance technique courses must audition for placement classes. Placement classes are offered at the beginning of each semester. The schedule for all dance technique courses and placement classes is available in the main office of the Sheila W. and Richard J. Schwartz Center for the Performing Arts.

The faculty offer rehearsal and performance workshops in which they choreograph and rehearse original dances, performed in public concert. Admission to rehearsal and performance courses is by permission. Students may receive one academic credit per semester. Up to eight credits may be taken in student-faculty concerts by registering for DANCE 155.

**Dance Major Requirements**

To be admitted to the major, students must have completed two technique courses in modern dance or Western classical at level I or above, DANCE 210 (Beginning Dance Composition), and DANCE 212 (Music Resources I) concurrently with DANCE 210. It is recommended that students take DANCE 201 (Dance Improvisation), the optional THETR 250 (Fundamentals of Theatre Design).
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and Technology), and the optional music course before the junior year. The following requirements are expected of the major.

**Prerequisites for the Major:**

**DANCE 210** Beginning Dance Composition (offered every spring semester) 3

**DANCE 212** Music Resources I (offered every spring semester) concurrently with DANCE 210 1

Two technique courses in modern dance or Western classical at level II or above 0–2

**TOTAL** 4–6

**Requirements for the Major:**

**Credits**

Two seminars each of Western classical and modern dance (in addition to the prerequisite) 0–4

One academic or studio course in non-Western form 0–4

**DANCE 155** Rehearsal and Performance 1

**DANCE 201** Dance Improvisation (offered every spring semester) 1

**DANCE 233** Explorations in Movement and Performance (offered every fall semester) 1

Two courses from the following approved list of five choices selected in consultation with the student’s advisor: 6–8

- **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, Mozart to Minimalism;
- **MUSIC 108** Mozart to Minimalism;
- **THETR 250** Fundamentals of Design and Technology;
- **DANCE 258** Techno Sonoma Kinesics (offered every spring semester);

**[DANCE 319** Music, Dance & Light (offered alternate fall semesters, not offered 2003)];

**[DANCE 413** Film and Performance (offered occasionally, not offered 2003–2004)]

**DANCE 310–311** Intermediate Dance Composition (offered every semester) 6

**DANCE 312** The Moving Body (offered every fourth or fifth semester) 3

**DANCE 314–315** Western Dance History (offered alternate years) 8

**DANCE 323** Music Resources II (offered every spring semester) 2

**DANCE 418** Seminar in Dance Studies or other 400-level academic dance course (offered alternate years; not offered 2003–2004) 4

**DANCE 491** Senior Project (year-long course offered every year) 6

**Total** 38–48

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 122, 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 credit, and in fact, students will usually be placed in a given course for at least two semesters.

Dance Improvisation (DANCE 201) and Explorations in Movement and Performance (DANCE 233) may be taken for 0 or 1 academic credit, which does not count as part of the 1 credit per semester and 8 credits total limit above.

The Indian dance courses (DANCE 307 and 317) may each be taken for 0, 1, or 3 academic credits, which do not count as part of the 1 credit per semester and 8 credits total limit above. The 3-credit option is available to students who attend an additional lecture period. Students may receive 3 credits no more than once, and only for DANCE 307 or DANCE 317, not both.

Students also have the option to receive physical education (PE) credit for all the courses above to satisfy the university's physical education requirement. Students may not get Dance and PE credit simultaneously for the same course.

The courses Dance Technique I (DANCE 122), Dance Improvisation (DANCE 201), Explorations in Movement and Performance (DANCE 233), and Indian Dance (DANCE 307) are introductory courses open to all students. Students registering in Dance may pre-enroll, enroll online, or sign up with the Department of Theatre, Film, and Dance registrar in Schwartz 225 before the end of the add period; they will need a drop/add slip. Students registering in PE may pre-enroll, or add during the one- or two-day PE registration period before the first day of classes; afterward, registration is not allowed.

The non-introductory dance technique courses (DANCE 231, 232, 303, 304, 306, 308, and 309) do not allow pre-enrollment or online enrollment. Students attending dance technique courses the previous semester receive course placement recommendations. Other students who wish to enroll must attend a placement class at the beginning of the semester, please contact the department registrar for more information. Indian Dance II (DANCE 317) requires permission of the instructor.

The technique course co-requisite for dance composition courses (DANCE 210, 310, 311, 410, 411) may be fulfilled by Dance Improvisation (DANCE 201), Explorations in Movement and Performance (DANCE 233), or a Western dance technique course (DANCE 122, 231, 232, 303, 304, 306, 308, or 309).

Any two 1-credit dance courses except DANCE 212 may be aggregated to count as one-half course for the purpose of satisfying the College of Arts and Sciences 34-course requirement. They do not satisfy a distribution requirement.

**DANCE 122** Dance Technique I (also PE 160)

Dance and spring. 0 to 1 credit. May be repeated. S-U grades only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Chu and J. Kovar; spring: J. Chu and J. Self.

Dance Technique I is the fundamentals of elementary dance training. Movement sequences focusing on rhythm, placement, and vitality of performance through an anatomically sound dance technique.

**DANCE 155** Rehearsal and Performance

Dance 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. Morgenroth.

When the body knows when, where, and how to move without prior direction, we call that improvisation. This course coaxes inspiration, seeking to make it reliable and to keep it surprising. It offers the possibility of "training" one’s movement instincts to respond relevantly and with spontaneity. Solo and group forms are covered. Live musical accompaniment.

**DANCE 231** Dance Technique II/Classical (also PE 161)

Spring. 0 to 1 credit. May be repeated. S-U grade only. By placement only; no pre-enrollment. 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 centre 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. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Morgenroth. Introductory modern technique intended for students with some dance training. Material covered includes specific spinal and center work with attention to rhythm, design, and movement expression.

**DANCE 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. Physically demanding exploration into various movement realms. Specific subjects covered are gendered movement, erotic
power, spiritual power, ritual, and performance. Techniques include extensive use of breath, animal movement, improvisation, and group games. This course requires an eagerness to investigate the nature of performance and explore unfamiliar territory in movement.

DANCE 303 Dance Technique Workshop (also PE 161, VISST 303)
Fall and spring. 0 to 1 credit. May be repeated. S-U grades only. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall, J. Self; spring, J. Chu and B. Suber.

Topi for Fall 2003: Hip Hop to Hollywood: Popular dance forms and media. Using readily available media images this course will explore the contemporary social and popular dance forms found in music television, Hollywood and Bollywood movies. Using a warm up which combines yoga, classical and other techniques, each class session will look at, analyze and try on a dance form.

Topi for Spring 2004: An exploration of contemporary dance forms which will include both formal and experimental dance techniques, yoga, and established repertory. The level of the class is intended for level III and IV dance technique students.

DANCE 304 Dance Technique III/Classical (also PE 161)
Fall. 0 to 1 credit. May be repeated. S-U grades only. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. B. Suber.

Intermediate Western classical technique. Work is done on strengthening the body through a movement technique emphasizing presence and musicality based on harmonic muscular control.

DANCE 306 Dance Technique III/Modern (also PE 161)
Fall and spring. 0 to 1 credit. May be repeated. S-U grades only. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. B. Suber.

Intermediate modern technique focusing on rhythm, placement and phrasing for students who are prepared to refine the skills of dancing. Students are challenged by complex phrases and musicality.

DANCE 307 Indian Dance I (also ASIAN 307 and PE 163)
Fall. 0, 1, or 3 credits. Satisfies the PE requirement if taken as PE. Satisfies @ if taken for 3 credits. B. Dör. This course is designed to give students a working knowledge of Indian classical dance in both movement and theory. The movement section will focus on Odissi classical dance, the indigenous style of Orissa state, starting with basic exercises, to open and strengthen the body and prepare it for the structured form of Odissi. Basic exercises, steps, and a full choreographed piece will be taught and performed at the end of the semester. The core material of this class can benefit all forms of dance. For three-credit students, the theory section will focus on history and development of the main styles of South Asian classical dance, their role in society and distinguishing characteristics. This will be done through lectures, videos, and reading assignments.

DANCE 308 Dance Technique IV/Modern (also PE 161, VISST 308)
Fall and spring. 0 to 1 credit. May be repeated. S-U grades only. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall, J. Chu; spring, J. Chu and B. Suber.

Advanced and pre-professional Modern technique. A continuation of and supplement to DANCE 306.

DANCE 309 Dance Technique IV/Classical (also PE 161)
Fall. 0 to 1 credit. May be repeated. S-U grade only. By placement only; no pre-enrollment. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.

Advanced and pre-professional Western classical. A continuation of and supplement to DANCE 304.

DANCE 317 Indian Dance II (also ASIAN 308 and PE 161)
Fall. 0, 1, or 3 credits. Prerequisite: DANCE 307 or ASIAN 307 or PE 163 or previous training in Odissi classical dance. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. G. Pradhan.

The culmination of DANCE 307/ASIAN 307. Emphasis is on choreography as well as continuing to refine and perfect the basic movements learned in the preliminary course. Guru Pradhan explores the nine rasas or emotions used in dramatic dance based on the teaching of the ancient text the “Natyasastra.” Meets twice weekly for movement classes. Students may receive 3 credits for attending an additional Friday lecture and completing additional academic requirements.

Dance Composition
DANCE 210 Beginning Dance Composition (also VISST 211) (IV) (LA)
Spring. 3 credits. Concurrent enrollment in DANCE 212 of a technique class at the appropriate level is required.

Weekly assignments in basic elements of choreography. Students compose and present short studies that are discussed and reworked. Problems are defined and explored through class improvisations. Informal showing at end of semester.

DANCE 212 Music Resources I
Spring. 1 credit. Attendance at dance concerts and music concerts is required. A. Fogelsanger.

Intended to expand choreographers’ vocabularies and skills through a survey of contemporary music for dance, the study of music and dance collaborations, and rhythm studies. Includes discussing and writing about concerts, recordings, and videotapes. May include rehearsing and performing music or dance. Concentrates especially on the related ideas of counterpoint, polyphony, and simultaneity with regard to music, dance, the two considered together, and other arts singly and in combination. This is a co-requisite for DANCE 210 but other students are welcome.

DANCE 310 Intermediate Dance Composition I (IV) (LA)
Fall and spring. 3 credits. Prerequisite: DANCE 210. Concurrent enrollment in a technique class at the appropriate level is required. Fall, J. Chu; spring, J. Self.

Intermediate choreographic projects are critiqued in progress by faculty and peers. Consideration of design problems in costuming and lighting.

DANCE 311 Intermediate Dance Composition II (IV) (LA)
Fall and spring. 3 credits. Prerequisite: DANCE 310 and DANCE 323, though DANCE 323 may be taken concurrently. Attendance at dance concerts is required. Concurrent enrollment in a dance technique class at the appropriate level is required. Fall, J. Chu; spring, J. Self.

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 for satisfying the Literature and Arts distribution requirement. A. Fogelsanger.

Intended to expand choreographers’ conceptions of music and its uses for dance, including serving as a source for ideas of choreographic organization. A continuation of DANCE 212 in its survey of contemporary music for dance and the study of music and dance collaborations, but also includes examples from film and the plastic arts. Reading topics include criticism and aesthetics of dance, music, and the arts in general. Includes discussion of and writing about concerts, recordings, and videotapes. May include rehearsing and performing music or dance. Concentrates especially on minimalism and polystylistism in music, dance, the two considered together, and other arts singly and in combination.

DANCE 410 Advanced Dance Composition I (IV) (LA)
Fall and spring. 3 credits. Prerequisite: DANCE 311. Concurrent enrollment in a technique class at the appropriate level is required. Attendance at dance concerts is required. Fall, J. Chu; spring, J. Self.

Students work on advanced choreographic problems, to be presented in performance. Work in progress is critiqued by faculty on a regular basis.

DANCE 411 Advanced Dance Composition II (IV) (LA)
Fall and spring. 3 credits. Prerequisite: DANCE 410. Concurrent enrollment in a technique class at the appropriate level is required. Attendance at dance concerts is required. Fall, J. Chu; spring, J. Self.

A continuation of DANCE 410.

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 1-15 page paper which expands their work into a historical, theoretical, or
DANCE 314 Western Dance History I: Classical Ballet History as a Reflection of Western Ideology # (IV) (LA)

This course examines the body systems involved in human movement with particular attention to dance movement. Readings in texts on human anatomy, physiology and kinesiology. We will emphasize the relationship between body form and function. Includes guest lectures by experts in anatomy and health areas. Practical analyses of human movement. Demonstration of dissection.

DANCE 315 Western Dance History II: History of Modern Dance (IV) (LA)

This course studies the course of modern dance in the twentieth-century United States. We examine each generation of dancers, starting with Duncan and ending with performers emerging today. Issues of gender, cultural identity, elitism, and democracy are discussed.

[DANCE 418 Seminar in Dance Studies (also VISST 419) (IV) (CA)]

DANCE 469 Senior Paper in Dance

Fall and spring. 4 credits. Prerequisite: DANCE 418, senior standing. Attendance at dance concerts is required. This course will present lectures by weekly guests from as many disciplines in the arts and sciences as possible, faculty members who will discuss the process underlying their research or their own creative and performing artists. Members of the course are encouraged to enroll in another course or be engaged in an activity (research, artistic production, or performance) in which the insights gained in this class can be applied or tested. In addition, each section will engage in a common creative project. To further abet the active participation so necessary to learning, students will be asked to keep a journal, one that summarizes their understanding of, and response to, the readings from the required texts. Students will also be obliged to attend several public art exhibits or performances and write two papers.

[DANCE 319 Music, Dance, and Light (also THETR 319) (IV) (LA)]

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 are devoted to creating sound, movement, and lighting.

DANCE 358 Techno Soma Kinesics II: The Moving Body and Technology (also VISST 358) (IV) (LA)

Spring. 4 credits. Prerequisite: DANCE 258 or DANCE 358 (or equivalent), or permission of instructor. Limited to 5 students. B. Suber. Reflecting the aesthetic of formal concert dance, and expanding on the work accomplished in DANCE 258, students work with more complex elements of multimedia interactive software to create more extensive projects in the field of dance and technology. As opposed to the smaller experimental projects accomplished in DANCE 258, DANCE 358 students are expected to complete substantial projects in interactive multimedia gallery installation/performance work as well as interactive multimedia CD-ROMs and web projects, all focused on the moving body.

DANCE 391 Media Arts Studio I (also ART 391, MUSIC 391, FILM 391, ARCH 459 and 659) (IV) (LA)
Fall or spring. 3 credits. Prerequisite: permission of instructor and junior or senior level standing required, minimum FILM 377 or 277, or DANCE 258. 550 equipment fee (to be paid in class). Participation limited to 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 and discussions also investigate the artistic and interactive potential of using arts spaces on campus, including virtual and performative events.

Independent Study, Internships and Honors

DANCE 300 Independent Study

Summer, fall, or spring. 1–4 credits. Independent Study in the dance allows students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the student's program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study which is available in 225 Schwartz.

DANCE 485 Undergraduate Internship

Fall, spring, or summer. 1–3 credits. To be eligible to enroll and receive credit for an internship, students must be majors in the department. Students are responsible for arranging their own internships and are in consultation with the faculty in their area of choice prior to preregistration for the semester in which the internship is planned to take place. To receive credit within this course, the internship must be unpaid. Students must follow the rules and procedures stated in the departmental internship form.

DANCE 496 Honors Research Tutorial

Fall or spring. 4 credits. Limited to Honors students in Dance. This course is the first of a two-semester sequence (the second is DANCE 495) for seniors engaged in an honors project.

DANCE 496 Honors Research Tutorial

Fall or spring. 4 credits. Limited to Honors students in Dance. This course is the second of a two-semester sequence (the first is DANCE 495) for students engaged in an honors project.

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 Scene 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

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 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 II or III—one assignment

**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.

**UKRAINIAN**

See Department of Russian.

**URDU**

See Department of Asian Studies.

**VIETNAMESE**

See Department of Asian Studies.

**VISUAL STUDIES 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 selection of one from two possible core courses (the two core courses may be offered in tandem or on an alternating basis depending on the availability of staff), which introduce 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 advisers, 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 copy of each advisee's transcript to the director, indicating courses completed for the concentration.

**Director and Affiliated Faculty**

Director, to be determined.

**Affiliated Faculty:**

David Bathrick, Theatre, Film, and Dance

Robert Bertoloia, Art

Susan Buck-Morss, Government

James Cutting, Psychology

Brett deBary, Asian Studies and Comparative Literature

Maria Fernandez, History of Art

David Field, Psychology

Donald Fredericksen, Theatre, Film, and Dance

Werner Goehner, Architecture

Salah Hassan, Africana Studies

Ellis Hanson, English

Marcia Lyons, Art

Laura Meizner, History of Art

Kaja McGowan, History of Art

Timothy Murray, English

Marlyn Rivchin, Theatre, Film, and Dance

Franklin B. Spector, Art

Michael Steinberg, History

Amy Villarejo, Theatre, Film, and Dance

Geoff Waite, German Studies

**Visual Studies Concentration Course List**

**Core Course for 2003–2004**

VISST 200 Introduction to Visual Studies (IV) (LA)

Spring. 4 credits. Requirements: two objective midterm exams; occasional listserv postings; two five page papers by B. Spector and M. Fernandez.

Introduction to Visual Studies will provide 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" will be 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 technologies (photography, cinema, video, and computing) to their historical corollaries in the arts.

The course will draw 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 will 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 will occasionally address the class.
For description, see ART 272.

ART 272 Special Topics: Digital Multimedia
Term to be announced. M. Lyons.

VISS 293 Middle Eastern Cinema (also NES 293, JWST 291, FILM 293)
Fall. 4 credits. D. Starr.
For description, see NES 293.

VISS 315 Japanese Cinema and the City (also ASIAN 315 and FILM 326)
Spring. 4 credits. A. Freedman.
For description, see ASIAN 315.

[VISS 336 French Film (also FRLIT 336 and THETR 341)]
Spring. 4 credits. Offered alternate years; not offered 2003–2004. T. Murray.
For description, see FRLIT 336.

[VISS 375 History and Theory of Commercial Narrative Film (also FILM 375)]
For description, see FILM 375.

VISS 376 History and Theory of Documentary and Experimental Film (also FILM 376)
Fall. 4 credits. Fee for screening expenses, $10 (paid in class). D. Fredericksen.
For description, see FILM 376.

VISS 379 Modern Documentary Film History and Theory (also FILM 379)
Spring. 4 credits. Prerequisite: FILM 376 is strongly recommended but not required. Fee for screening expenses $10 (paid in class). D. Fredericksen.
For description, see FILM 379.

[VISS 386 Third Cinema (also FILM 386)]
For description, see FILM 386.

VISS 410 Chinese Film (also ASIAN 410)
Spring. 4 credits. E. Gunn.
For description, see ASIAN 410.

[VISS 433 Electronic Innovation (also ENGL 433)]
For description, see ENGL 433.

[VISS 435 African Cinema (also AS&RC 435 and ART H 478)]
For description, see AS&RC 435.2.

Interdisciplinary, Intermedia Studies

VISS 202 Art, Archaeology and Analysis (also ARCH 200, EAS 200, and PHYS 200)
Spring. 4 credits. R. Kay.
For description, see EAS 200.

ART 272 Special Topics: Digital Multimedia
Term to be announced. M. Lyons.
For description, see ART 272.

VISS 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.

VISS 344 Actor/Performing Object (also THETR 344/644)
Fall. 4 credits. E. Winet.
For description, see THETR 344.

VISS 400 Proseminar (also ART H 400)
Fall. 4 credits. Prerequisite: History of Art Majors only. Enrollment is limited. M. Dadi.
For description, see ART H 400.

VISS 444 Youth in Japanese Literature and Culture (also ASIAN 444 and FGSS 444)
Fall. 4 credits. A. Freedman.
For description, see ASIAN 444.

VISS 580 Dancing the Stone: Body, Memory and Architecture (also ART H 580.1)
For description, see ART H 580.1

VISS 651 The Sexual Child (also ENGL 651 and FGSS 651)
For description, see ENGL 651.

VISS 660 Cinematic Desire (also ENGL 660)
Spring. 4 credits. Prerequisite: permission of instructor. E. Hanson.
For description, see ENGL 660.

Perception, Cognitive Studies

[VISS 305 Visual Perception (also PSYCH 305)]
Fall. 4 credits. Prerequisite: PSYCH 205 or permission of instructor. Limited to 20 students. Not offered 2003–2004. J. Cutting.
For description, see PSYCH 305.

VISS 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.

VISS 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.

[VISS 475 Seminar in Cinema: Cognitive Film Theory (also FILM 475 and AM ST 475)]
For description, see FILM 475.

[VISS 492 Sensory Function (also BIONB 482 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 2003–2004. B. Halpern.
For description, see PSYCH 492.4.

Theory and Visuality

VISS 203 Introduction to Feminist Theory (also FGSS 202)
Spring. 3 credits. D. Reese.
For description, see FGSS 202.

VISS 367 Visual Culture and Social Theory (also ART H 370, COM L 368, and GOVT 375)
For description, see ENGL 395.J

VISS 473 Film and Spiritual Issues (also FILM 473 and RELST 473)
Spring. 4 credits. Limited to 20 students. D. Fredericksen.
For description, see FILM 473.

Performance and Visuality

VISS 233 Explorations in Movement (also DANCE 233 and PE 168)
Fall. 0 to 1 credit. Limited to 16 students. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.
For description, see DANCE 233.

VISS 303 Dance Technique Workshop (also DANCE 303 and PE 167)
Fall. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.
For description, see DANCE 303.

VISS 308 Modern Dance (also DANCE 308 and PE 166)
Fall. 0 to 1 credit. By placement only; no pre-enrollment. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.
For description, see DANCE 308.

VISS 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 281 or THETR 250 or THETR 398 or permission of the instructor. Limited to 15 students. B. Levitt.
For description, see THETR 445.

VISS 446 Shakespeare in (Con)text (also THETR 446)
Fall. 4 credits. B. Levitt.
For description, see THETR 446.
VISST 245 Renaissance and Baroque (also ART H 245)
Fall. 4 credits. Each student must enroll in a section. C. Lazzati.
For description, see ART H 245.

VISST 361 European Cultural History 1750-1870 (also COM L 352 and HIST 363)
For description, see HIST 362.

VISST 362 Impressionism in Society (also ART H 362)
For description, see ART H 362.

VISST 363 European Cultural History 1870-1948 (also COM L 353 and HIST 363)
For description, see HIST 363.

VISST 364 Introduction to Japanese Art (also ART H 364, ASIAN 361)
Fall. 4 credits. A. Pan.
For description, see ART H 364.

VISST 394 The House and the World: Architecture of Asia (also ART H 395 and ASIAN 394)
For description, see ART H 395.

VISST 407 The Museum and the Object (also ART H 407)
Fall. 4 credits. Prerequisites: History of Art majors only. Not open to freshmen or sophomores without permission of instructor. All classes meet in the Johnson Art Museum Study Gallery. A. Pan.
For description, see ART H 407.

VISST 408 Tuscany as a New Jerusalem (also S HUM 408 and ART H 408)
Fall. 4 credits. Prerequisite: permission of instructor. Reading comprehension of Italian is strongly recommended. M. Lasansky.

VISST 416 Tourism and the Catholic Grotesque (also S HUM 418)
Spring. 4 credits. Limited to 15 students. M. Lasansky.
For description, see S HUM 416.

VISST 452 The Printed Image: The World on Paper (also ART H 452)
For description, see ART H 452.

VISST 462 Topics in Early Modernism: America and the Machine Age (also ART H 462)
For description, see ART H 462.

Theory/Practice

VISST 104 Introduction to World Music: Asia (also MUSIC 104 and ASIAN 192)
Fall. 3 credits. 1-hour discussion to be arranged. No previous training in music required. Not offered 2003–2004; offered next in 2004. M. Hatch.
For description, see MUSIC 104.

VISST 201 Cognitive Studies in Context Laboratory (also COGST 201, COM S 201, and PYSCH 201)
Spring. 4 credits. Prerequisite: COGST 101/COM S 101/LING 101/PHIL 191/PSYCH 102. Knowledge of programming languages is not assumed. Limited to 24 students. D. Field.
For description, see COGST 201.

VISST 211 Beginning Dance Composition (also DANCE 210)
Fall and spring. 3 credits. Concurrent enrollment in DANCE 212 and a dance technique class at the appropriate level is required. Attendance at dance concerts is required. Fall, B. Suber; spring, J. Morgenroth.
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 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 335 Modern Western Drama, Modern Western Theater: Theory and Practice (also COM L 335 and THETR 335)
For description, see THETR 335.

VISST 358 Techno Soma Kinesics II: Technology and the Moving Body (also DANCE 358)
Spring. 4 credits. Prerequisite: DANCE 258 (or equivalent) or permission of instructor. Limited to 5 students. 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. Rivelchin, M. Lyons, D. Borden, J. Zasovick.
For description, see FILM 391.

VISST 396 Fundamentals of Directing I (also THETR 396)
Fall. 3 credits. Limited to 10 students. Prerequisite: 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 the course. D. Feldshuh.
For description, see THETR 396.

VISST 419 Seminar in the History of Dance (also DANCE 418)
Spring. 4 credits. B. Suber.
For description, see DANCE 418.

VISST 478 Intermediate Film and Video Projects, Narrative Workshop (also FILM 478)
Fall. 4 credits. Limited to 8 students. Prerequisites: FILM 377 or 277. As minimum production, and THETR 383 (Screenwriting) or 398 (Directing I), and permission of instructor based on proposals. Equipment fee $100 (paid in class). Film projects 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: 383 (Screenwriting) and 398 (Directing I). Equipment fee: $100. Project costs: $500–2000, unless group project is funded by the Melville Shavelson Fund. M. Rivchin.
For description, see FILM 493.

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 UNDER “BIOLOGICAL SCIENCES”

Abrams, Meyer H., Ph.D., Harvard U. Class of 1916 Professor of English Emeritus, English
Abuña, Hector D., Ph.D., U. of North Carolina at Chapel Hill. Emile M. Chamot Professor of Chemistry, Chemistry and Chemical Biology
Abusch, 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
Fay, Robert C., Ph.D., U. of Illinois. Prof., Chemistry and Chemical Biology
Feldman, Richard L., M.A., U. of Illinois at Urbana-Champaign. Senior Lecturer, Intensive English Program
Feldshuh, David, Ph.D., U. of Minnesota.
Prof., Theatre, Film and Dance
Ferguson, Melissa, Ph.D., New York U. Asst. Prof., Psychology
Fernández, María, Ph.D., Columbia U. Asst. Prof., History of Art
Field, David J., Ph.D., U. of Pennsylvania.
Assoc. Prof., Psychology
Fine, Gail J., Ph.D., Harvard U. Prof., Philosophy/Classics
Finlay, Barbara L., Ph.D., Massachusetts Inst. of Technology. William R. Kenan, Jr. Professor of Psychology/Neurobiology and Behavior
Fitchen, Douglas B., Ph.D., U. of Illinois. Prof., Physics/LASSP
Flanagan, Éanna É., Ph.D., California Inst. of Technology. Assoc. Prof., Physics/Astronomy/LEPP
Fogel, Melanie L., Ph.D., Cornell U. Senior Lecturer, Theatre, Film and Dance
Fortune, Joanne E., Ph.D., Cornell U. Assoc. Prof., Physiology/Feminism, Gender, and Sexuality Studies
Frank, Carl P., Ph.D., Princeton U. Assoc. Prof., Physics/LASSP
Frank, Robert H., Ph.D., U. of California at Berkeley. Goldwin Smith Professor of Economics/Ethics and Public Policy
Fredericksen, Donald L., Ph.D., U. of Iowa. Assoc. Prof., Theatre, Film and Dance
Freed, Jack H., Ph.D., Columbia U. Prof., Chemistry and Chemical Biology
Fried, Debra, Ph.D., Yale U. Assoc. Prof., English
Fulbright, Robert, Ph.D., U. of Michigan.
Senior Lecturer, Physics
Fulton, Alice. M.F.A., Cornell U. Prof., English
Furman, Nelly, Ph.D., Columbia U. Prof., Romance Studies
Gainor, Ellen J., Ph.D., Princeton U. Prof., Theatre, Film and Dance
Gair, James W., Ph.D., Cornell U. Prof., Emeritus, Linguistics
Gallik, Richard S., Ph.D., Cornell U. Prof., Physics/LEPP
Galloway, Andrew, Ph.D., U. of California at Berkeley. Assoc. Prof., English
Ganem, Bruce, Ph.D., Columbia U. Franz and Elisabeth Roesler Professor of Chemistry and Chemical Biology
Garces, María Antonia, Ph.D., Johns Hopkins U. Assoc. Prof., Romance Studies
Garcia, Maria Cristina, Ph.D., U. of Texas at Austin. Assoc. Prof., History/Latino Studies
Gehrke, Johannes, Ph.D., U. of Wisconsin at Madison. Assoc. Prof., Computer Science
Giam Battista, Alan G., M.S., Cornell U. Senior Lecturer, Physics
Gibbons, Lawrence K., Ph.D., U. of Chicago.
Asst. Prof., Physics/LEPP
Gibson, Eleanor J., Ph.D., Yale U. Susan Linn Sage Professor of Psychology Emeritus, Psychology
Giersch, Peter J., Ph.D., Harvard U. Prof., Astronomy/CRSR
Gilbert, Roger S., Ph.D., Yale U. Assoc. Prof., English
Gilgen, Peter, Ph.D., Stanford U. Asst. Prof., German Studies
Gillespie, Tarleton L., Ph.D., U. of California at San Diego. Assoc. Prof., Science and Technology Studies
Giillland, Mary M.A., Cornell U. Senior Lecturer, Knight Institute for Writing in the Disciplines
Gillowich, Thomas, Ph.D., Stanford U. Prof., Psychology
Ginet, Carl A., Ph.D., Cornell U. Prof., Emeritus, Philosophy
Ginsparg, Paul, Cornell U. Prof., Physics/CIS
Giovanelli, Riccardo, Ph.D., Indiana U. Prof., Astronomy/NAIC
Gittelman, Bernard, Ph.D., Massachusetts Inst. of Technology. Prof. Emeritus, Physics/LEPP
Goetz, Kent, M.F.A., U. of Wisconsin at Madison. Asst. Prof., Theatre, Film and Dance
Gold, Daniel, Ph.D., U. of Chicago Divinity School. Prof., Asian Studies
Gold, Thomas, Ph.D., Cambridge U. (England). John L. With erhill Professor of Astronomy Emeritus/CRSR
Goldsmith, Paul F., Ph.D., U. of California at Berkeley. James A. Weeks Professor of Physical Sciences, Astronomy/NAIC
Golikowska, Krystyna Urbisz, Ph.D., Jagiellonian University (Poland). Senior Lecturer, Intensive English Program
Gottfried, Kurt, Ph.D., Massachusetts Inst. of Technology. Prof. Emeritus, Physics/LEPP
Gottschalk, Katherine Kubinger, Ph.D., U. of Chicago. Senior Lecturer, English and Knight Institute for Writing in the Disciplines
Graaff, Delta, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Philosophy
Graubart, Karen, Ph.D., U. of Massachusetts at Amherst. Asst. Prof., History
Greenberg, Donald P., Ph.D., Cornell U. Prof., Computer Science
Greenberg, Mitchell, Ph.D., U. of California at Berkeley. Prof., Romance Studies
Greene, Charles H., Ph.D., U. of Washington.
Assoc. Prof., Earth and Atmospheric Sciences/CFE
Greene, Sandra E., Ph.D., Northwestern U. Prof., History
Greenwood, Davyd J., Ph.D., U. of Pittsburgh. Goldwin Smith Professor of Anthropology
Greisen, Kenneth I., Ph.D., Cornell U. Prof.
Emeritus, Physics/LASSP
Grimes, Joseph E., Ph.D., Cornell U. Prof.
Emeritus, Modern Languages and Linguistics
Groos, Arthur, Ph.D., Cornell U. Prof., German Studies
Groth, Leonard, Ph.D., U. of Chicago.
Prof., Mathematics
Grossvolg, Anita V., Ph.D., Cornell U. Assoc. Prof. Emerita, Romance Studies
Grossvolg, David I., Ph.D., Columbia U. Prof.
Emeritus, Goldwin Smith Professor of Romance Studies and Comparative Literature
Gruner, Sol M., Ph.D., Princeton U. Prof., Physics/LASSP
Grusky, David, Ph.D., U. of Wisconsin.
Prof., Sociology
Guckenheimer, John, Ph.D., U. of California at Berkeley.
Prof., Mathematics
 Gunn, Edward M. Jr., Ph.D., Columbia U. Assoc. Prof., Astronomy/NAIC
Haenni, Sabine, Ph.D., U. of Chicago.
Asst. Prof., Theatre, Film and Dance/American Studies
Hagfors, Tor, Ph.D., U. of Oslo (Norway). Prof. Emeritus, Astronomy/Engineering/NAIC
Hall, Daniel Crawford, M.A., U. of Iowa.
Senior Lecturer, Theatre, Film and Dance
Haltern, Joseph Y., Ph.D., Harvard U. Prof., Computer Science
Hamnes, Gordon G., Ph.D., U. of Wisconsin.
Horace White Prof. Emeritus, Chemistry and Chemical Biology
Hand, Louis N., Ph.D., Stanford U. Prof., Physics/LEPP
Hanson, Ellis, Ph.D., Princeton U. Assoc. Prof., English
Harbert, Wayne E., Ph.D., U. of Illinois. Prof., English
Harris, David, Ph.D., Northwestern U. Prof., Sociology
Harris, Robert L., Ph.D., Northwestern U. Assoc. Prof., Africana Studies and Research Center
Hawes-Warrick, Rebecca, D.M.A., Stanford U. Prof., Music
Hartill, Donald L., Ph.D., California Inst. of Technology. Prof., Physics/LEPP
Hartman, Paul L., Ph.D., Cornell U. Prof.
Emeritus, Physics/Applications and Engineering Physics/LASSP
Hartmans, Juris, Ph.D., California Inst. of Technology Warren R. Read Professor of Engineering Emeritus, Computer Science
Harwit, Martin O., Ph.D., Massachusetts Inst. of Technology. Prof. Emeritus, Astronomy/CRSR
Hassan, Salah, Ph.D., U. of Pennsylvania.
Assoc. Prof., Africana Studies and Research Center/History of Art
 Hatch, Martin, Ph.D., Cornell U. Assoc. Prof., Music
Hatcher, Allen, Ph.D., Stanford U. Prof., Mathematics
Hay, George A., Ph.D., Northwestern U. Prof., Economics/Edward Cornell Prof. of Law
Hayes, Donald P., Ph.D., U. of Washington.
Prof. Emeritus, Sociology
Haynes, Martha P., Ph.D., Indiana U. Prof., Astronomy/NAIC
Heckathorn, Douglas D., Ph.D., U. of Kansas.
Prof., Sociology
Hellie, Benjamin, Ph.D., Princeton U. Asst. Prof., Philosophy
Henderson, John S., Ph.D., Yale U. Prof., Anthropology
Hendrix, Burke, Ph.D., U. of Colorado.
Asst. Prof., Government
Henley, Christopher L., Ph.D., Harvard U. Assoc. Prof., Physics/LASSP
Herrin, W. Lamar, Ph.D., U. of Cincinnati.
Assoc. Prof., Linguistics
Hester, Kent L., Ph.D., U. of Rochester.
Prof., Astronomy/CRSR
Hertz, Susan R., Ph.D., Cornell U. Adjunct Assoc. Prof., Philosophy
Hexter, Karlton, Ph.D., City U. of New York.
Asst. Prof., Africana Studies and Research Center
Hildebrand, George H., Ph.D., Cornell U. Maxwell M. Upson Professor of Economics and Industrial Relations Emeritus, Economics/Industrial and Labor Relations
Hilgartner, Stephen, Ph.D., Cornell U. Assoc. Prof., Science and Technology Studies

Irwin, Terence H., Ph.D., Princeton U. Susan Ilyashenko, Yuliji, Ph.D., Moscow State U.

Isacks, Bryan L., Ph.D., Columbia U. William and Katherine Snee Professor of Earth and Atmospheric Sciences/INSTOC.

Isard, Walter, Ph.D., Harvard U. Prof. Emeritus, Economics.


Istvan, Alice M., Ph.D., Stanford U. Prof., Johnson Graduate School of Management/ Psychology.

Jagdfisch, Ngamit, Ph.D., Ohio State U. Senior Lecturer, Asian Studies.

Janowitz, Phyllis, M.A., U. of Massachusetts. Prof., English.

Jeylamo, Bodrun, Ph.D., New York U. Prof., English.


Johns, Marylee M., S.E., Northeastern U. Senior Lecturer, Intensive English Program.


Johnston, Robert E., Ph.D., Rockefeller U. Prof., Psychology.

Jones, Karen, Ph.D., Cornell U. Asst. Prof., Philosophy.

Jones, Robert B., Ph.D., U. of California at Berkeley. Prof. Emeritus, Modern Languages and Linguistics.


Jordan, Teresa E., Ph.D., Stanford U. Prof., Earth and Atmospheric Sciences/INSTOC.

Jorden, Eleanor H., Ph.D., Yale U. Mary Donlon Alger Professor of Linguistics Emerita, Modern Languages and Linguistics.

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