Cornell University Calendar

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>1997-98</th>
<th>1998-99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence halls open</td>
<td>Friday, August 22</td>
<td>Friday, August 21</td>
</tr>
<tr>
<td>Freshman orientation begins</td>
<td>Friday, August 22</td>
<td>Friday, August 21</td>
</tr>
<tr>
<td>New-student orientation begins</td>
<td>Friday, August 22</td>
<td>Friday, August 21</td>
</tr>
<tr>
<td>Registration–course exchange</td>
<td>Tuesday–Wednesday, August 26–27</td>
<td>Tuesday–Wednesday, August 25–26</td>
</tr>
<tr>
<td>Instruction begins</td>
<td>Thursday, August 28</td>
<td>Thursday, August 27</td>
</tr>
<tr>
<td>Physical education classes begin</td>
<td>Monday, September 8</td>
<td>Monday, September 7</td>
</tr>
<tr>
<td>Fall break: instruction suspended</td>
<td>Saturday, October 11</td>
<td>Saturday, October 10</td>
</tr>
<tr>
<td>Instruction resumes</td>
<td>Wednesday, October 15</td>
<td>Wednesday, October 14</td>
</tr>
<tr>
<td>Pre-course enrollment for spring</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>Family Weekend</td>
<td>October 31–November 2</td>
<td>October 30–November 1</td>
</tr>
<tr>
<td>Homecoming</td>
<td>September 27</td>
<td>September 19</td>
</tr>
<tr>
<td>Thanksgiving recess: instruction suspended, 1:10 p.m.</td>
<td>Wednesday, November 26</td>
<td>Wednesday, November 25</td>
</tr>
<tr>
<td>Instruction resumes</td>
<td>Monday, December 1</td>
<td>Monday, November 30</td>
</tr>
<tr>
<td>Instruction ends</td>
<td>Saturday, December 6</td>
<td>Saturday, December 5</td>
</tr>
<tr>
<td>Study period</td>
<td>Sunday–Wednesday, December 7–10</td>
<td>Sunday–Wednesday, December 6–9</td>
</tr>
<tr>
<td>Final examinations begin</td>
<td>Thursday, December 11</td>
<td>Thursday, December 10</td>
</tr>
<tr>
<td>Final examinations end</td>
<td>Friday, December 19</td>
<td>Friday, December 18</td>
</tr>
<tr>
<td>Residence halls close</td>
<td>Saturday, December 20</td>
<td>Saturday, December 19</td>
</tr>
<tr>
<td>Winter Session Period Begins</td>
<td>Friday, December 26</td>
<td>Monday, December 28</td>
</tr>
<tr>
<td>Three-week classes begin</td>
<td>Friday, January 2</td>
<td>Monday, January 4</td>
</tr>
<tr>
<td>Winter session period ends</td>
<td>Saturday, January 17</td>
<td>Friday, January 22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th>1997-98</th>
<th>1998-99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence halls open for continuing students</td>
<td>Sunday, January 11</td>
<td>Saturday, January 17</td>
</tr>
<tr>
<td>Residence halls open for new students</td>
<td>Monday, January 12</td>
<td>Monday, January 18</td>
</tr>
<tr>
<td>Registration–course exchange</td>
<td>Thursday–Friday, January 15–16</td>
<td>Thursday–Friday, January 21–22</td>
</tr>
<tr>
<td>Instruction begins</td>
<td>Monday, January 19</td>
<td>Monday, January 25</td>
</tr>
<tr>
<td>Physical education classes begin</td>
<td>Monday, February 2</td>
<td>Monday, February 8</td>
</tr>
<tr>
<td>Spring break: instruction suspended</td>
<td>Saturday, March 14</td>
<td>Saturday, March 20</td>
</tr>
<tr>
<td>Instruction resumes</td>
<td>Monday, March 25</td>
<td>Monday, March 29</td>
</tr>
<tr>
<td>Pre-course enrollment for fall</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>Instruction ends</td>
<td>Saturday, May 2</td>
<td>Saturday, May 8</td>
</tr>
<tr>
<td>Study period</td>
<td>Sunday–Wednesday, May 3–6</td>
<td>Sunday–Wednesday, May 9–12</td>
</tr>
<tr>
<td>Final examinations begin</td>
<td>Thursday, May 7</td>
<td>Thursday, May 13</td>
</tr>
<tr>
<td>Final examinations end</td>
<td>Friday, May 15</td>
<td>Friday, May 21</td>
</tr>
<tr>
<td>Residence halls close (students who are graduating may stay through Commencement Day)</td>
<td>Saturday, May 16</td>
<td>Saturday, May 22</td>
</tr>
<tr>
<td>Senior Week</td>
<td>Sunday–Saturday, May 17–23</td>
<td>Sunday–Saturday, May 23–29</td>
</tr>
<tr>
<td>Commencement</td>
<td>Sunday, May 24</td>
<td>Sunday, May 30</td>
</tr>
<tr>
<td>Summer Session</td>
<td>1997-98</td>
<td>1998-99</td>
</tr>
<tr>
<td>Three-week session</td>
<td>Wednesday, June 3</td>
<td>Wednesday, June 2</td>
</tr>
<tr>
<td>Eight-week session</td>
<td>Monday, June 15</td>
<td>Monday, June 14</td>
</tr>
<tr>
<td>Six-week session</td>
<td>Monday, June 29</td>
<td>Monday, June 28</td>
</tr>
</tbody>
</table>

The dates shown in this calendar are subject to change at any time by official action of Cornell University.

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In this calendar, the university has scheduled classes, laboratories, and examinations on religious holidays. It is the intent of the university that students who miss those activities because of religious observances be given adequate opportunity to make up the missed work.

The dates shown in this calendar are subject to change at any time by official action of Cornell University.

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 Media Services at Cornell University.
It is the policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, sexual orientation, age, or handicap. The university is committed to the maintenance of affirmative action programs that will assure the continuation of such equality of opportunity. Sexual harassment is an act of discrimination and, as such, will not be tolerated. Inquiries concerning the application of Title IX may be referred to Cornell's Title IX coordinator (assistant director, gender equity) at the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801 (telephone: 607 255-3976; TDD: 607 255-7665).

Cornell University is committed to assisting those persons with disabilities who have special needs. A brochure describing services for persons with disabilities may be obtained by writing to the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801. Other questions or requests for special assistance may also be directed to that office.
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For Cornell University directory information or general information, call 607-255-2000 or 607-254/INFO. The Web page for 1997 Courses of Study has been made available at http://www.comell.edu/Academlc/Courses97/Courses97.html

To obtain a copy of this catalog, please follow these guidelines:
If you are a prospective undergraduate student, please contact the Undergraduate Admissions Office, Cornell University, 410 Thurston Ave., Ithaca, NY 14853-2488, 607-255-5241.
If you are a prospective graduate student, please contact the Graduate School, Cornell University, B2 Caldwell Hall, Ithaca, NY 14853, 607-255-4884.
If you are a currently enrolled student, please contact your college registrar.
All others please contact the Office of the Vice President for Student and Academic Services, Cornell University, 311 Day Hall, Ithaca, NY 14853-2801, 607-255-9595, Internet: eisyl@comell.edu

Corrections or suggestions for changes in this catalog may be sent to
Project Coordinator, Courses of Study
Media Services
Cornell University
1150 Comstock Hall
Ithaca, NY 14853-0901
Fax: 607-255-9873
e-mail: jaa3@cornell.edu

Abbreviations and symbols used in this catalog:
M Monday S-U Satisfactory-Unsatisfactory
T Tuesday disc discussion
W Wednesday lab laboratory
R Thursday lec lecture
F Friday rec recitation
S Saturday sec section
TBA To be announced
@ geographic breadth
# historical breadth

Courses with names and descriptions enclosed in brackets—[ ]—are not offered fall 1997 and spring 1998.
CORNELL UNIVERSITY—GENERAL INFORMATION

Introduction

Courses of Study contains information primarily concerned with academic resources and procedures, college and department programs, interdisciplinary programs, and undergraduate and graduate course offerings of the university. Not included in this publication is information concerning the Medical College and the Graduate School of Medical Sciences, located in New York City. A student handbook describing life at Cornell will be distributed to all new incoming students. In addition, each new student receives the Policy Notebook, which summarizes pertinent university policy. Students should consult with their college's advising office for specific information on academic policies and procedures, degree programs and requirements.

Student responsibility and regulations. The Campus Code of Conduct describes the regulations and policies for maintaining public order on campus. The Code of Academic Integrity and other statements of student responsibility are set forth in the Policy Notebook. Publications are available for viewing on CUINFO, on the World Wide Web, the university's electronic information system, and in print at the various university libraries, the Student Life Union, the Office of the Dean of the University Faculty, the Office of University Counsel, the Office of the Judicial Administrator, and the college offices. The following is a list of offices and information sources for admission information:

Undergraduate admissions. Information pertinent to prospective applicants is available from the Undergraduate Admissions Office, 410 Thurston Avenue, Ithaca, NY 14850-2488, 607–255–5241.

Graduate School. Information pertaining to admission to the Graduate School may be obtained by contacting the Graduate School, B2 Caldwell Hall, Ithaca, NY 14853–2602, 607–255–4894.


Medical College and Graduate School of Medical Sciences. Information regarding admissions is available from the Office of Admissions, 1300 York Avenue, New York, NY 10021, 212–746–1067.

CUINFO ON THE WORLD WIDE 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 World Wide Web. The URL is: http://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

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—graduate 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
- Biological 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.

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 http://www.ipr.cornell.edu/Accreditation/Status. Requests to review additional documentation supporting Cornell's accreditation should be addressed to the Vice President for Academic Programs, Planning and Budgeting, Cornell University, 455 Day Hall, Ithaca, NY 14853–2801, rge2@cornell.edu.

Advanced Placement

CREDIT FOR ADVANCED PLACEMENT

Definition and Purpose of Advanced Placement Credit

Advanced placement credit is college credit that students earn before they matriculate as freshmen. Students may use credit they receive for advanced placement to satisfy degree requirements only as specified by the individual college at Cornell. Although such credit counts toward the bachelor's degree, 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 undergraduate curricula.

Sources of Advanced Placement Credit

Advanced placement credit may be earned from one of the following:

a. Achieving the requisite score on a departmental examination at Cornell (usually given during orientation week) or from the Advanced Placement Examination from the College Entrance Examination Board (CEEB). The requisite scores, which vary by subject, are determined by the relevant departments at Cornell and are listed on page 7.

b. Passing 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
Some departments review each request individually. Some departments accept credit from virtually all accredited colleges, some do not. Credit for international credentials is evaluated individually (see 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, take the appropriate Advanced Placement Examination offered by the College Entrance Examination Board in Princeton, New Jersey, to qualify for credit as in paragraph 1 above.

The final decision for awarding advanced placement credit at Cornell rests with each individual college. The appropriate department of instruction within the university sets the standards of achievement that must be met for advanced placement and recommends AP credit for those who meet the standards. For policies governing advanced placement in a specific college, see the academic information section for that college. Students need not accept advanced placement. They may repeat the course, thereby relinquishing the advanced placement credit.

Advanced placement examinations. Entering freshmen should have their scores from CEEB Advanced Placement Examinations sent to their college or school office (see below: "Forwarding of scores and transcripts").

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 will appear in the orientation booklet that will be mailed to entering students in late summer. The departments that award advanced placement and credit on the basis of departmental examinations are shown on page 7.

Transfer of credit. Entering freshmen who have completed college courses for which they want to receive credit toward their Cornell degree should send transcripts and course descriptions to their college or school office (see below: "Forwarding of scores and transcripts").

Chemistry

The Department of Chemistry offers two sequences that satisfy prerequisites for further work in the department. Chemistry 207–208, an eight-credit sequence that includes qualitative analysis, and Chemistry 215–216, a nine-credit sequence that includes quantitative and qualitative analysis. Freshmen may qualify for advanced placement and advanced standing credits in chemistry by satisfactory performance on the CEEB Advanced Placement Examination in chemistry or by passing an advanced standing examination offered by the department. A score of 5 on the CEEB examination entitles a student to four credits. A student may earn four or eight credits by suitable performance on the departmental examination. To take the departmental examination students must sign up beforehand with Mrs. Virginia Marcus, in 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 Dr. Stanley Marcus, associate director of undergraduate studies, in 138 Baker Laboratory. Students receiving advanced placement who are interested in a major in chemistry or a related science should consider taking Chemistry 215–216 and should consult the Chemistry 215 instructor.

Latin. Credit and placement are determined on the basis of a departmental examination. A student who is permitted to register in a 300-level course will be given six advanced placement credits.

Greek and Modern Greek. Credit and placement are determined on the basis of a departmental examination. For Ancient Greek, a student who is permitted to register in a 300-level course will be given six advanced placement credits. For Modern Greek, a student who is determined by the examiner to be at an advanced level will be given six advanced placement credits.

Computer Science

Students who receive a score of 4 or 5 on the CEEB Advanced Placement Examination in computer science will receive four advanced placement credits and may take Computer Science 211, 212, or 222 (provided, in the case of Computer Science 222, the mathematics prerequisites are met). These credits may be used to satisfy the requirement in computer programming for students in the College of Engineering or half the distribution requirement in mathematics for students in the College of Arts and Sciences. Freshmen may also earn four credits by suitable performance on a departmental examination to be given during orientation week. Students who receive a score of 3 on the CEEB Advanced Placement Examination may choose, at their own risk and in consultation with their advisers, to go directly into a 200-level course without receiving credit for Computer Science 100.
## Summary of Credit and Placement

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<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>Biology</td>
<td>5 (majors)</td>
<td>8 credits or 4 credits</td>
<td>Placement out of all introductory courses. Students may choose to accept only 4 credits and follow the guidelines for majors with a score of 4.</td>
</tr>
<tr>
<td></td>
<td>4 (majors)</td>
<td>4 credits</td>
<td>4 AP credits awarded after completion of any combination of 4 credits from 101–104 or 105 or 106. Consult department to determine which semester to take to complete introductory biology.</td>
</tr>
<tr>
<td></td>
<td>5 (nonmajors)</td>
<td>8 credits</td>
<td>Placement out of all introductory courses.</td>
</tr>
<tr>
<td></td>
<td>4 (nonmajors)</td>
<td>6 credits</td>
<td>Does not always satisfy the prerequisite for second- and third-level courses in biology.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
<td>4 credits</td>
<td>Department determines placement.</td>
</tr>
<tr>
<td>Computer science</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of C.S. 100.</td>
</tr>
<tr>
<td>Economics, micro</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of Economics 101.</td>
</tr>
<tr>
<td>Economics, macro</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of Economics 102.</td>
</tr>
<tr>
<td>English</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Modern Languages determines placement. Students may earn additional credit by taking CASE examination.†</td>
</tr>
<tr>
<td>French language</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement.</td>
</tr>
<tr>
<td>French literature</td>
<td>4,5</td>
<td>3 credits (and proficiency)</td>
<td>Department of German Studies determines placement in literature courses. Department of Modern Languages determines placement in language courses. Students may earn additional credit by taking CASE examination.†</td>
</tr>
<tr>
<td>German</td>
<td>4,5</td>
<td>3 credits (and proficiency)</td>
<td>Placement out of Government 111.</td>
</tr>
<tr>
<td>Government and politics, U.S.</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of Government 131.</td>
</tr>
<tr>
<td>Government and politics,</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Classics determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>comparative</td>
<td></td>
<td></td>
<td>Department of Near Eastern Studies determines placement based on departmental examination.</td>
</tr>
<tr>
<td>Hebrew</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Modern Languages determines placement. Students may earn additional credit by taking CASE examination.†</td>
</tr>
<tr>
<td>American history</td>
<td>4,5</td>
<td>4 credits</td>
<td>Department of Romance Studies determines placement.</td>
</tr>
<tr>
<td>European history</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of Government 111.</td>
</tr>
<tr>
<td>History of art</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of Government 111.</td>
</tr>
<tr>
<td>Italian language</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Modern Languages determines placement. Students may earn additional credit by taking CASE examination.†</td>
</tr>
<tr>
<td>Italian literature</td>
<td>4,5</td>
<td>3 credits (and proficiency)</td>
<td>Department of Romance Studies determines 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</td>
<td>4,5</td>
<td>8 credits</td>
<td>Placement out of 111, 112. Permission to take 221, 293, or 213.</td>
</tr>
<tr>
<td>engineering students)</td>
<td>2 or 3</td>
<td>4 credits</td>
<td>Placement out of 111. No advanced placement credit for students who take 111. Permission to take 112 or 192.</td>
</tr>
<tr>
<td>Mathematics AB (excluding</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of 111. Permission to take 112, 122, or 192.</td>
</tr>
<tr>
<td>engineering students)</td>
<td>3</td>
<td>4 credits</td>
<td>Placement out of 111. Permission to take 112 or 192.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>none</td>
<td>Students are strongly urged to take the mathematics placement examination.</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td></td>
<td>Department determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>Physics B</td>
<td>5</td>
<td>8 credits</td>
<td>Placement out of Physics 101–102. Students with a score of 4 or 5 on Mathematics BC may choose placement out of Physics 112 or 207 (4 credits).</td>
</tr>
<tr>
<td>Physics B</td>
<td>4</td>
<td>8 credits</td>
<td>Placement out of Physics 101–102.</td>
</tr>
<tr>
<td>Physics C—Mechanics</td>
<td>4,5</td>
<td>4 credits</td>
<td>Placement out of Physics 101.</td>
</tr>
<tr>
<td>Physics C—Electricity/</td>
<td>5</td>
<td>4 credits</td>
<td>Student may choose placement out of Physics 112 or 207, or placement into Physics 116 with no AP credit. For more information, contact department representative.</td>
</tr>
<tr>
<td>Magnetism</td>
<td></td>
<td></td>
<td>Student may choose 4 credits for Physics 213 or placement into Physics 217 with no AP credit. For more information, contact department representative.</td>
</tr>
<tr>
<td>Psychology</td>
<td>4,5</td>
<td>3 credits</td>
<td>Placement out of Psychology 101.</td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
<td></td>
<td>Department of Modern Languages determines placement. Students may earn additional credit by taking CASE examination.†</td>
</tr>
<tr>
<td>Spanish language</td>
<td>4,5</td>
<td>3 credits</td>
<td>Department of Romance Studies determines placement.</td>
</tr>
<tr>
<td>Spanish literature</td>
<td>4,5</td>
<td>3 credits (and proficiency)</td>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</td>
</tr>
<tr>
<td>Turkish</td>
<td></td>
<td></td>
<td>Department of Modern Languages determines placement. Students may earn additional credit by taking CASE examination.†</td>
</tr>
</tbody>
</table>

†Cornell Advanced Standing Examination. Contact the Department of Modern Languages, 203 Morrill Hall.
students are strongly urged to take the departmental placement test. To take the
departmental examination, students must sign up beforehand in the Undergraduate Office,
303 Upson Hall.

English
The English department will grant 3 credits to students who score 4 or 5 on the CEEB
Advanced Placement Examination. The credits are granted automatically: no
application to the department is required.

Students who receive scores of 700 or better on the CEEB SAT II examination in English
composition, or a 3 or 4 on the CEEB SAT II examination in literature, or a 4 or 5 on the
CEEB Advanced Placement Examination are eligible to enroll, space permitting, in the
following English freshman writing seminars: 270, 271, 272.

Advanced placement credits may not be used to fulfill requirements of the English major or
distribution requirements of the College of Arts and Sciences.

Mathematics
The Cornell calculus sequences discussed below are described under “Basic Sequences”
in the Department of Mathematics section of this catalog.

The regular 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.

The following rules do not apply to students being admitted to the College of Engineering.
See the college’s brochure for a detailed statement.

Students with a grade of 4 or 5 on the BC examination may take the appropriate third-
semester course (Mathematics 213, 221, or 293), but students entering Mathematics 293
may have to make up some material on partial differentiation. Students with a 3 on the BC
examination or a 4 or 5 on the AB examination may take the appropriate second-semester course (Math-
ematics 112 or 192). Students with a 2 on the BC examination or a 3 on the AB examination may take
one of the second-semester courses (Mathematics 112 or 192). Advanced placement credit will be awarded appropriately;
however, no credit will be granted for a grade of 1 on the BC or 1 or 2 on the AB examination.

A grade of 3 or higher on the BC examination satisfies the distribution requirement in
mathematics for students in the College of Arts and Sciences.

Note, however, that the grade of 3 is not sufficient for a full year of advanced place-
ment credit in mathematics.

The placement examination in mathematics is offered at Cornell only during orientation
week and should be taken by students who
1) have had at least a semester of calculus but did not take a CEEB Advanced Placement Examination;
2) have received a 2 on the BC examination or a 3 on the AB examination and want to
enter the upper sequence; or
3) believe that the placement assigned on the strength of the CEEB Advanced Placement Examination is not high enough in their
case.

Students are strongly urged to take the departmental placement test even if they feel that
their grasp of the material is uncertain.

The grade on this test does not become part of a student’s record. No advance registration
for the departmental examination is necessary.

Modern 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. In cases where no
placement test exists for a particular language, the Department of Modern Languages
designates a professor to handle placement for that language. Students should contact Prof.
Carol Rosen, director of undergraduate studies, at 255-0722. 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 entered on a student’s record as follows:

1. For students with a score of 4 or 5 on the language Advanced Placement Examination
   of the CEEB, three credits are granted, and they are eligible to take Cornell’s Advanced
   Standing Examination (CASE). Outstanding performance on this examination can result in a maximum of
   six credits.

2. Students who achieve a minimum score of 65 on the language placement test given
during orientation week are eligible to take Cornell’s Advanced Standing Examination (CASE). Outstanding
   performance on this examination can result in a maximum of six credits.

3. For formal language work at an accredited
college, credit is considered by the department on submission of a transcript and
   may be entered on the student’s Cornell record.

4. Native speakers of languages other than
   English may, on examination by the appropriate professor, be granted a
   maximum of six credits if they can
demonstrate proficiency equivalent to
   course work on the 200 level or above at Cornell. Additional credit will be
   considered only for those who pursue
   advanced work in their native language.

Information about times and places to take placement tests is available in the orientation
booklet, from Academic and Career Counseling
Services, and from the Department of Modern Languages. For more information,
see the College of Arts and Sciences section on language course placement, or contact the
Department of Modern Languages, 203 Morrill Hall.

Music
Advanced placement and credit are awarded only in music theory and only on the basis of
a comprehensive examination administered by the Department of Music, normally during
orientation week. If special arrangements are made, the examination may be administered at
other times during the academic year.

All students interested in taking this examination should consult Professor E. Murray, 311
Lincoln Hall (telephone: 607/255-4675). Inquiries may be directed to the Department of Music,
104 Lincoln Hall (telephone: 607/255-4097).

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 director of undergraduate studies,
Professor R. S. Galik, 101 Clark Hall, or the
department chair.

Physics B. Students earning a score of 4 or 5
may receive eight credits for Physics 101 and
102. Those earning a score of 5 in physics B
with a score of 4 or 5 in calculus BC may
choose to accept four credits in Physics 112 or
207 instead of eight credits in Physics 101 and
102. Those earning a score of 3 will receive four credits in Physics 101.

Physics C—Mechanics. Students earning a score of 4 or 5
may receive four credits for Physics 112 or 207, or placement into Physics
116 with no AP credit.

Physics C—Electricity and Magnetism:
Students earning a score of 5 may choose four
credits for Physics 213, or placement into
Physics 217 with no AP credit.

A student planning a major in Physics or
Applied and Engineering Physics and who is
eligible for AP credit should consult with his/
hers adviser or the department representative.

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

General information and advice may be
obtained from Professor R. S. Galik, 101 Clark
Hall, or from the Department of Physics, 109
Clark Hall.

ADVANCED PLACEMENT AND
CREDIT FOR INTERNATIONAL
CREDENTIALS
Following are the policies currently in effect
for G.C.E. "A" Level Examinations and
International Baccalaurate Higher Level
Examinations. Accepted students holding any
other secondary school credentials are urged
to sit for the Advanced Placement Examina-
tions of the College Entrance Examination
Board or for the departmental examinations
offered during orientation week. Students
requiring further information concerning
advanced standing credit for foreign creden-
tials may contact the Associate Director,
Undergraduate International Admissions.

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
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, Gannett Clinic, 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. 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 prior to 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. A form is completed by the student and signed by both the student’s advisor and an appropriate representative of the department offering the course (an instructor, department staff member or college registrar, depending on the college). The completed and signed form must be returned to the student’s college office to be processed. Professional schools, 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>†</td>
<td>†</td>
</tr>
<tr>
<td>Johnson Graduate</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>School of Management</td>
<td>No fee</td>
<td>No fee</td>
</tr>
<tr>
<td>Law School</td>
<td>$30</td>
<td>$20</td>
</tr>
<tr>
<td>Physical education</td>
<td>$15*</td>
<td>$15*</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.
†Consult the Summer Session catalog and the Division of Extramural Study brochure for fees.

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 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. Although sponsorship does not guarantee admission to the Internal Transfer Division, it 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 (255-4380).

Bursar Information

TUITION, FEES, AND EXPENSES

Tuition for Academic Year 1997-98

<table>
<thead>
<tr>
<th>Division</th>
<th>Undergraduate</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architectural, Art, and Planning</td>
<td>$21,840</td>
<td>$21,840</td>
</tr>
<tr>
<td>Arts and Sciences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Administration</td>
<td>$21,840</td>
<td>$21,840</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Division</th>
<th>Undergraduate</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endowed Divisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Architecture, Art, and Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arts and Sciences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel Administration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Division</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law School</td>
<td>$23,100</td>
</tr>
<tr>
<td>Management</td>
<td>$23,460</td>
</tr>
</tbody>
</table>

Statutory Divisions

<table>
<thead>
<tr>
<th>Division</th>
<th>Undergraduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Life Sciences</td>
<td></td>
</tr>
<tr>
<td>Human Ecology</td>
<td></td>
</tr>
<tr>
<td>Industrial and Labor Relations</td>
<td></td>
</tr>
<tr>
<td>New York resident</td>
<td>$9,195</td>
</tr>
<tr>
<td>Nonresident</td>
<td>$17,823</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Division</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate School (with major</td>
<td></td>
</tr>
<tr>
<td>chair in an endowed division</td>
<td>$21,840</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Division</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinary Medicine</td>
<td></td>
</tr>
<tr>
<td>New York resident</td>
<td>$14,250</td>
</tr>
<tr>
<td>Nonresident</td>
<td>$19,500</td>
</tr>
</tbody>
</table>

Summer Session (1997)

<table>
<thead>
<tr>
<th>Tuition</th>
<th>Per credit (estimated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate</td>
<td>$200 per term</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>15 per term</td>
</tr>
<tr>
<td>Law and Management</td>
<td>75 per term</td>
</tr>
</tbody>
</table>

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

Refund Schedule for Withdrawals and Leaves of Absence

Fall 1997 and Spring 1998

<table>
<thead>
<tr>
<th>Percent</th>
<th>Fall 1997</th>
<th>Spring 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>No charge</td>
<td>8/26-9/2</td>
<td>1/15-1/21</td>
</tr>
<tr>
<td>10% charge</td>
<td>9/3</td>
<td>1/22</td>
</tr>
<tr>
<td>20% charge</td>
<td>9/4-9/10</td>
<td>1/23-1/29</td>
</tr>
<tr>
<td>30% charge</td>
<td>9/11-9/17</td>
<td>1/30-2/5</td>
</tr>
<tr>
<td>40% charge</td>
<td>9/18-9/24</td>
<td>2/6-2/12</td>
</tr>
<tr>
<td>60% charge</td>
<td>9/25-10/1</td>
<td>2/13-2/19</td>
</tr>
<tr>
<td>80% charge</td>
<td>10/2-10/8</td>
<td>2/20-2/26</td>
</tr>
<tr>
<td>100% charge</td>
<td>10/9-9/7</td>
<td>2/27-9/8</td>
</tr>
</tbody>
</table>

Refund Schedule for Withdrawals and Leaves of Absence

First-Time Matriculated Students

<table>
<thead>
<tr>
<th>Percent</th>
<th>Fall 1997</th>
<th>Spring 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>No charge</td>
<td>8/26-9/2</td>
<td>1/15-1/21</td>
</tr>
<tr>
<td>10% charge</td>
<td>9/3</td>
<td>1/22</td>
</tr>
<tr>
<td>20% charge</td>
<td>9/4-9/17</td>
<td>1/23-2/5</td>
</tr>
<tr>
<td>30% charge</td>
<td>9/18-9/24</td>
<td>2/6-2/12</td>
</tr>
<tr>
<td>40% charge</td>
<td>9/25-10/8</td>
<td>2/13-2/26</td>
</tr>
<tr>
<td>50% charge</td>
<td>10/9-10/19</td>
<td>2/27-3/5</td>
</tr>
<tr>
<td>60% charge</td>
<td>10/20-11/2</td>
<td>3/6-3/28</td>
</tr>
<tr>
<td>100% charge</td>
<td>11/3/97</td>
<td>3/29/98</td>
</tr>
</tbody>
</table>

BILLING AND PAYMENT

Billing

Tuition and room and board charges will be billed in July and December and must be paid prior to registration. The due date for these semester bills will normally be five to ten working days prior to ID validation day. All other charges, credits, and payments will
STUDENT HEALTH INSURANCE

It is a Cornell University policy, by a university board of trustees decision, that all full-time students have health insurance coverage while enrolled at Cornell.

The student health plan offers extensive coverage at a reasonable cost for students and their eligible dependents. Plan benefit information will be mailed to all registered students (including students registered in absen) in their July bursar bill. If you decide that you have adequate coverage and want to waive the student health plan, a waiver form with proof of other coverage must be submitted to the student insurance office before the August 29 deadline. All full-time registered students, including students registered in absentia, will be automatically billed and enrolled in the student health plan if a completed waiver is not received by the deadline. Because of policy restrictions, the plan is nonrefundable after the deadline (except for dependents who no longer meet eligibility requirements).

Students enrolled in the student health plan may also enroll their eligible dependents for an additional charge. Enrollment deadline is September 30.

A five-month graduate plan is available for those students who finish their degree requirements before the start of the spring semester. The deadline for application is prior to the start of the spring semester.

To obtain additional information about the Cornell University health plan, please contact the insurance carrier directly at 1-800-859-8475. E-mail: SICU@cornell.edu

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 an examination, 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>50 MIN</td>
<td>08:00 AM</td>
</tr>
<tr>
<td>75 MIN</td>
<td>08:40 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>09:05 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>10:10 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>11:15 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>12:20 PM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>01:25 PM</td>
</tr>
</tbody>
</table>

Tuesday/Thursday

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 MIN</td>
<td>08:00 AM</td>
</tr>
<tr>
<td>75 MIN</td>
<td>08:40 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>09:05 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>10:10 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>11:15 AM</td>
</tr>
<tr>
<td>75 MIN</td>
<td>11:40 AM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>12:20 PM</td>
</tr>
<tr>
<td>50 MIN</td>
<td>01:25 PM</td>
</tr>
</tbody>
</table>

Laboratories and similar exercises

1 HR 55 MIN

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

2 HR 25 MIN

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:30 AM</td>
<td>09:55 AM</td>
</tr>
<tr>
<td>10:10 AM</td>
<td>12:35 PM</td>
</tr>
<tr>
<td>02:00 PM</td>
<td>04:25 PM</td>
</tr>
<tr>
<td>07:30 PM</td>
<td>09:55 PM</td>
</tr>
</tbody>
</table>

3 HR

<table>
<thead>
<tr>
<th>Start Times</th>
<th>End Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 AM</td>
<td>11:00 AM</td>
</tr>
<tr>
<td>10:10 AM</td>
<td>01:10 PM</td>
</tr>
<tr>
<td>01:25 PM</td>
<td>04:25 PM</td>
</tr>
<tr>
<td>07:30 PM</td>
<td>10:30 PM</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.
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 Room Roster and the Course and Time Roster, both of which are published through the Office of the University Registrar each semester. Examinations not listed in the registrar’s examination schedule will be arranged by the professor in charge and must fall within the announced examination period, except by permission of the dean of the faculty in accordance with existing faculty legislation.

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 university registrar’s office without prior written permission of the dean of the faculty.

2. No permission will be given, for any reason, to schedule final examinations during the last week of classes or the designated study period preceding final examinations.

3. Permission will be given by the dean of the faculty to reschedule examinations during the examination period itself if requested in writing by the faculty member, but only on condition that a comparable examination also be given for those students who wish to take it at the time the examination was originally scheduled. The faculty member requesting such a change shall be responsible for making appropriate arrangements for rooms or other facilities in which to give the examination. This should be done through the university registrar’s office.

4. No tests are allowed during the last week of scheduled classes unless such tests are part of the regular week-by-week course program and are followed by an examination (or the equivalent) in the final examination period.

5. Papers may be required of students during the study period if announced sufficiently far in advance that the student did not have to spend a significant segment of the study period completing them.

6. Faculty can require students to submit papers during the week preceding the study period.

7. Take-home examinations should be given to classes well before the end of the regular term and should not be required to be submitted during study period but rather well into the examination period. 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 twenty-four hour time period and especially on any one day. It is urged that members of the faculty consider student requests for a make-up examination, particularly if their course is the largest of the three involved and thus 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 of the examination.) Exams, papers, etc., as well as grading records, should be retained for a reasonable time after the end of the semester, preferably till the end of the following term, to afford students such right of review.

EVENING PRELIMINARY EXAMINATIONS

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

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

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

Grading Guidelines

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>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>3.5</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>1.7</td>
</tr>
<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>

This is how a term average is computed:

<table>
<thead>
<tr>
<th>Course</th>
<th>Grade</th>
<th>Points</th>
<th>Quality</th>
<th>Credits</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 103</td>
<td>B+</td>
<td>3.3</td>
<td>3</td>
<td>4</td>
<td>9.9</td>
</tr>
<tr>
<td>English 151</td>
<td>C-</td>
<td>1.7</td>
<td>3</td>
<td>4</td>
<td>5.1</td>
</tr>
<tr>
<td>DEA 145</td>
<td>B</td>
<td>3.0</td>
<td>4</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>CEE 100</td>
<td>B</td>
<td>3.0</td>
<td>3</td>
<td>6</td>
<td>9.0</td>
</tr>
<tr>
<td>DEA 111</td>
<td>C</td>
<td>2.0</td>
<td>3</td>
<td>3</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Total: 16 42.0

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 such as uniform within the university: “S” means C- or above; “U” means D-, D-, or failure.

B. S-U options be chosen by the student during the first three weeks of the term.

C. The Announcements and/or supplementary course registration materials describing each course include a description of the course grading options, particularly if the course is graded with an exclusive S-U. Any change in grading options must be announced by the instructor within the first two weeks of the term.

D. Course requirements (required reading, term paper, etc.) be the same for students electing S-U grades as for those electing letter grades.

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

Agriculture and Life Sciences (A) Must have 100 credit hours with A, B, C, D grades.

(b) The S-U option is available only in those courses so designated in the course catalog after approval by the Educational Policy Committee. (c) Freshmen may not exercise the S-U option.

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 course is so graded. The instructor must announce this decision within the first two weeks of class. (c) Where the option for S or U exists, both student and instructor must agree on the option. This agreement must be made by the end of the third week of classes on the appropriate form in the college office. Once agreed upon, this grade option will be used for the final grade.

Arts and Sciences. (a) Courses that count toward satisfaction of major requirements should not be taken for an S or U grade unless the department grants permission.
A grade of incomplete may not be given merely because a student fails to complete all course requirements on time. It is not an option that may be elected at the student's own discretion.

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

It is the responsibility of the student to see that all grades of incomplete are made up 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 student. Transcripts can be obtained through the Office of the University Registrar, 222 Day Hall. There is a $2.00 fee per transcript.

**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 twenty 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 student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing his or her chosen program of studies. Students should know how far they have progressed in meeting those requirements at every stage of their academic career.

**Student Records Policy**

Under the Family Educational Rights and Privacy Act of 1974 (FERPA), Cornell University is required to advise students of 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 office of the university registrar in writing within 10 days of the date of official university registration each academic year. Students may rescind their no release request at any time in writing to the office of the university registrar.


### POLICY ON POSTING OF STUDENT INFORMATION

In compliance with the university’s policy on student educational records, and the U.S. Department of Education’s Family Educational Rights and Privacy Act of 1974 (FERPA), restricted student information may not be posted.

Accordingly, the following student information is considered restricted and therefore may not be posted:

- Student social security number
- Student identification number
- Courses elected
- Grades earned
- Grade point average
- Class rank
- Date of birth
- Place of birth
- Home telephone listing
- Academic and disciplinary actions
- Student or administrative committees

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

Financial arrangements between the student and the university

Any other education record containing personally identifiable information


### 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 of all university projects that use humans as research subjects.

Projects affected by this restriction include, but are not limited to, surveys, questionnaires, studies of existing data, documents, records in which there are no identifiers, as well as mental and physical tests of human subjects.

Requests for student information must be submitted in writing to the Assistant Vice President for Academic Programs and Campus Affairs, 311 Day Hall. All proposals involving human subjects in any category must be submitted to the committee for review.

Requests for student information must be submitted in writing to the Assistant Vice President for Academic Programs and Campus Affairs, 311 Day Hall. All proposals involving human subjects in any category must be submitted to the committee for review. Inquiries, communications, and requests for guidelines should be directed to the committee’s Executive Secretary, 120 Day Hall (255-5013). The guidelines are also available at the World Wide Web address www.osp.cornell.edu

### USE OF ANIMALS FOR COURSES

**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 the Announcement “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 in 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 in 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 Director of the Cornell Center for Research Animal Resources (253-3520).

### Interdisciplinary Centers, Programs, and Studies

**ANDREW D. WHITE PROFESSORS-AT-LARGE**

726 University Avenue (255-0832).

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

**Term Ending in 1998**

Diaconis, Persi, mathematical statistician

Levertov, Denise, poet and critical writer

**Term Ending in 1999**

Mitchell, Juliet, psychoanalyst and feminist theorist

Mosse, George, historian
Analysis (and Differential Equations)
Math 427 Introduction to Ordinary Differential Equations
Math 428 Introduction to Partial Differential Equations
Math 617 Dynamical Systems
Math 618 Smooth Ergodic Theory
Math 619-620 Partial Differential Equations
Math 625 Differentiable Manifolds
Math 711-712 Seminar in Analysis
Math 713 Functional Analysis
Math 715 Fourier Analysis
Math 722 Riemann Surfaces
Math 727-728 Seminar in Partial Differential Equations

Logic and Theory of Computing
CS 615 Theory of Concurrent Systems
CS 671 Introduction to Automated Reasoning
CS 682 Theory of Computing
CS 715 Seminar in Programming Refinement

Discrete and Numerical Mathematics
CS 422-522 Parallel Scientific Computing
CS 621 Matrix Computations
CS 622 Numerical Optimization and Nonlinear Algebraic Equations
CS 624 Numerical Methods for Differential Equations
CS 681 Analysis of Algorithms
CS 721-722 Advanced Topics in Numerical Analysis
CS 729 Seminar in Numerical Analysis
Math 425 Numerical Solution of Differential Equations (not offered 1997–98)
Math 727-728 Seminar in Partial Differential Equations

OR&IE 625 Scheduling Theory
OR&IE 630-631 Mathematical Programming I and II
OR&IE 632 Nonlinear Programming
OR&IE 635 Graph Theory and Network Flows
OR&IE 636 Combinatorial Optimization
OR&IE 635 Interior-Point Methods for Mathematical Programming
OR&IE 646 Integer Programming
OR&IE 639 Polyhedral Convexity

Information Communication and Control Theory
EE 411 Random Signals in Communications and Signal Processing
EE 425 Digital Signal Processing
EE 468 Communication Theory
EE 472 Digital Control
EE 495 Group Theory with Applications
EE 521 Theory of Linear Systems
EE 522 Theory of Nonlinear Systems
EE 525 Adaptive Filtering in Communication Systems
EE 526 Advanced Signal Processing
EE 528 Multisensor Digital Signal Processing
EE 561 Error Control Codes
EE 562 Fundamental Information Theory
EE 563 Communication Networks
EE 564 Decision Making and Estimation
EE 565 Queueing Networks
EE 567 Digital Communication
EE 573 Optimal Control and Estimation for Continuous Systems

EE 574 Estimation and Control in Discrete Linear Systems
EE 577 Artificial Neural Networks

Mathematical Biology
Bio 662 Mathematical Ecology
Stat & Biom 451 Mathematical Modeling of Populations
Stat & Biom 651 Mathematical Population Studies and Modeling
Stat & Biom 676 Special Topics in Theoretical and Computational Biology

Mathematical Economics
Econ 519 Econometrics I
Econ 520 Econometrics II
Econ 610 Stochastic Economics: Concepts and Techniques
Econ 617-618 Mathematical Economics
Econ 619-620 Advanced Topics in Econometrics

Mechanics and Dynamics
Chem E 731 Advanced Fluid Mechanics and Heat Transfer
Chem E 732 Mass Transfer
Chem E 751 Mathematical Methods of Chemical Engineering Analysis
Chem E 753 Applied Analysis of Nonlinear Systems: Stability and Bifurcation
EE 681 (also A&EP 761) Kinetic Theory
M&AE 601 Foundations of Fluid Dynamics and Aerodynamics
M&AE 602 Fluid Dynamics at High Reynolds Numbers
M&AE 732 Applications of Turbulent Flow
M&AE 733 Stability of Fluid Flow
M&AE 734 Turbulence and Turbulent Flow
M&AE 736 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 579 Vibrations and Waves in Elastic Systems
T&AM 671 Advanced Dynamics
T&AM 672 Celestial Mechanics (also Astro 579)
T&AM 673 Mechanics of the Solar System (also Astro 571)
T&AM 675 Nonlinear Vibrations
T&AM 751 Continuum Mechanics and Thermodynamics
T&AM 752 Nonlinear Elasticity
T&AM 776 Applied Dynamical Systems

Probability and Statistics
EE 562 Fundamental Information Theory
EE 563 Communication Networks
EE 564 Decision Making and Estimation
EE 566 Queueing Networks
EE 664 Foundations of Inference and Decision Making
Math 671-672 Probability Theory
Math 674-675 Introduction to Mathematical Statistics
Math 777-778 Stochastic Processes
OR&IE 561 Queueing Theory and Its Applications
OR&IE 565 Applied Time-Series Analysis
OR&IE 650 Applied Stochastic Processes
OR&IE 651 Applied Probability
OR&IE 662 Advanced Stochastic Processes
OR&IE 663 Time-Series Analysis
OR&IE 665 Advanced Queueing Theory
OR&IE 670 Statistical Principles
OR&IE 671 Intermediate Applied Statistics
OR&IE 674 Design of Experiments
OR&IE 675 Statistical Analysis of Discrete Data
OR&IE 676 Statistical Analysis of Life Data
The Cornell Center for the Environment (CfE), with the goals of enhancing the quality of life, the conservation of natural resources for a sustainable future. The Center serves as a hub for interdisciplinary environmental research; and coordinates outreach programs to enhance the quality of life, encouraging economic vitality, and promoting the conservation of natural resources for a sustainable future. The Center serves as a clearinghouse for environmental information; initiates environmental courses and curricula at both the graduate and undergraduate levels; facilitates interdisciplinary environmental research; and coordinates outreach programs that assist state, federal, and local government, private organizations, businesses, and individuals in assessing and solving environmental problems.

**Programs of Study**

Various departments, centers, and institutes across the campus are involved in teaching and research of potential interest to students wishing to pursue environmental studies. A brochure listing undergraduate environmental course offerings is available from the Center (telephone: 255-7535, www.http://www.cfe.cornell.edu/coursebook/, or email: cufe@cornell.edu). Students with this interest most often study in one of the following areas:

- Agricultural and Biological Engineering
- Agricultural, Resource, and Managerial Economics
- Architecture
- Biology and Society
- City and Regional Planning
- Civil and Environmental Engineering
- Design and Environmental Analysis
- Development Sociology
- Ecology and Evolutionary Biology
- Environmental Toxicology
- Natural Resources
- Plant Pathology
- Regional Science
- Rural Sociology
- Science and Technology Studies
- Soil, Crop, and Atmospheric Sciences

Program options for focusing on environmental issues are offered in a number of departments: (1) ecosystems science through the Section of Ecology and Systematics; and the Department of Natural Resources; (2) remote sensing through the Departments of Civil and Environmental Engineering; and Soil, Crop, and Atmospheric Sciences; (3) water resources primarily through the Department of Agricultural and Biological Engineering; (4) waste management through the Departments of Environmental Engineering; Agricultural and Biological Engineering; and Agricultural, Resource and Managerial Economics; (5) environmental policy through Toxicology, Natural Resources, and City and Regional Planning; (6) and biological resources through the Division of Biological Sciences.

The graduate field of environmental toxicology offers a multidisciplinary science program leading to a Ph.D. or M.S. degree. The three major areas of concentration in the program are: cellular and molecular toxicology; food and nutritional toxicology; and ecotoxicology and environmental chemistry. The graduate program prepares students for professional opportunities in academia, industry and private research institutes and governmental agencies. Page 29 lists the courses and describes the program in more detail.

In response to a demand for individuals who can bridge the gap between the technical, social, and managerial aspects of environmental problems, a new multidisciplinary Master of Professional Studies (Age.) degree program in environmental management will begin in September, 1997. In this curriculum, students will undertake preparation in the fields of Natural Resources; Agricultural Economics; Soil, Crop, and Atmospheric Sciences; Agricultural and Biological Engineering; and Development Sociology will be eligible to undertake a concentration in environmental management. Students in this program will be expected to take courses that will enhance or build upon their education and in addition will enroll in a common core of courses in science and technology of environmental management; environmental systems and social systems; environmental and resource economics, environmental regulation; and an intensive field project. These core courses are intended to provide students with the knowledge, skills, and insights that will enable them to function effectively as managers at various levels in the private, public, and voluntary sectors.

An undergraduate program in the Science of Earth Systems, available to students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Engineering, highlights the study of the Earth as one of the outstanding intellectual challenges in modern science and as the necessary foundation for the future management of our home planet. The curriculum coalesces Cornell's strengths across a broad range of earth and environmental sciences to prepare students with a rigorous scientific foundation for the study of the Earth system. The program is described in more detail on page 21.

Student employment opportunities are available through programs in the Center for the Environment. The core programs include the Water Resources Institute; the Institute for Comparative and Environmental Toxicology; the Cornell Waste Management Institute; and the Institute for Resource Information Systems. Other programs of the Center include the Cornell Institute for Research in Chemical Ecology, the Watershed Science and Management Initiative; the Cornell Program in Environmental Sciences for Educators and Youth; the Cornell Program on Breast Cancer and Environmental Risk Factors in New York State; the Work and Environment Initiative; the Cornell Local Government Program; the Ocean Resources and Ecosystems Program; and the Cornell Program on Environmental Conflict Management.

Students interested in the environment will also find many organizations, resources, and activities beyond the classroom setting at Cornell. The CfE sponsors guest lecturers and co-hosts conferences with a variety of departments across the campus. Providing a forum for the diversity of environmental interests and perspectives, the student-produced publication, CfE's The Cornell Forum for Environmental Issues, seeks to promote the sharing of environmental information within and around the Cornell community. Other environmental organizations on campus include, but are not limited to, the Compost Club, Cornell Greens, Cornell Laboratory of Ornithology, Earthrise Committee (Ecology House), and Eco-Justice.

For additional information on programs and publications contact:

- The Center for the Environment
  Cornell University
  Rice Hall
  Ithaca, NY 14853
  Telephone: 607-255-7535
  Fax: 607-255-0238
  Email: cufe@cornell.edu
  WWW: http://www.cfe.cornell.edu
  Listserv: ENVIRONMENT-L@cornell.edu

**THE MARIO EINAUDI CENTER FOR INTERNATIONAL STUDIES**

170 Uris Hall (255-6370)

The Mario Einaudi Center for International Studies was established in 1961 to encourage, coordinate, and support comparative and interdisciplinary research on international subjects and was named for its founder in 1991. It is one of the largest and most diverse centers in the United States. Currently it oversees six Title VI National Resource Centers (East Asia, Latin American Studies, Slavic and East European Studies Program, South Asia, Southeast Asia, and Western Societies), as well as sixteen topical programs and the university study-abroad program. More than 500 faculty members voluntarily collaborate in the center's programs and well over 300 graduate students are involved directly in its international programs. Undergraduate concentrations in International Relations and Modern European Societies serve 285 students.

Cornell is committed to the application and expansion of its resources to study the global community in all its complexity. These resources include a faculty of preeminent scholars and teachers, excellent research facilities, ability to teach forty-five languages, and a library system with more than 2,500,000
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: Psychology, Linguistics, and Philosophy, as well as Modern Languages and Mathematics (College of Arts & Sciences), Computer Science (College of Arts & Sciences and College of Engineering), Human Development & Family Studies (College of Human Ecology), Neurobiology & Behavior (Division of Biological Sciences), Education (College of Agriculture and Life Sciences), and 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 Concentration” in the College of Arts and Sciences section. Contact Sue Wurster (255-6431 or cogst@cornell.edu).

Graduate Programs

At the graduate level 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, or Psychology on common committees. For further information on the graduate Field of Cognitive Studies, contact Carol Rosen, director of graduate studies, 311 Morrill Hall, (255-0722; cgrl@cornell.edu).

Courses

Courses from across the university that are relevant to the Cognitive Studies program are listed in this catalog under Arts and Sciences in the section “Special Programs and Interdisciplinary Studies.”
CORNELL ABROAD
474 Uris Hall 607/255-6224, fax 607/255-8700, e-mail: CUAbread@cornell.edu
WWW home page: http://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 broad 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, at a cost that is generally no greater than for study on campus.

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. In all cases, 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 approximately 40 countries. The following list includes those programs chosen most frequently by students with college approval; those locations preceded by an asterisk (*) are programs run directly by Cornell.

AFRICA
Botswana, Cameroon, Kenya, Tanzania: School for International Training;
Ghana: University of Ghana (through the Council of International Educational Exchange, CIEE);
Kenya: Wildlife Management (School for Field Studies); Kenya Semester Program (St. Lawrence University);

ASIA
China: Peking and Nanjing Universities (CIEE);
Hong Kong: Chinese University of Hong Kong;
Indonesia: Institut Keguruan Dar Ilmu Pendidikan (IKIP) in Malang (CIEE);
Japan: *Kyoto Center for Japanese Studies through a Stanford University-led consortium, and various other university programs;
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
Australia National University, Canberra; University of Sydney; University of Melbourne; University of New South Wales, Sydney; University of New

England, Armidale; University of Queensland, Brisbane; University of Wollongong; University of Western Australia, Perth; School for International Training; Sydney Internship (Boston University);

EUROPE
Denmark: *Denmark's International Study Program (DIS);
France: *EDUCO (Cornell and Duke in Paris) at Universite de Paris VII, Paris I, Institut d’Etudes Politiques de Paris (Sciences Po); Critical Studies Program at the University of Paris (CIEE);
Germany: various university-based study abroad programs including the Berlin Consortium for German Studies at the Free University of Berlin; Wayne State University in Munich and Freiburg;
Greece: College Year in Athens;
Ireland: University of Limerick; Trinity College and University College, Dublin;
Italy: Cornell College of Art, Architecture and Planning Program in Rome; Intercollegiate Center for Classical Studies in Rome; programs in Florence and other cities;
Russia: St. Petersburg University (CIEE); Moscow International University (American Council of Teachers of Russian);
Spain: *Cornell-Michigan-Penn program at the University of Seville;
Sweden: *Swedish Child Care and Family Policy Internship at the University of Goteborg, Agricultural College of Sweden, Uppsala; The Swedish Program at the University of Stockholm;
United Kingdom: *Direct enrollment at: University of Bath; University of Birmingham; University of Bristol; Cambridge University; University of East Anglia; University of Edinburgh; University of Glasgow; University of Lancaster; University of Manchester; University of Nottingham; Oxford University; University of Reading; University of St. Andrews, University of Sussex; University of Warwick; University of York; University of London: King's College, University College, Imperial College of Science and Technology, and the London School of Economics and Political Science; School of Oriental and African Studies, School of Slavonic and East European Studies.
Students studying at these 22 British universities enjoy admissions, advising, and counseling services, as well as an array of cultural activities, provided by the Cornell-Brown-Penn London Centre.

LATIN AMERICA, CENTRAL AMERICA, AND THE CARIBBEAN
Costa Rica: School for Field Study; Universidad National (Heredia);
Ecuador and Jamaica: Partnership for Service Learning;
Honduras: Escuela Agricola Panamericana (Zamorano);
Mexico: Instituto Tecnologico y de Estudios Superiores de Monterrey; Universidad de las Americas-Puebla (UDLA); Universidad Iberoamericana;

MIDDLE EAST
Egypt: American University in Cairo;
Israel: Ben-Gurion University; Haifa University; Hebrew University of Jerusalem; Tel Aviv University;
Morocco: School for International Training

Other Locations
Cornell students are not limited to the locations listed above. In recent years, they have also studied in Argentina, Austria, Brazil, Colombia, Czech Republic, Dominican Republic, India, New Zealand, the Philippines, Poland, Puerto Rico, Switzerland, Turkey, Venezuela, and elsewhere.

Who Studies Abroad
Students from all seven undergraduate colleges and from all major fields study abroad; they are generally 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 20 hours of undergraduate credit on the Ithaca campus, students who transfer to Cornell as juniors are usually unable to count student abroad credit toward their Cornell degree.

When Students Study Abroad and for How Long
Students may study abroad their sophomore, junior, or senior year. Junior year is the traditional choice, but second semester sophomore year or first semester senior year is increasingly popular. To ensure preparation, it is important to begin planning for study abroad in the freshman year. Although semester-long programs are usually available, academic year programs are highly recommended, especially for students enrolling in non-English speaking universities.

Application Process
Applications for all study abroad programs—Cornell programs, as well as those administered externally by other institutions—are available in the Cornell Abroad Office, 474 Uris Hall, where students are encouraged to consult the library of study abroad materials, ask questions of the staff, and meet with the associate director to gather information. The Cornell Abroad website is a good place to browse through program offerings and links to universities worldwide. Students meet with the study abroad advisers in their colleges to choose programs that fit the needs of their degree programs. Each applicant completes a one-page written statement of academic purpose outlining goals for study abroad and the program of study that will be followed. Applications are signed by both college study abroad and faculty advisers, 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
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. Students are eligible for financial aid and receive full academic credit for pre-approved courses of study completed with satisfactory grades. Students can enroll for a full load of courses abroad, according to the standards of their home institution, and normally receive 30 credits per semester, or 12 to 20 credits per semester. The colleges review coursework 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 outside universities 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 such non-university enrollment programs in a non-English-speaking country with English-language coursework are required to take at least one language course per semester as part of their program of study. 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 university halls of residence, 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 on Cornell programs in Copenhagen, Goteborg, Kyoto, Nepal, Paris, Seville, and the United Kingdom in 1997–98 pay a uniform study abroad tuition of $13,800 per semester, which covers, tuition, housing, orientation, some field trips and excursions. Meals and airfare may also be included in particular Cornell programs. Students studying abroad on all other programs in 1997–98 pay the tuition and other costs charged by their programs, and a Cornell international program tuition of $3,200 per semester or $6,000 for the full academic year. The international program tuition covers the direct and indirect costs of study abroad to the university, including financial aid for study abroad students.

Financial Aid
All students who are accepted for study abroad during the academic year or semester, having applied through Cornell Abroad, are eligible for financial aid, consistent with general university policy; this applies to all programs, whether run directly by Cornell or not.

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 stay in regular contact with representatives abroad and receive information regarding rapidly changing political situations through the U.S. Department of State Office of Citizens Emergency Services and other agencies. As long as the State Department does not restrict travel by U.S. citizens, Cornell Abroad does not 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.

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 Cornell and universities other than Cornell; they are advised to inquire about those institutions' policies regarding the completion of academic work and the 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 will also consider the completion of academic programs even under unusual circumstances and have tuition refund policies that contain a prorated formula.

Sources of Information and Advice Concerning Study Abroad
Cornell Abroad (474 Uris Hall); Beatrice B. Szekely Ph.D., associate director; Elizabeth R. Ohkido, student services; Kathy Lynch, accounts coordinator. The Cornell Abroad library contains an extensive collection of university catalogs, study abroad program brochures, course syllabi and evaluations, books, videotapes, and some information on travel, summer study, and study abroad. In the event of an emergency, students, staff, and faculty can contact programs in a series of information meetings that is announced in the Cornell Daily Sun. Please consult the Cornell Abroad World Wide Web home page at http://www.cuinabroad.cornell.edu/abroad.
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 and during the summer. All are fully furnished (except for dishes, cookware, towels and bedding) and reasonably priced by both Washington and Cornell standards. Two students are assigned to each efficiency and three to each one-bedroom apartment. Because of the limited number of spaces and the need for accurate planning, a non-refundable deposit of $150 is required to reserve a space. Students are discouraged from bringing automobiles. The public transportation system, consisting of both bus and subway service, is extensive and convenient to the Center and street parking is not available.

Applications
Application forms are available from the Cornell-in-Washington office at 471 Hollister Hall. Applications should be submitted the semester prior to participation.

Information
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 on externships, courses, housing and other features of the program may be obtained at either the Cornell-in-Washington office at 471 Hollister Hall (607) 255-4090, or in Washington at the Cornell Center, 2148 O Street, NW, Washington, DC 20037, (202) 466-2184.

**CORNELL INSTITUTE FOR PUBLIC AFFAIRS**

473 Hollister Hall (255-8018)

The Cornell Institute for Public Affairs (CIPA) is a university-wide two-year graduate professional program leading to a Master of Public Administration degree. Its mission is to develop professionals who can be effective, ethical, and creative leaders in government and in the private sector's interface with government.

CIPA emphasizes the interactions between public and private interests for the benefit of all sectors of society. We use Cornell's cutting-edge strengths as a major research university to understand rapidly evolving public interests, technological opportunities, ecological constraints, individual aspirations, and political possibilities. Examples of Cornell's extraordinary breadth of policy-related specialties include science and technology; health, education, and social services administration; agricultural policy; nutrition; international development; environmental studies; peace studies; labor relations; city and regional planning; and ethics in public life. These areas of expertise provide a diverse base for the CIPA Fellows (our students) to pursue the study of public affairs. Thus, CIPA Fellows take courses and work with faculty from all of Cornell's colleges as well as the Cornell Law School, with whom a joint M.P.A./J.D. degree is offered, and the Johnson Graduate School of Management. The CIPA program has been developed to offer both a sound foundation in the principles, tools, and techniques for a career and leadership in public affairs and the flexibility to accommodate and encourage the special policy-related interests of its students.

The curriculum is structured into three parts: four required core courses taken by all CIPA Fellows; area requirements focused on developing the wide variety of skills necessary for the public policy professional; and sectoral specialties, focused on the particular interest of the Fellow and leading to a thesis.

The Core Courses
These courses have been developed specially for CIPA Fellows to provide a common, hands-on experience in employing the latest analytical techniques to guide the formulation of programs, their supporting institutions, and their effective administration. They will also provide strategies for implementing change in complex heterogeneous societies.

CIPA I: Quantitative Techniques for Policy Analysis and Program Management (CRP 720) This course is designed to give students the basic management tools essential for the contemporary career in public affairs. It includes hands-on practice with formal management techniques, including investment analysis and linear and dynamic programming.

CIPA II: Public Political Economy (ECON 639 or CEE 528) Techniques of economic analysis are used to understand the need for various public programs, to estimate the value of new programs and policies, to explore desirable institutional structures for service delivery, and to anticipate and evaluate outcomes.

CIPA III: Administration, Politics, and Public Affairs (GOVT 621) This course is focused on the processes and institutional context of public affairs and analyzes the political and administrative structure and dynamics of policy development and implementation.

CIPA IV: Social Policy (SOC 526) This course incorporates the study of analytic methods, expert statistics, and simulation models, to study the structure of public programs and to assess their consequences.

**The Area Requirements**
In addition to the four core courses, Fellows must also complete satisfactorily a series of foundation subject or area requirements that are essential to the training of public policy professionals. These areas are: methodology, politics and policy, economics, math and statistics, finance, regulation, ethics, and public law.

**The Sectoral Specialty**
At least three courses taken by individual Fellows will be in their sectoral specialty or "concentration." These are widely divergent and depend on the unique interests and background of the individual student.

**The CIPA Thesis**
Each Fellow must complete a thesis that applies the conceptual tools, theories, and analytical techniques to a problem in the Fellow's area of sectoral expertise. As the culmination of each M.P.A. course of study, this thesis must be both critical and creative, reflecting the Fellow's ability to identify, analyze, and generate supportable solutions to important public policy questions.

**Additional Requirements**
All M.P.A. candidates must spend four semesters in residence to complete the degree.

**The Faculty**
In addition to our four core faculty members (Richard E. Schuler, director, economics and civil and environmental engineering; Steven Caldwell, sociology; Arch Dotson, government; and David Lewis, city and regional planning) who offer the four core courses and advise the Fellows in the development of their programs of study, more than one hundred faculty members from nearly all colleges at Cornell participate in the graduate field of public affairs and policy, and they are available to supervise the theses of individual Fellows whose policy interests coincide with faculty expertise.

**Special Programs**
A combined four-year MPA/JD degree program is available. For selected Cornell undergraduates who are accepted by the end of their junior year, a combined five-year bachelors/MPA program can be arranged.

**Application**
Applicants are required to submit GRE general test scores. CIPA has a policy of rolling admissions. Students requesting aid; however, must submit applications by March 1 for consideration. For an application or more information, contact Cornell Institute for Public Affairs, 473 Hollister Hall (phone: 607-255-8018; fax: 607-255-5240; e-mail: cipa@cornell.edu; web site: www.cipa.cornell.edu/cipa/).

**Financial Support**
As a professional program, the financial aid resources of CIPA are extremely limited. Students of unusual merit and documented need will be considered for support, but CIPA is unable to provide any one student full support. Therefore, applicants are encouraged to explore and exploit all available sources of external funding.

For an application or more information, contact Cornell Institute for Public Affairs, 473 Hollister Hall (phone: 607-255-8018; fax: 607-255-5240; e-mail: cipa@cornell.edu).

**CORNELL PLANTATIONS**

One Plantations Road (255-3020)
e-mail: cu_plantations@cornell.edu

A place of exceptional diversity and opportunities, Cornell Plantations comprises the university's botanical garden, arboretum, and natural areas. Its nearly 3,000 acres include the woodlands and gorges bordering campus, as well as specialized gardens and the 100+ acre arboretum that features a field flower meadow and trees and shrubs native to New York State. Cornell Plantations provides unique outdoor laboratories and plant collections for Cornell's academic programs and research in disciplines that include agronomy, biology, ecology and systematics, entomology, floriculture and ornamental horticulture, fruit and vegetable science, geology, landscape architecture, natural resources, plant breeding, and plant pathology. While much of Cornell Plantations'
resources are on or near campus, several thousand acres in and around Tompkins County. EPL aims to enrich existing departments with dilemmas and responsibilities for the public world, ways of thinking that are realistic and urgent problems of the real world. In politics and the law, we confront 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 ethics and the environment, we wrestle with questions about campaigning, character, and compromise. And in international affairs, we encounter the complexities of war and peace, human rights, 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 anything of their ethical character.

EPL does not intend to create either an undergraduate major or a graduate field in Ethics & Public Life. On the contrary, we seek to enhance and facilitate the discussion of ethical issues by students whose central educational interests lie elsewhere, 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 serious 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 246 Ethics and the World Environment
- PHIL 247 Ethics and Public Life
- PHIL 294/GOVT 294 Global Thinking
- PHIL 342 Law, Society, and Morality
- PHIL 343 Political Obligation and Civil Disobedience
- GOVT 469/Law 469 Limiting War: The Morality of State Violence
- GOVT 412 Voting and Political Participation
- GOVT 466/PHIL 468 Law and Gender Discrimination
- GOVT 468/PHIL 368 Global Climate and Global Justice
- GOVT 491/492 Normative Elements of International Relations

**Related Courses**

- B&SOC 206/S&T/S 206 Ethics and the Environment
- CEH 356 Economics of Welfare Policy
- CRP 549 Ethics and Practical Judgment in Planning Practice
- ENGR 341/AGN 350 Engineering Ethics
- GOVT 474/PHIL 446 Topics in Social and Political Philosophy
- HSS 658 Ethics, Public Policy, and American Society
- IILRR 306 Women at Work
- ILRBC 401 My Brother’s Keeper
- ILRBC 482 Ethics at Work
- ILRBC 488 Liberty and Justice For All
- ILRBC 604 Theories of Equality and Their Application in the Workplace
- LAW 655 International Human Rights
- LAW 667 Law and Ethics of Lawyering
- LAW 718 Ethnics Conflict and International Law
- NBER 578 Business Ethics
- NTR 407 Religion, Ethics, and the Environment
- NTR 411 Seminar in Environmental Ethics
- PHIL 145 Contemporary Moral Issues
- PHIL 241 Ethics
- PHIL 245 Ethics and Health Care
- PHIL 246 Ethics and the Environment
- PHIL 341 Ethical Theory
- PHIL 344 History of Ethics: Ancient and Medieval
- PHIL 345 History of Ethics: Modern
- PHIL 346 Modern Political Philosophy

**Program in Real Estate**

219 West Sibley Hall (255–1748)

The two-year Master of Professional Studies (MPS) degree in Real Estate is an interdisciplinary degree 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 is housed at the School of Hotel Administration, which serves as the integrating organizational unit for financial management and administration of academic 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 and administration of the real estate curriculum.

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

Core courses in financial management, economics, real estate finance and investment, market analysis, project development, housing economics, regulation, and environmental issues will be required during the first year of study. During the second year, students take additional core courses and elective courses in their areas of concentration. Many concentration options are possible, which are structured from the hundreds of related courses taught at Cornell University (e.g., an international real estate concentration).

**Admissions**

Admissions procedures for the MPS (Real Estate) program are supervised by the Graduate School and Real Estate Field. Applicants to the program must complete a bachelor’s degree with a good academic record. They must achieve the Graduate Management Admission Test (GMAT) or Graduate Record Examination (GRE) scores that are at the level required in other Cornell graduate professional degree programs; and at least two letters of recommendation from undergraduate college faculty members (and if appropriate, from employers) familiar with the student’s academic and professional work must be submitted. There is no experience requirement for admission. Foreign students, for whom English is a second language, will need to achieve acceptable TOEFL scores.

For more information, contact Professor Robert Abrams, director of the Program in Real Estate (607–255–1748) or Professor Matthew Drennan, director of graduate studies (607–257–7276) or e-mail real_estate@cornell.edu.

**Science of Earth Systems: An Inter-College Program**

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

A new major, Science of Earth Systems (SES), is now available for students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Engineering. The SES program...
of study 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. Within 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.

Students can enter the major in the College of Agriculture and Life Sciences and in the College of Arts and Sciences. In the College of Engineering, the SES program is one of two options in the Geological Sciences major.

The SES Curriculum

The SES curriculum emphasizes strong preparation in mathematics, physics, chemistry, and biology during the freshman and sophomore years. In addition, students take a two-credit SES Colloquium, which is designed to introduce students about the field and to provide a sense of community for SES students and faculty from the several colleges. 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 math and science sequences.

The SES program provides strong preparation for graduate school in any one of the Earth systems sciences and related engineering fields. The major can also serve as excellent preparation for an advanced degree in environmental law or policy, a teaching degree, or for employment in one of many environmentally oriented careers with the B.S. degree.

The requirements for the major are summarized as follows:

1. MATH 191, 192 (or MATH 111, 112)
2. Two calculus-based physics courses:
   (e.g., PHYS 207–208);
3. Two introductory chemistry courses:
   (e.g., CHEM 207–208);
4. Two biology courses: (e.g., BIO G 101/103-102/104 or BIO G 109–110);
5. Two additional courses in higher mathematics and/or basic sciences;
6. Colloquium in the Science of Earth Systems (SYS 101 or 102);
7. Four core courses in the Science of Earth Systems (SYS 301, 302, 321, and 402);
8. Two additional courses in basic math or sciences (for B.A.);
9. Four intermediate to advanced-level courses approved by the SES Curriculum Committee. These courses should build on the core sequence and include upper-level courses with prerequisites in the basic sciences and mathematics. The selection of these courses can be used to prepare for careers or graduate study in specific environmental science disciplines such as geology, hydrological sciences, biogeochemistry, ecology, oceanography, and atmospheric sciences. Effective combinations of these disciplines are also possible.

SES Course Descriptions

Note: Class meeting times are accurate at the time of publication. If changes are necessary, new information will be provided as soon as possible.

**SES 101-102 Science of Earth Systems Colloquium (enroll in ABEN 120–121, GEOL 122–124, or SCAS 101–102)**
101, fall; 102, spring. 2 credits each term. S-U grade only. 101 is prerequisite for 102. One lecture, one recitation. T 1:25. Staff.

Weekly seminars, field trips, and hands-on learning experiences in current topics in the study of the earth system. Introduces the student to scientific issues relating to understanding our planet and managing the environment. (http://www.scas.cit.cornell.edu/ses/)

**SES 301 Climate Dynamics (enroll in ASTRO 331 or SCAS 331)**
Fall. 4 credits. Prerequisite: Math 112 or 192 or equivalent. Lecs, M W F 1:25; rec, W 2:50. K. Cook, P. Gierasch.
The purpose of this course is to develop a physical understanding of the climate system. Processes that determine climate and contribute to its change are discussed, including comparisons with the climates of other planets. Applications to problems of climate change and variability include the astronomical theory of ice ages, greenhouse warming, the ozone hole, African drought, and Amazonian deforestation.

**SES 302 Evolution of the Earth System (enroll in GEOL 302 or SCAS 332)**
Spring. 4 credits. Prerequisites: Math 112 or 192 and Chem 207 or equivalent, or instructor’s approval. Lecs, M W F 11:15; recitation TBA. W. White, B. Isacks, W. Allmon, K. Cook.
The co-evolution of life and the earth system over three time scales: origin of the earth and life and earth’s early history; plate tectonics, continental drift and climate changes during the past billion years; and mountain building, ice ages, and our own emergence during the past ten million years. Introduction to methods of interpreting the paleontological, geochemical, and tectonic information preserved in the rock record. (http://www.geo.cornell.edu/geology/classes/ses302.html)

**SES 321 Biogeochemistry (enroll in GEOL 321 or NTRSES 321)**
Fall. 4 credits. Prerequisites: college-level biology and chemistry. Lecs T R 12:20–2:15. L. Derry and J. Yavitt.
The cycling of elements at the earth’s surface through biologically governed processes and fluxes. Topics include weathering and acid-base chemistry, nutrient limitation and recycling in terrestrial and marine systems, anthropogenic pollution, isostopic tracers, and mathematical modeling of element fluxes.

**SES 402 Mechanics in the Earth and Environmental Sciences (enroll in ABEN 385)**
Spring. 2 credits. Prerequisites: 2 semesters of calculus. Lecs, M W F 10:10-11:00; rec, F TBA. P. Baveye, J.-Y. Parlange, W. Brutsaert.
The study of the earth and the environment requires an understanding of the physical processes within and at the surface of the earth. This course encourages the students to develop a broad working knowledge of mechanics and its application to the earth and environmental sciences, providing the background necessary to study the professional literature.

**Advising**

Students will be matched with an SES adviser according to the student’s interests and the college in which the student is enrolled. The adviser will assist the student in selecting the four upper-level courses required by the SES Program. Several example curricula have been designed as guides for students in each of the colleges, to demonstrate how the college and SES Program requirements are met.

**Entering the SES Program**

Transfers into the program during the freshman and sophomore years will be relatively straightforward for students who have already begun a calculus sequence and have taken courses in the basic sciences. Other interested students, either junior- or senior-level science and math students or those from other fields, should contact an SES adviser to explore the possibility of entering the SES program.

For more information on the SES program and classes, see the Web page (http://www.geo.cornell.edu/SES/SES_home.html) and contact:

- College of Agriculture and Life Sciences: K. H. Cook (Soil, Crop, and Atmospheric Sciences), R. W. Howarth (Ecology and Systemsatics), J. Parlange (Agricultural and Biological Engineering);
- College of Arts and Sciences: T. Dawson (Biological Sciences), P. Gierasch (Astronomy), B. L. Isacks (Geological Sciences);
- College of Engineering: W. Brutsaert (Civil and Environmental Engineering), B. L. Isacks (Geological Sciences), M. Kelley (Electrical Engineering), J. Parlange (Agricultural and Biological Engineering).

**DEPARTMENT OF STATISTICAL SCIENCE**

610 Rhodes Hall (255–8066)
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 course work. Students in the Field of Statistics plan their graduate program in consultation with their Special Committee. For detailed information on opportunities for graduate study, students should contact the director of graduate studies, 610 Rhodes Hall. The department also offers an undergraduate program through the Biometrics Unit in the College of Agriculture and Life Sciences. Undergraduate majors and certificate programs are currently under development for other colleges. For information, contact the undergraduate coordinator, Professor Steven Schwager (424 Warren Hall, 255–1644). Statistics courses offered by the department listed below will fill distribution requirements in many of the colleges.
The concepts developed in BTRY 408 are applied to provide an introduction to the classical theory of parametric statistical inference. Topics include sampling distributions, parameter estimation, hypothesis testing, and linear regression. Students seeking applied courses in statistical methodology should consider BTRY 601-602 or BTRY 215.

**STBTRY 494 Undergraduate Special Topics in Biometry and Statistics (enroll in BTRY 494)**

Fall or spring. 1–3 credits. S-U grades only.

A course of lectures selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

**STBTRY 495 Statistical Consulting (enroll in BTRY 495)**

Spring. 2 credits. S-U grades only.

Limited to undergraduates. Prerequisites or co-requisites: BTRY 409 and 602 or permission of instructor.

Participation in the Biometrics Unit consulting service: faculty-supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered during previous weeks.

**STBTRY 400 Biometry Seminar (enroll in BTRY 400)**

Fall or spring. 1 credit. S-U grades only.

Prerequisite: BTRY 200 or by permission of the instructor.

Students will attend weekly seminar; the Biometrics Unit Discussion Series. Can be taken concurrently with BTRY 600 only with permission of instructor. Students can only take course twice.

**STBTRY 408 Theory of Probability (enroll in BTRY 408)**

Fall. 4 credits. Prerequisite: MATH 112, 122 or 192, or permission of instructor.

An introduction to probability theory, foundations, combinatorics, random variables and their probability distributions, expectations, generating functions and limit theory. Biological and statistical applications are the focus. Can serve as either a one-semester introduction to probability or a foundation for a course in the theory of statistics.

**STBTRY 409 Theory of Statistics (enroll in BTRY 409)**

Spring. 4 credits. Prerequisite: BTRY 408 or equivalent.

**STBTRY 602 Statistical Methods II (enroll in BTRY 602)**

Spring. 4 credits. Limited to graduate students; others by permission of instructor. Prerequisite: BTRY 601 or equivalent.

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.

**STBTRY 603 Statistical Methods III (enroll in BTRY 603)**

Fall or spring. 3 credits. Prerequisite: BTRY 601 and 602 or permission of instructor. Offered alternate years. Not offered 1997–98; next offered spring 1999.

Categorical data analysis, including logistic regression, loglinear models, stratified tables, matched pairs analysis, polytomous response and ordinal data. Applications in biomedical and social sciences.

**STBTRY 604 Statistical Methods IV: Applied Design (enroll in BTRY 604)**

Spring. 3 credits. Prerequisites: BTRY 601 and 602 or permission of instructor. Offered alternate years. Not offered 1998–99.

Applications of experimental design including such advanced designs as split plot, incomplete blocks, fractional factorials. Use of the computer for both design and analysis will be stressed, with emphasis on solutions of real data problems.

**STBTRY 607 Nonparametric and Distribution-Free Statistical Methods (enroll in BTRY 607)**

Spring. 1/3 of the term. 1 credit. S-U grades only. Prerequisite: BTRY 601 or equivalent. Offered alternate years. Not offered 1998–99.

Nonparametric and distribution-free alternatives to normal-theory testing procedures are presented; sign or rank tests for one or two populations; analyses for completely randomized and randomized blocks designs, comparisons among several means; correlation and regression; goodness-of-fit, and tests based on randomization of the data.

**STBTRY 639 Epidemiology Seminar (enroll in BTRY 639)**

Spring. 1 credit. Variable. S-U grades only. Permission of instructor. This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.

**STBTRY 662 Mathematical Ecology (enroll in BTRY 662)**

Fall. 3 credits. S-U grades only. Prerequisites: a year of calculus and a course in statistics.

Mathematical and statistical analysis of populations and communities: theory and
methods. Spatial and temporal pattern analysis, deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, and simulation and analytical techniques.

**STBTRY 672 Topics in Environmental Statistics (enroll in OR&E 672 or BTRY 672)**

Fall and spring. 2 credits. S-U grades optional. Prerequisite: BTRY 601 or permission of the instructor. This course is a discussion group focusing on statistical problems arising in the environmental sciences. These issues are explored in a number of different ways, such as student presentations of research papers, directed readings, and outside speakers.

**STBTRY 682 Statistical Methods for Molecular Biology (enroll in BTRY 682)**

Spring. 2 credits. S-U only. Prerequisite: permission of instructor. Statistical and mathematical topics of current interest in molecular biology: genetic mapping, physical mapping, DNA sequence analysis, phylogenetic inference, population modeling. Topics may vary. The course may be repeated for credit.

**STBTRY 694 Graduate Special Topics in Biometry and Statistics (enroll in BTRY 694)**

Fall or spring. 1–3 credits. S-U grades optional. A course of lectures selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

**STBTRY 697 Individual Graduate Study in Biometry and Statistics (enroll in BTRY 697)**

Fall, spring, or summer. 1–3 credits. S-U grades optional. Consists of individual tutorial study selected by the faculty. Since topics usually change from year to year, this course may be repeated for credit.

**STBTRY 717 Linear Models (enroll in BTRY 717)**

Spring. 3 credits. S-U grades only. Prerequisites: BTRY 409 or equivalent and BTRY 417 and 602. Offered alternate years. Not offered 1997–98; next offered spring 1999. Analysis of variance and estimation procedures for unequal-subclass-numbers data. Cell means models for the 1-way classification, nested classifications, and the 2-way crossed classification, both with and without interactions; introduction to multinormal variables and the distribution of quadratic forms. The general linear model (in matrix and vector form), estimability, and testable hypotheses. Overparameterized models, restricted models, multifactor cases, covariables, computing.

**STBTRY 795 Statistical Consulting (enroll in BTRY 795)**

Fall or spring. 2 credits. S-U grades only. Limited to graduate students. Participation in the Biometrics Unit consulting service; faculty supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered by the services during previous weeks. Since consultations usually change from semester to semester, the course may be repeated for credit.

**Engineering Statistics Unit**

**STENGR 270 Basic Engineering Probability and Statistics (enroll in ENGRD 270 or OR&IE 270)**

Fall or spring. 3 credits. Prerequisite: first-year calculus. This course should give students a working knowledge of basic probability and statistics and their application to engineering. Computer analysis and simulation are emphasized. Topics include random variables, probability distributions, expectation, estimation, testing, experimental design, quality control, and regression.

**STENGR 310 Introduction to Probability and Random Signals (enroll in ELE E 310)**

Spring. 4 credits. Prerequisite: Mathematics 294. This course may be used in place of Engr 270 to help satisfy the engineering distribution requirement. It can then also meet a system design requirement if 3 additional credits of field-approved or out-of-field elective are taken. Introduction to the theory of probability as a basis for modeling random phenomena and signals, calculating the probability of systems, and making estimates, inferences, and decisions in the presence of chance and uncertainty. Applications will be given in such areas as communications, and device modeling, probability, characteristic functions, nonlinear transformations of data, expectation, correlation, and the central limit theorem.

**STENGR 360 Engineering Probability and Statistics II (enroll in OR&E 360)**

Fall. 4 credits. Prerequisite: ENGRD 270 or equivalent. 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, and reliability. Hypothesis testing, confidence intervals, and point estimation using maximum likelihood and the method of moments.

**STENGR 361 Introductory Engineering Stochastic Processes I (enroll in OR&E 361)**

Spring. 4 credits. Prerequisite: OR&E 360 or equivalent. Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include Poisson process, Markov chains, renewal theory, models for queuing and reliability.

**STENGR 411 Random Signals in Communications and Signal Processing (enroll in ELE E 411)**

Fall. 3 credits. Prerequisite: ELE E 301 and 310 or permission of instructor. Introduction to models for random signals in discrete and continuous time, Markov chains, Poisson process, queuing processes, power spectral densities, Gaussian random process. Response of linear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems.

**STENGR 475 Regression (enroll in OR&E 475)**

Spring. First half of term. 2 credits. Prerequisite: ENGRD 270. Linear models; estimation and testing; confidence sets; diagnostics and residual analysis; variable selection and modeling.

**STENGR 476 Experimental Design I (enroll in OR&E 476)**


**STENGR 511 Error-Control Codes (enroll in ELE E 521)**

Fall. 4 credits. Prerequisite: ELE E 301, 521, or equivalent. A strong familiarity with linear algebra is assumed. An introduction to the theory of algebraic error-control codes. Topics include Hamming codes, group codes, the standard array minimum-distance decoding, cyclic codes, and the dual of a linear block code. Hamming and Singleton bounds for error-correcting codes. The construction and decoding of Bose-Ramanujan-Hocquenghem (BCH) and Reed-Solomon (RS) codes. Computer methods for the study of the structure and algorithms for error-control are used.

**STENGR 512 Fundamental Information Theory (enroll in ELE E 562)**

Fall. 4 credits. Prerequisite: ELE E 310 or equivalent. Fundamental results of information theory with application to storage, compression, and transmission of data. Entropy and other information measures. Block and variable length codes. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multitermed configurations. Gaussian sources and channels.

**STENGR 513 Communication Networks (enroll in ELE E 563)**

Spring. 4 credits. Prerequisite: ELE E 411 or permission of instructor. 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: using various protocols, TDMA. Flow control and capacity assignment algorithms for wideband circuit-switched and ATM networks.

**STENGR 514 Decision Making and Estimation (enroll in ELE E 564)**

Fall. 4 credits. Prerequisite: ELE E 411. Coregistration in ELE E 411. An introduction to those methods of making rational decisions and inferences and of forming estimates that are central to problems of communications, detection, pattern recognition, and statistical signal processing. Topics include Bayes, minimax and Neyman-Pearson decision theories; Bayes and maximimum likelihood point estimation; Cramer-Rao bound efficient and consistent estimation; spectral estimation, and robust models for signal extraction.

**STENGR 517 Artificial Neural Networks (enroll in ELE E 577)**

Fall. 4 credits. Prerequisites: ELE E 310; ELE E 411 recommended.
Artificial neural networks are brainlike in being formed out of many highly interconnected nonlinear memoryless elements. Probability theory will provide our primary analytical approach to design and analysis of neural networks. The course will cover mathematical and computer-based design capabilities of feedback-forward nets (multilayer perceptrons) that can serve as pattern classifiers.

STENGR 523 Introductory Engineering Stochastic Process I (enroll in OR&IE 523)
Spring. 4 credits. Prerequisite: OR&IE 360 or equivalent.
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.

STENGR 560 Engineering Probability and Statistics II (enroll in OR&IE 360)
Fall. 4 credits. Prerequisite: ENGRD 270 or equivalent.
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 to simulate models for these models. Specific topics include random variables, probability distributions, density functions, expectation and variance, multidimensional random variables, and important distributions including normal, Poisson, exponential, hypothesis testing, confidence intervals, and point estimation using maximum likelihood and the method of moments.

STENGR 561 Queuing Theory and Its Applications (enroll in OR&IE 561)
Spring. 3 credits. Prerequisite: OR&IE 561 or permission of instructor.

STENGR 563 Applied Time-Series Analysis (enroll in OR&IE 563)
Fall. 3 credits. Prerequisites: OR&IE 361 and OR&IE 270, or permission of instructor. Not offered 1997–98.
The first part of this course treats regression methods to model seasonal and non-seasonal 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.

STENGR 570 Statistical Analysis of Reliability Data (enroll in OR&IE 570)
Spring. 3 credits. Prerequisite: OR&IE 475 or OR&IE 563 or equivalent. Not offered 1997–98.

STENGR 577 Quality Control (enroll in OR&IE 577)

STENGR 580 Design and Analysis of Simulated Systems (enroll in OR&IE 580)
Fall. 4 credits. Prerequisites: programming experience and OR&IE 360/560, or permission of instructor. Note: OR&IE 360/560 may be taken concurrently.
Digital computer programs to simulate the operation of complex discrete, systems in time. Modeling, program organization, pseudo-random-variable generation, simulation languages, statistical considerations, applications to a variety of problem areas.

STENGR 585 Probability (enroll in OR&IE 585)
Spring. 4 credits. Prerequisite: one semester calculus-based probability course.
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.

STENGR 586 Applied Stochastic Processes (enroll in OR&IE 586)
Fall. 4 credits. Prerequisite: one semester calculus-based probability course.
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.

STENGR 590 Reliability Data (enroll in OR&IE 590)
Fall. 3 credits. Prerequisite: OR&IE 360/560 may be taken concurrently.
The second course in reliability and quality control covers reliability data. Topics include survival data, estimation and hypothesis testing. Applications in regression analysis and ANOVA models. Variance components and mixed models. Use of the computer as a tool for statistics is stressed.

STENGR 672 Selected Topics in Environmental Statistics (enroll in OR&IE 672 or ENGR 672)
Fall or spring. 2 credits. Prerequisite: ENGR 270 or equivalent.
This course is a discussion group focusing on statistical problems arising in the environmental sciences. These issues are explored in a number of different ways, such as student presentations of research papers, directed readings, and outside speakers.

Mathematical Statistics and Probability Unit

STENGR 670 Statistical Principles (enroll in OR&IE 670)
Fall. 4 credits. Prerequisite: Real analysis at the level of Math 413 and a previous one-semester course in calculus-based probability.
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, conditioning.

STENGR 671 Intermediate Applied Statistics (enroll in OR&IE 671)
Spring. 3 credits. Prerequisite: OR&IE 670 or equivalent.
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, hypothesis testing, including Neyman-Pearson Lemma and likelihood ratio principle; confidence interval construction; introduction to linear models.

STENGR 672 Selected Topics (enroll in MATH 672)
Spring. 4 credits. Prerequisite: Mathematics 471 and knowledge of linear algebra such as taught in Mathematics 221. Some knowledge of multivariate calculus helpful but not necessary.
Classical and recently developed statistical procedures are discussed in a framework that emphasizes the basic principles of statistical inference and the rationale underlying the choice of these procedures in various settings. These settings include problems of estimation, hypothesis testing, and sample selection.

STENGR 673 Simulation (enroll in MATH 673)
Fall. 4 credits. Prerequisite: Mathematics 471 or equivalent and knowledge of linear algebra such as taught in Mathematics 221.
This is a second-semester undergraduate course on probability. It covers topics from
renewal theory, martingales, discrete and continuous time Markov chains, Brownian motion and related diffusion processes, and applications to queueing theory and finance. Theoretical as well as applied aspects of the subject will be emphasized.

STMath 671-672 Probability Theory (enroll in MATH 671-672)
671 fall; 672 spring. 4 credits each.
Prerequisite: a knowledge of Lebesgue integration theory, or at least on the real line. Students can learn this material by taking parts of Mathematics 413-414 or 521. Prerequisite for Mathematics 672; Mathematics 671.


STMath 674 Introduction to Mathematical Statistics (enroll in MATH 674)
Spring. 4 credits. Prerequisite: Mathematics 671 or permission of instructor.
Topics include an introduction to the theory of point estimation, consistence, efficiency, sufficiency, and the method of maximum likelihood. Convexity and basic concepts of decision theory are introduced. Concepts of sequential methods may be discussed.

STMath 771-772 Seminar in Probability and Statistics (enroll in MATH 771-772)
771 fall; and 772 spring. 4 credits each.

STMath 777-778 Stochastic Processes (enroll in MATH 777-778)
777 fall; and 778 spring. 4 credits each.

Social Statistics Unit
STSSC 210 Statistical Reasoning I (enroll in ILRST 210)
Fall or spring. 3 credits. An introduction to the basic concepts of statistics and data analysis. Descriptive methods, mathematical models and inference procedures for univariate and bivariate data. Basic statistical designs, and introduction to probability and applications of the Binomial and Normal distributions. Estimation, confidence intervals and tests of significance for a population mean and proportion, simple linear regression, correlation and two-way contingency tables. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

STSSC 211 Statistical Reasoning II (enroll in ILRST 211)
Fall or spring. 3 credits. Prerequisite: ILRST 210 or suitable introductory statistics course.
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, elements of time series analysis, and sample-survey design. Computer packages are used throughout the course.

STSSC 310 Statistical Sampling (enroll in ILRST 310)
Spring. 3 credits. Prerequisite: ILRST 211 or equivalent.
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.

STSSC 311 Practical Matrix Algebra (enroll in ILRST 311)
3 credits.
A primer on matrices and matrix algebra is a necessary tool for statistics courses such as regression and multivariate analysis and for other "research methods" courses in various other disciplines. One goal of this course is to provide students with enough knowledge of basic understanding of matrix algebra in a language they can easily understand. Topics include special types of matrices; matrix calculations; linear dependence and independence; vector geometry; matrix reduction (trace, determinant, norms); matrix inversion; linear transformation; eigenvalues; matrix decompositions; ellipsoids and distances; some applications of matrices.

STSSC 312 Applied Regression Methods (enroll in ILRST 312)
Fall. 3 credits. Prerequisite: ILRST 211 or equivalent.
Topics include; simple linear regression; multiple linear regression (theory, model building, and model diagnostics); and the analysis of variance. Computer packages are used extensively.

STSSC 410 Techniques of Multivariate Analysis (enroll in ILRST 410)
Spring. 3 credits. Prerequisite: ILRST 312 or equivalent.
Topics include: multivariate normal distribution; sample geometry and multivariate distances; and several multivariate means, variances, and covariances. Students are instructed in the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

STSSC 510 Statistical Methods for the Social Sciences I (enroll in ILRST 510)
Fall. 3 credits.
A first course in statistics for graduate students in the social sciences. Descriptive statistics, probability and sampling distributions, estimation, hypothesis testing, simple linear regression and correlation. Students are instructed in the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

STSSC 511 Statistical Methods for the Social Sciences II (enroll in ILRST 511)
Fall or spring. 3 credits. Prerequisite: ILRST 510 or equivalent introductory statistics course.
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.

STSSC 610 Seminar in Modern Data Analysis (enroll in ILRST 610)
3 credits. Prerequisite: two statistics courses or permission of instructor. Not offered 1997-98.
An advanced survey of modern data analysis methods. Topics include exploratory data analysis, data reexpression, philosophy of data analysis, robust methods, statistical graphics, regression methods, and diagnostics. Extensive outside readings cover recent and historical work. Participants should have some knowledge of multiple regression, including the use of matrices, and some experience using a computer.

STSSC 611 Statistical Consulting (enroll in ILRST 611)
3 credits. Prerequisite: linear algebra, knowledge of a programming language, and statistics at least through multiple regression. Not offered 1997-98.
A survey of new aspects of statistical computing. Topics include: basic numerical methods, numerical linear algebra, nonlinear statistical methods, matrix factorization, data reexpression, philosophy of data analysis, robust methods, statistical graphics, regression methods, and diagnostics. Designed for graduate students in the statistical sciences and related fields interested in new advances. Students may be instructed to write programs in a programming language of their choice.

STSSC 612 Statistical Classification Methods (enroll in ILRST 612)
3 credits. Prerequisite: ILRST 312 or equivalent, or permission of instructor. Not offered 1997-98.
An introduction to a variety of statistical techniques that assign objects to categories on the basis of observed characteristics of the objects. Course topics include (but are not limited to): discriminant analysis and its extensions and variations; nearest neighbor methods, classification and regression trees (CART); neural networks (for classification; and estimation of error of classification rules).
This course gives the probabilistic and statistical background for meaningful simultaneous equation models, nonlinear variables, dynamic regression models, linear squares, specification tests, instrumental conditional distributions, distributions theory, moments, transformations, hypothesis testing and econometrics; the testing, asymptotic test theory, and nonnested method of maximum likelihood, generalized computer software to gain experience.

This course covers the following topics: loss functions and utility theory, prior information and subjective probability, coherence, basic Bayesian inference, empirical Bayesian inference, robust Bayesian inference, Bayesian computations, ancillarity, conditional properties of statistical procedures, and Barndorff-Nielsen's exact likelihood theory.

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Spring. 3 credits. Prerequisites: ILRST 210, ILRST 211 or ILRST 510, ILRST 511 or equivalent.

Provides a comprehensive introduction to the general structural equation system, commonly known as the "LISREL model." One purpose of the course is to demonstrate the generality of this model. Rather than treating path analysis, recursive and nonrecursive models, classical econometrics, and confirmatory factor analysis as distinct and unique, we will treat them as special cases of a common model. Another goal of the course is to emphasize the application of these techniques.

This course covers the following topics: loss functions and utility theory, prior information and subjective probability, coherence, basic Bayesian inference, empirical Bayesian inference, robust Bayesian inference, Bayesian computations, ancillarity, conditional properties of statistical procedures, and Barndorff-Nielsen's exact likelihood theory.

Spring. 3 credits. Prerequisites: ILRST 560 or equivalent.

This is an interdisciplinary course for students in applied mathematics, computer science, statistics, and other related fields of applications such as medical, engineering, and social sciences. Topics include: components of expert systems, neural networks, regression-based systems, probability-based systems, uncertainty measures, dependency models, Bayesian and Markov networks, propagation of uncertainties, learning from data, and examples of applications. Students will use computer software to gain experience.

Spring. 4 credits. Prerequisite: Econometrics 519.

This course is a continuation of Econometrics 519 (Econometrics I) covering (1) statistics, estimation theory, least squares methods, method of maximum likelihood, generalized method of moments, theory of hypothesis testing, asymptotic test theory, and nonnested hypothesis testing and (2) econometrics: the general linear model, generalized least squares, specification tests, instrumental variables, dynamic regression models, linear simultaneous equation models, nonlinear models, and applications.

Fall. 4 credits. Prerequisites: Economics 319-320 or permission of instructor.

This course gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics to be covered are (1) probability theory; probability spaces, random variables, distributions, moments, transformations, conditional distributions, distributions theory and the multinomial distribution, convergence concepts, laws of large numbers, central limit theorems, Monte Carlo simulation; (2) statistics; sample statistics, sufficiency, exponential families of distributions. Further topics in statistics will be considered in Economics 520.

Spring. 3 credits. Letter grade or S-U. Prerequisite: ILRST 312 or equivalent, or permission of instructor.

A course on regression for students in statistical sciences and related fields. Attempts to narrow the gap between the theory and practical application of the linear regression model. Classical and recently developed statistical procedures are discussed. Students will be expected to read articles and thoroughly analyze real-life data sets using computer-packaged programs. Topics include role of variables in regression equation, regression diagnostics (outliers, leverage points, influential observations, generalized linear models, errors in variables, and multicollinearity).

Spring. 3 credits. Prerequisite: ILRST 560 or equivalent.

This is an interdisciplinary course for students in applied mathematics, computer science, statistics, and other related fields of applications such as medical, engineering, and social sciences. Topics include: components of expert systems, neural networks, regression-based systems, probability-based systems, uncertainty measures, dependency models, Bayesian and Markov networks, propagation of uncertainties, learning from data, and examples of applications. Students will use computer software to gain experience.

Spring. 3 credits. Prerequisites: Economics 519-520 or permission of instructor.

This course covers traditional and current time series techniques that are widely used in econometrics. Topics include the theory of stationary stochastic processes including univariate ARMA (p,q) models, spectral density analysis, and vector autoregressive models, parametric and semi-parametric estimation; current developments in distributional theory; estimation and testing in models with integrated regressors including unit root tests, cointegration, and permanent vs. transitory components.

Fall. 4 credits. Prerequisites: Economics 519-520 or permission of instructor.

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This course covers traditional and current time series techniques that are widely used in econometrics. Topics include the theory of stationary stochastic processes including univariate ARMA (p,q) models, spectral density analysis, and vector autoregressive models, parametric and semi-parametric estimation; current developments in distributional theory; estimation and testing in models with integrated regressors including unit root tests, cointegration, and permanent vs. transitory components.
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 major in the graduate Field of Environmental Toxicology promotes training leading to the M.S. or Ph.D. degrees. It provides both breadth and depth in 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. Specialization tracks 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 of the faculty associated with the program is focused on the interactions of drugs, pesticides, and other potentially hazardous environmental agents with a wide variety of living organisms (including humans) and with the ecosystems with which these organisms are associated.

Courses

Courses in environmental toxicology are cosponsored by the university academic departments and are open to all graduate students and to those undergraduates who have permission of the instructor. The titles and numbers of these courses are listed below, and details of course content are provided elsewhere 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.

Tox 751 Professional Responsibilities of Toxicologists (Biological Sciences 751)
Tox 899 Master's Thesis and Research
Tox 999 Doctoral Thesis and Research

VISUAL STUDIES

Studio G, 726 University Ave. (255–6770) or Sb20A Center for Theatre Arts (254–2782)

Visual Studies as a distinct area of intellectual activity comprehends the analysis of visual forms, especially symbolic visual forms, from a range of historical, scientific, sociological, and aesthetic points of view. Images can be analyzed within a variety of contexts and by means of a variety of methods, and their study is therefore ideally conceived of in interdisciplinary terms. And since the creation of images has an important bearing on their analysis, visual studies concerns itself with practice as well as theory.

In addition to the courses listed below, which represent only a sampling of formal curricular offerings pertinent to visual studies, interested students should refer to the extensive offerings in Art, Architecture, Communications, Computer Science, History of Art, Design and Environmental Analysis, Theatre Arts, and the annual listings of offerings in the Society for the Humanities. Students interested in pursuing visual studies as an area of study should propose an "Independent Major in Visual Studies" following the same procedures as for any independent major in the school of Arts and Sciences. For additional information, contact Marilyn Kivchin (Theatre Arts).

Courses

Some of these courses may not be taught in 1997–98. For information about availability consult the appropriate departmental listings.

An Introduction to Architecture (Architecture 132)
Art and Politics in Twentieth-Century Latin America (History 424)
Art and Visual Thinking (Textiles and Apparel 125)
Asian American Images on Film (Asian American Studies 437)
African Cinema (African Studies 435)
Art, Design, and Visual Thinking (Textiles and Apparel 125)
Blacks in Communication Media (African Studies 303)
Chicanos and Film: Representations of La Raza (English 242)
Color, Form, Space (Art 110)
Contemporary French Culture Through Film (French 291)
Computer Art (Art 171)
Computer Graphics and Visualization (Architecture 374 and Computer Science 417)
Computer Vision (Electrical Engineering 547)
Design I and II (Design and Environmental Analysis 101–102)
Ethics in Media (Communications 420)
Fiction and Film in France (French Literature 499)
Film and Performance (Theatre Arts 413)
Framing Other Cultures (Anthropology 290 and Theatre Arts 290)
Fundamentals of 16-mm Filmmaking (Theatre Arts 377)
The Geometry of Tilings, Polyhedral and Structural Engineering (Mathematics 151)
German Film (German Studies 396)
Theatre Arts 396)
Graphic Design (Design and Environmental Analysis 349)
History and Theory of Commercial Narrative Film (Theatre Arts 375)
History and Theory of Documentary and Experimental Film (Theatre Arts 376)
The History of the Book (English 450)
Human Perception (Psychology 342)
Interactive Multimedia (Communications 439)
Introduction to Film Analysis: Meaning and Value (Theatre Arts 274)
Introduction to Mass Media (Communication 120)
Introductory Photo I (Art 161 and Architecture 251)
Japanese and Asian Film (Asian Studies 313 and Theatre Arts 313)
Latin American and Latino Video (Romance Studies 402 and Theatre Arts 402)
Literature to Cinema (Italian 390)
Machine Vision (Computer Science 664)
The Medieval Illuminated Book (History of Art 337)
Modern Architecture on Film (Architecture 392)
Modern Experimental Optics (Physics 330)
Myth onto Film (Anthropology 653 and Theatre Arts 653)
Optical Methods of Biologists (Biological Sciences 450)
Perception (Psychology 205)
Photo Communication (Communication 234)
Political Theory and Cinema (German Studies 330 and Theatre Arts 330)
Psychology of Television (Human Development and Family Studies 461)
Psychology of Visual Communications (Psychology 347)
Russian Film of the 1920s and French Film of the 1960s (Theatre Arts 378)
Scientific Illustration (Freehand Drawing 417)
Seminars in Museum Issues (History of Art 407)
Social and Cultural Construction of Printed Pictures (History 381)
Spanish Film (Spanish 399)
Special Investigations in Visual Studies (Architecture 458)
Studies in Film Analysis (English 263)
Video: Art, Theory, Politics (English 395, Theatre Arts 395)
Video Communication (Communication 348)
Visual Anthropology (Anthropology 453)
Visual Communication (Communication 230)
Visual Culture and Social Theory (Art History 370, Comp. Lit. 368)
Visual Ideology (Comp. Lit 660, Theatre Arts 660)
Visual Perception (Psychology 305)
The Visual System (Neurobiology and Behavior 326)
Business and Preprofessional Study

UNDERGRADUATE BUSINESS STUDY

Undergraduate preparation for business is found in many schools and colleges at Cornell. Students most frequently take courses in more than one area, as well as in related fields, to construct a program to suit their interests and career objectives. Each of the following areas provides a different focus for application and use of business study and training, and students should consider carefully the implications of each program when making a choice. (Graduate study is available in the Johnson Graduate School of Management as well as in graduate fields following each of the undergraduate options.)

The areas most often pursued include applied economics and business management (College of Agriculture and Life Sciences), economics (College of Arts and Sciences), engineering, hotel administration, consumer economics and housing (College of Human Ecology), industrial and labor relations, and sociology.

Applied economics and business management. This program is designed to prepare students for a career in business or in public service. Emphasis is placed on the application of economic theory and management principles. Graduates of this program typically choose careers in investment banking or finance or with firms offering opportunities in sales and marketing. Areas of specialization include business management and marketing, farm business management and finance, and food industry management.

Economics. This program provides a broad view of that social science concerned with the description and analysis of the production, distribution, and consumption of goods and services, the understanding of monetary systems, and the comprehension of economic theories and models. It is viewed more often as preprofessional than as training for immediate practice in business or economics.

Engineering. This area provides much of the management personnel of modern industry. Engineers frequently climb the ladders of technological management that lead to more general management responsibilities; more than half of the management-level personnel of major corporations such as General Electric, Xerox, IBM, and Du Pont have engineering degrees. In addition to becoming managers by being effective technical supervisors, many students enter engineering explicitly anticipating graduate business education, judging that an engineering background is particularly appropriate for management in a technology-oriented society.

Hotel administration. The undergraduate program in hotel administration prepares individuals to be mid- to upper-level managers and entrepreneurs for the hospitality industry (lodging, food service, and travel) and related fields. Specialization is provided in the areas of administration and general management, human-resources management, accounting and financial management, food and beverage management, law, properties management, communication, science and technology, economics, and marketing.

Consumer economics and housing. Study in the department develops an understanding of the market economy from both buyers' and sellers' perspectives. The focus is on the economic behavior and welfare of consumers in the private, public, and mixed sectors of the economy. An understanding of economics, sociology, and government policy provides the basis for an analysis of consumers' rights and responsibilities.

Industrial and labor relations focuses on the interactions among human beings, organizations, and institutions. It encompasses not only the relationships between employer and employee but the political, economic, social, and psychological factors that affect these relationships. It includes the study of the hiring, training, and motivating of individual workers; negotiation and conflict resolution; and the economic and technological changes that affect the jobs that people perform. Finally, it embraces the many regulations and regulatory agencies created by our society to protect and help both employer and employed.

Sociology. The program provides disciplined understanding of society and social issues. The insights and analytical skills you will acquire are applicable to corporate, government, and nonprofit settings, and the department's focus on social organization and institutions will prepare you well for graduate or professional programs in business schools. (Also see the description of the Society and Economy Concentration in the Department of Sociology section of Arts and Sciences.)

Related Areas

Courses in areas directly related to these business programs are found in many of the university departments. For example, quantitative methods may be studied in the departments of Mathematics and Computer Science, and courses in public administration are found in the departments of Government, and City and Regional Planning. There are additional programs that allow students with an interest in business to focus on a particular geographic area. Examples are the Latin American Studies Program, the South Asia Program, and the African Studies and Research Center. Such interdisciplinary programs as the Program on Science, Technology, and Society and the various programs in international agriculture provide additional opportunities for study of interest to business students.

Combined Degree Programs

Because Cornell has the Samuel Curtis Johnson Graduate School of Management, special opportunities exist for highly qualified undergraduates to combine their undergraduate programs with graduate study in that school. Students in the double-registrar program generally receive a bachelor's degree after four years of study and a Master of Business Administration (M.B.A.) degree after the fifth year of study, rather than the usual sixth year. Students in all Cornell undergraduate colleges and schools are eligible to explore this option. There is also a program with the College of Engineering that 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 work in the two schools.

SELECTED BUSINESS AND MANAGEMENT COURSES

Accounting

ARME 221 Financial Accounting
ARME 323 Managerial Accounting
H Adm 120 Survey of Financial Management
H Adm 226 Financial Management
JGSM NBA 500 Intermediate Accounting
JGSM NBA 501 Advanced Accounting
JGSM NBA 505 Auditing
ORR&IE 350 Cost Accounting Analysis and Control

Communications

Comm 201 Oral Communication
Comm 204 Effective Listening
Comm 272 Principles of Public Relations and Advertising
Comm 301 Business and Professional Speaking
Comm 372 Advanced Advertising
H Adm 165 Managerial Communication: Writing Principles and Procedures
H Adm 364 Advanced Business Writing

Computing

ARME 412 Introduction to Mathematical Programming
ABEN 204 Introduction to Computer Uses
COMS 100 Introduction to Computer Programming
COMS 101 The Computer Age
COMS 102 Introduction to Microcomputer Applications
Educ 247 Instructional Applications of the Microcomputer
H Adm 174 Microcomputing
H Adm 374 End-User Business Computing Tools
H Adm 375 Hotel Computing Applications

Economics

ARME 415 Price Analysis
ARME 431 Food and Agricultural Policies
ARME 450 Resource Economics
ARME 451 Environmental Economics and Policy
ARME 464 Economics of Agricultural Development
CEE 321 Microeconomic Analysis
CEH 355 Wealth and Income
Econ 101 Introductory Microeconomics
Econ 102 Introductory Macroeconomics
Econ 314 Intermediate Microeconomic Theory
Econ 317 Intermediate Mathematical Economics I
Econ 31B Intermediate Mathematical Economics II
Econ 351 Industrial Organization
ILR&IC 240 Economics of Wages and Employment
ILR&IC 340 Economic Security

Entrepreneurship

ARME 325 Personal Enterprise and Small Business Management
ARME 425 Small Business Management Workshop
JGSM NBA 300 Entrepreneurship and Enterprise

Finance

ARME 324 Financial Management
ARME 404 Advanced Agricultural Finance Seminar
### GENERAL INFORMATION - 1997-1998

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ARME 405</td>
<td>Farm Finance</td>
</tr>
<tr>
<td>CEH 315</td>
<td>Personal Financial Management</td>
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<tr>
<td>Econ 351</td>
<td>Money and Credit</td>
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<tr>
<td>Econ 333</td>
<td>Theory and Practice of Asset Markets</td>
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<td>Econ 336</td>
<td>Public Finance: Resource Allocation</td>
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<tr>
<td>H Adm 125</td>
<td>Finance</td>
</tr>
<tr>
<td>H Adm 322</td>
<td>Investment Management</td>
</tr>
<tr>
<td>H Adm 326</td>
<td>Corporate Finance</td>
</tr>
<tr>
<td>OR&amp;IE 451</td>
<td>Economic Analysis of Engineering Systems</td>
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#### International Business

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ARME 100</td>
<td>Tradeoffs in Global Economic Issues: There's No Free Lunch</td>
</tr>
<tr>
<td>ARME 430</td>
<td>International Trade Policy</td>
</tr>
<tr>
<td>ARME 449</td>
<td>Global Marketing Strategy</td>
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<tr>
<td>Econ 102</td>
<td>Introductory Macroeconomics</td>
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<td>Econ 313</td>
<td>Intermediate Macroeconomics Theory</td>
</tr>
<tr>
<td>Econ 325</td>
<td>Economic History of Latin America</td>
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<tr>
<td>Econ 366</td>
<td>The Economy of the Soviet Union</td>
</tr>
<tr>
<td>Econ 369</td>
<td>Selected Topics in Socialist Economic Change</td>
</tr>
<tr>
<td>Econ 661</td>
<td>International Trade Theory and Policy</td>
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<td>Econ 362</td>
<td>International Monetary Theory and Policy</td>
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#### Law, Regulation, and Ethics

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<th>Course Code</th>
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<tbody>
<tr>
<td>ARME 250</td>
<td>Environmental Economics</td>
</tr>
<tr>
<td>ARME 320</td>
<td>Business Law I</td>
</tr>
<tr>
<td>ARME 321</td>
<td>Business Law II</td>
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<tr>
<td>ARME 422</td>
<td>Estate Planning</td>
</tr>
<tr>
<td>Comm 428</td>
<td>Communication Law</td>
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<tr>
<td>Econ 302</td>
<td>The Impact and Control of Technological Change</td>
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<tr>
<td>Econ 304</td>
<td>Economics and the Law</td>
</tr>
<tr>
<td>Econ 309</td>
<td>Economic Analysis of Government (also Civil and Environmental Engineering 322)</td>
</tr>
<tr>
<td>Econ 354</td>
<td>Economics of Regulation</td>
</tr>
<tr>
<td>Econ 552</td>
<td>Public Regulation of Business</td>
</tr>
<tr>
<td>Educ 477</td>
<td>Law and Educational Policy</td>
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<tr>
<td>Govt 389</td>
<td>International Law</td>
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<tr>
<td>H Adm 422</td>
<td>Taxation and Management Decisions</td>
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<tr>
<td>ILR 201</td>
<td>Labor Relations Law and Legislation</td>
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<tr>
<td>ILRC 330</td>
<td>Comparative Industrial Relations Systems: Western Europe</td>
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<tr>
<td>ILRC 331</td>
<td>Comparative Industrial Relations Systems: Non-Western Countries</td>
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#### Management

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<tbody>
<tr>
<td>ARME 320</td>
<td>Farm Business Management</td>
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<tr>
<td>ARME 402</td>
<td>Seminar in Farm Business Planning and Managerial Problem Solving</td>
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<tr>
<td>ARME 424</td>
<td>Business Policy</td>
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<tr>
<td>ARME 426</td>
<td>Cooperative Management and Strategies</td>
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<tr>
<td>ARME 443</td>
<td>Food Industry Management</td>
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<tr>
<td>Econ 326</td>
<td>History of American Business Enterprise</td>
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<tr>
<td>H Adm 103</td>
<td>Principles of Management</td>
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#### Manufacturing

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<tr>
<td>Econ 302</td>
<td>The Impact and Control of Technological Change</td>
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<tr>
<td>OR&amp;IE 410</td>
<td>Industrial Systems Analysis</td>
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<tr>
<td>OR&amp;IE 421</td>
<td>Production Planning and Control</td>
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#### Marketing

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ARME 240</td>
<td>Marketing</td>
</tr>
<tr>
<td>ARME 340</td>
<td>Futures and Options Trading</td>
</tr>
<tr>
<td>ARME 342</td>
<td>Marketing Management</td>
</tr>
<tr>
<td>ARME 347</td>
<td>Marketing Fruits, Vegetables, and Ornamental Products</td>
</tr>
<tr>
<td>ARME 375</td>
<td>Food Merchandising</td>
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<tr>
<td>CEH 233</td>
<td>Marketing and the Consumer</td>
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<tr>
<td>H Adm 243</td>
<td>Principles of Marketing</td>
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#### Personnell and Human Resource Management

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ARME 526</td>
<td>Human Resource Management in Small Businesses</td>
</tr>
<tr>
<td>Econ 381</td>
<td>Economics of Participation and Workers' Management</td>
</tr>
<tr>
<td>Econ 382</td>
<td>The Practice and Implementation of Self-Management</td>
</tr>
<tr>
<td>H Adm 211</td>
<td>The Management of Human Resources</td>
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<tr>
<td>H Adm 212</td>
<td>Human Relations Skills</td>
</tr>
<tr>
<td>H Adm 414</td>
<td>Organizational Behavior and Small-Group Processes</td>
</tr>
<tr>
<td>ILROB 120</td>
<td>Introduction to Macro Organizational Behavior and Analysis</td>
</tr>
<tr>
<td>ILROB 121</td>
<td>Introduction to Micro Organizational Behavior and Analysis</td>
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<tr>
<td>ILROB 370</td>
<td>The Study of Work Motivation</td>
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<td>ILROB 375</td>
<td>Organizational Behavior Simulations</td>
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<td>ILROB 374</td>
<td>Technology and the Worker</td>
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<tr>
<td>ILROB 420</td>
<td>Group Processes</td>
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<td>ILROB 425</td>
<td>Sociology of Industrial Conflict</td>
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<td>ILRP 461</td>
<td>Human Resource Management (ILR 200 Collective Bargaining)</td>
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#### Quantitative Decisions and Decision Science

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<tr>
<td>ARME 210</td>
<td>Introductory Statistics</td>
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<tr>
<td>ARME 313</td>
<td>Information Systems and Decision Models</td>
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<td>ARME 410</td>
<td>Business Statistics</td>
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<tr>
<td>ARME 411</td>
<td>Introduction to Econometrics</td>
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<td>ARME 416</td>
<td>Demographic Analysis in Business and Government</td>
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<td>ARME 417</td>
<td>Decision Models for Small and Large Businesses</td>
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<td>ARME 428</td>
<td>Technology: Management and Economic Issues</td>
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<td>CEE 304</td>
<td>Uncertainty Analysis in Engineering</td>
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<td>CEE 323</td>
<td>Engineering Economics and Management</td>
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<tr>
<td>Econ 320</td>
<td>Introduction to Econometrics</td>
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<td>Econ 520</td>
<td>Econometrics II</td>
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<tr>
<td>CEH 330</td>
<td>Economics of Consumer Policy</td>
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<td>ENG 270</td>
<td>Basic Engineering Probability and Statistics</td>
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#### Real Estate

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<tr>
<td>ARME 406</td>
<td>Farm and Rural Real Estate Appraisal</td>
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<td>CRP 691</td>
<td>Economics and Financing of Neighborhood Conservation and Preservation</td>
</tr>
<tr>
<td>H Adm 323</td>
<td>Hospitality Real Estate Finance</td>
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<tr>
<td>H Adm 350</td>
<td>Real Estate Management</td>
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#### Sociology

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<tr>
<td>SOC 110</td>
<td>Introduction to Economy and Society</td>
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<tr>
<td>SOC 215</td>
<td>Organizations: An Introduction</td>
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<td>SOC 222</td>
<td>Social Policy and Organization in Health, Education, and Welfare</td>
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<td>SOC 245</td>
<td>Inequality in Industrial Societies</td>
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<td>SOC 275</td>
<td>Women at Work</td>
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<td>SOC 301</td>
<td>Evaluating Statistical Evidence</td>
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<td>SOC 303</td>
<td>Design and Measurement</td>
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<td>SOC 340</td>
<td>Health, Behavior, and Health Policy</td>
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<td>SOC 345</td>
<td>Gender Inequality</td>
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<td>SOC 351</td>
<td>Research Seminar on Organizations</td>
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<td>SOC 354</td>
<td>Law and Social Order</td>
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<tr>
<td>SOC 366</td>
<td>Transitions from State Socialism</td>
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### 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. Freshman writing seminars, required of nearly all Cornell freshmen, 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.

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 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 a particular selection of undergraduate courses be completed. These courses usually include general chemistry and organic chemistry, biology, physics, and a year of English composition (or a freshman writing seminar). In addition, many medical schools require or recommend mathematics and at least one advanced biological science course, such as genetics, embryology, histology, or physiology.

There is no major program 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.

Exceptionally qualified students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology may apply for acceptance to the Medical College through a double registration procedure arranged between Cornell University and Cornell University Medical College in New York City. This procedure allows registered students to save one year in pursuit of the bachelor’s and M.D. degrees. This is not a traditional “seven year program”; separate application to the Medical College is required. Further information about this procedure is available from the Health Careers Program office at the Career Center, Cornell University, 103 Barnes Hall, Ithaca, New York, 14853-1601.

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

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

For information on additional preparation, including work experience and necessary examinations, students should consult the brochure, Admission to the College of Veterinary Medicine at Cornell, obtained by writing to the Office of Student Services, College of Veterinary Medicine, Cornell University, C-106 Schurman Hall, Ithaca, New York 14853-6401. Information on the Guaranteed Admissions Program is available from the same address.

Qualified students in the College of Agriculture and Life Sciences may apply for acceptance in a double-registration program arranged between Cornell University and the College of Veterinary Medicine at Cornell. This program allows registered students to save one year in pursuit of the bachelor’s and D.V.M. degrees. Further information about this program is available from the Health Careers Program office at the Career Center, Cornell University, 103 Barnes Hall, Ithaca, New York 14853-1601.
ADMINISTRATION
Daryl B. Lund, dean
Brian F. Chabot, associate dean
Vacant, assistant dean for public affairs
H. Dean Sutphin, associate dean and director of academic programs
Donald R. Viands, associate director of academic programs
W. Ronnie Coffman, associate dean and director of research
Anthony M. Shelton, associate director of academic programs
Donald R. Viands, associate director of academic programs
H. Dean Sutphin, associate dean and director of cooperative extension
R. David Smith, associate director of cooperative extension
Norman T. Uphoff, director of international agriculture
James E. Haldeman, associate director of international agriculture

Office of Academic Programs Staff
Counseling and advising: Lisa Ryan, Bonnie Shelley
Registrar: Mary Milks, Patricia Austic, Leora Shelley
Admissions: Randy Stewart, Laurie Gillespie
Career development: William Alberta, Amy Benedict-Martin, Sheri Mahaney
Minority programs: Catherine Thompson

Department Chairs
Agricultural and biological engineering: M. F. Walter, Riley-Robb Hall
Agricultural, resource, and managerial economics: A. M. Novakovic, Warren Hall
Animal science: A. W. Bell, Morrison Hall
Communication: C. J. Glynn, Kennedy Hall
Education: D. H. Monk, Kennedy Hall
Entomology: D. A. Rutz, Comstock Hall
Floriculture and ornamental horticulture: T. C. Weiler, Plant Science Building
Food science: D. Miller, Stocking Hall
Fruit and vegetable science: H. C. Wien, Plant Science Building
Natural resources: J. P. Lassoie, Fernow Hall
Plant breeding and biometry: E. D. Earle, Emerson Hall
Plant pathology: S. A. Slack, Plant Science Building
Rural sociology: D. L. Brown, Warren Hall
Soil, crop and atmospheric sciences: J. M. Duxbury, Emerson 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’s programs fall into three major areas:

• Science and technology
• Management
• Communication and education

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, research, and cooperative extension. Included in the Office of Academic Programs are the director and associate director, the Admissions Office, the Career Development Office, the Office of Counseling and Advising, 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 Board 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.)], H. D. Sutphin, Roberts Hall
Agricultural and Biological Engineering, J. A. Bartsch, Riley-Robb Hall
Agricultural Economics, R. N. Boisvert, Warren Hall
Animal Breeding, E. J. Pollak, Morrison Hall
Animal Science, R. L. Quaas, Morrison Hall
*Biochemistry, Molecular and Cell Biology, P. A. Karplus, Biotechnology Building
Biometry, N. S. Altman, Warren Hall
Communication, M. A. Shapiro, Kennedy Hall
Development Sociology, P. McMichael, Warren Hall
*Ecology and Evolutionary Biology, R. W. Howarth, Conson Hall
Education [also M.A.T.], J. D. Deshler, Kennedy Hall
Entomology, J. G. Scott, Comstock Hall
Environmental Toxicology, A. Yen, Rice Hall
Floriculture and Ornamental Horticulture, N. L. Bassuk, Plant Science Building
Food Science and Technology, J. H. Hotchkiss, Stocking Hall
*Genetics and Development, M. L. Goldberg, Biotechnology Building
International Agriculture and Rural Development [M.P.S. (Agr.)], R. W. Blake, Morrison Hall
International Development, N. T. Uphoff, Caldwell Hall
Landscape Architecture [M.L.A.], L. J. Mirin, W. Sibley Hall
*Microbiology, S. C. Winans, Wing Hall
Natural Resources, M. E. Krasny, Fernow Hall
Departmental Programs

Summary of Basic College Requirements for Graduation

1. Credit Hours
   a. Minimum: 120
   b. Minimum with letter grade: 100 (number with S-U grades pro-rated for transfer students)
   c. Maximum independent study, teaching experience, internships: 15 (pro-rated for transfer students)
   d. Minimum College of Agriculture and Life Sciences credits (includes transfer credit): 55
   e. Maximum from endowed colleges without experience, internships: 15 (pro-rated for transfer students)
   f. Maximum transferred in: 55; minimum at Cornell: 60

Note: Credits received for physical education and for certain other courses, such as Mathematics 109, Education 005 and LSC courses, do not count toward the 120 hours but are included on the transcript and in the grade-point average.

Credit Earned While in High School
Transfer credit will not be accepted for the Project Advance 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 adjunct) at the offering college.

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

2. Residence
   a. Normally, eight full-time semesters
   b. Seven semesters, if all other degree requirements are met, with a grade-point average of 2.0 or above
   c. Minimum of 12 credits per semester
   d. Minimum of two semesters, including the final semester prior to graduation, in the College of Agriculture and Life Sciences (residency in the Internal Transfer Division [ITD] does not count toward residency in the college)
   e. Students who have completed 8 semesters in residence at Cornell, including two in the college, and who have 8 or fewer credits remaining for graduation may petition for approval to complete this work elsewhere.

3. Physical Education (see note at 1f)
   a. Completion of university requirement for two semesters of work
   b. Transfer students may be exempt from part or all of the requirement.

Note: Requests for exemption should be made in writing to the University Faculty Committee on Physical Education. Requests for postponement should be referred to Alan Gannett, Teagle Hall (255-1866). Medical postponement requests must go through Gannett Clinic.

4. Grade-Point Average (GPA)
   a. Cumulative GPA: 1.7 or above must be maintained
   b. Final semester GPA: 1.7 on a minimum of 12 credits in final term before graduation.

Note: GPA includes only grades earned at Cornell after matriculating into the college.

5. Distribution
   The purpose of the distribution requirement is to provide a broad educational background and to ensure a minimum level of competence in particular skills. Through study of the physical sciences, students develop quantitative and analytic skills based on an understanding of the physical laws governing the universe, through study of the biological sciences, they 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 impact their work and role in society.

Through development of written and oral expression skills, students master the essentials of effective communication.

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

Group A: Physical Sciences. 9 credits of 100- or 200-level courses, in at least two disciplines, including at least one course in chemistry or physics.

Chemistry

Mathematics (excluding Education 005, Mathematics 101 and 109)

Education 115

Soil, Crop and Atmospheric Sciences 131

Astronomy

Geology

Statistics (Including ARME 210, ILRST 210)

*The college mathematics requirement is described below.

Group B: Biological Sciences. 9 credits, including 6 of introductory biological science (introductory courses include BIO 101-104, 105, 106, 109, 110.)

Biological Sciences (excluding 152, 160, 200 [unless permission of associate director of the division of Biological Sciences is obtained], 202, 205, 206, 208, 209, 301 or 307)
Animal Sciences 100, 221, 300, 301
Entomology 212
Nutritional Sciences 262
Plant Breeding 201, 225
Plant Pathology 309, 401

Group C: Social Sciences and Humanities.
12 credits (6 in each of the following two categories):

Social Sciences. 100- through 400-level courses in the following departments (excluding Freshman Seminars):
- Anthropology
- Archaeology
- Communication 116, 120, 410, 418, 420, 422
- Economics (excluding all ARME courses except 100)
- Education 271, 311, 317, 370, 378
- Government
- Psychology
- Sociology (including ARME 416, Rural Sociology except Rs 100, 175, 318, 442)
- Humanities. 100- through 400-level courses in the following departments (excluding Freshman Seminars and language courses):
  - Africana Studies (literature and history)
  - Asian American Studies
  - Asian and Near Eastern Studies (literature and history)
  - Classics
  - Comparative Literature
  - English (literature only)
  - French
  - German
  - Italian
  - Russian
  - Spanish (literature only)
  - History
  - History of Art/History of Architecture
  - LA 282
  - Music
  - Theatre Arts (theory, literature, and history only)
  - Natural Resources 411
  - Philosophy (also Natural Resources 407)
  - Religious Studies
  - Rural Sociology 100, 175, 318, 442
  - WOMNS/S&T 444

Group D: Written and Oral Expression.
9 credits, of which at least 6 must be in written expression, selected from the following:
- Freshman Seminars
- Communication 117, 201, 350, 352, 260 (was 360), 263 (was 363), 365

6. Mathematics
The faculty requires minimum competency in mathematics as a prerequisite to satisfactory completion of a degree. As a measure of competency in mathematics, all entering undergraduates and transfer students, including those presenting advanced placement or transfer credit in college calculus, must take the college’s math proficiency exam. The exam is administered free of charge just prior to the start of classes each semester. It consists of fifty sample questions covering arithmetic, algebra, geometry, trigonometry, and basic calculus.

The score divides students into three groups, with specific graduation requirements and placement information.

Mathematics requirements and placement suggestions:

Group I Students in this group are considered proficient in math for college graduation requirements. If further math is needed for the major, placement score suggests calculus skill level (MATH 111, 191, 193).

Group II Students in this group MUST complete one "math course at Cornell." Placement score suggests skill level for EDUC 115, MATH 105, or BTRY 101.

Group III Students in this group must take EDUC 005, remedial level math in their first semester. Students must also complete an additional "math course at Cornell."

* Math courses at Cornell that may be used to fulfill math requirement:

- All courses in the Math department (excluding 101 and 109)
- EDUC 115
- Biometry 101

Transfer credit for mathematics

Most college-level math courses in a transfer student's record will be transferred (limit 6 hours into Group A of the college distribution). Transfer students are held for the results of the math exam and must satisfy the college's math requirement determined by his or her score. Students entering with AP calculus credit are also held for the results of the math exam and must satisfy the college's math requirement determined by his or her score.

7. Faculty Adviser
   - 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 for the college distribution. Students must be planned in consultation with the faculty adviser. Students pre-enroll for courses by computer through CoursEnroll on the Bear Access menu. Pre-enrollment by computer is not valid until the student's individual code is entered. This code, or advisor key, is provided by the faculty adviser to the student after approval of the choice of courses.
   - Course enrollment each semester should be planned in consultation with the faculty adviser. Students pre-enroll for courses by computer through CoursEnroll on the Bear Access menu. Pre-enrollment by computer is not valid until the student's individual code is entered. This code, or advisor key, is provided by the faculty adviser to the student after approval of the choice of courses.
   - 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.

8. Progress toward the Degree
   - The progress of each student toward meeting the degree requirements is recorded each 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 must notify the College Registrar of their intent to return for the eighth semester. 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. Students who are planning to graduate must complete an "Application to Graduate" by February 15th (for May graduate) or September 15th (for January graduate). The adviser signs the application after verifying that the requirements for the major have been completed. The college later signs after verifying that the college requirements have been met.

STUDENTS

Undergraduate enrollment is approximately 3,000, with about 50 percent in the upper division. Each year about 850 students are graduated, while 650 freshmen and 250 new transfer students are enrolled. Members of the faculty of the college serve as chairs of the special committees of about 1,000 graduate students.

Admission

The College Admissions Committee selects applicants who are academically well prepared and appear most likely to profit from the college's various curricula.

Most students come from New York State, but about 30 percent come from other parts of the United States or abroad. About half of the undergraduates are women. Approximately 20 percent are identified as members of minority ethnic groups.

Transfer Students

Approximately 18 to 20 percent of the ALS undergraduate students are transfers who have taken part of their collegiate work at community colleges, agricultural and technical colleges, or other four-year institutions. Many of them hold an associate degree.

A Cornell student in good standing may apply for intra-university transfer to pursue a course of study unavailable in his or her current college. Guidelines are available in the Admissions Office of the College of Agriculture and Life Sciences, 177 Roberts Hall. The procedure includes filing a transfer request, meeting with a faculty member in the proposed area of study and submitting a letter explaining reasons for making the transfer.

Consideration is given to students who have demonstrated an interest in their intended field of study, by taking appropriate prerequisite courses and courses within this area of study. Academic achievement is also considered. Students are seldom allowed to transfer during their freshman year.

In some cases a student may be referred to the Internal Transfer Division to study for one semester before entering the college. A second semester is considered under 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 selected 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 they want to take. For more information and guidelines, students should contact the Admissions Office, 177 Roberts Hall.

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 are to be registered for at least twelve (12) credits of course work each semester. It is expected that students will not be enrolled in course work at another institution while they are enrolled at CALS.

Two exceptions to enrollment elsewhere while being a full-time student at Cornell would be the joint enrollment agreements between Cornell and Ithaca College and Wells college. Other exceptions would be reviewed by the Committee on Academic Achievement and Petitions. Students must petition before enrolling for a course elsewhere. The committee would 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 discouraged.

Leaves of Absence
A student who finds it necessary to leave the university before the end of a semester should make a written request for a leave of absence or withdrawal. Such action is necessary to clear the record of the term and, if not taken, may adversely affect the student's subsequent readmission to the university. Students leaving at the end of any semester, whether temporarily or permanently, should file a standard leave of absence/withdrawal petition form, available in the Counseling and Advising Office.

An approved leave is considered an interruption in study, with the student's place in the college being held without requiring application for readmission. A database is maintained by the Counseling and Advising Office to send materials at the appropriate time for the student to pre-enroll for courses when returning to the college. A leave of absence may be extended by contacting the Counseling and Advising Office. Students must petition for a leave of absence and they are issued in two ways: Voluntary leaves are issued for students in good academic standing, and these students may return to the college with no restrictions. Restricted leaves are issued when students are not in good academic standing. A student must petition to return from a restricted leave. Information and petitions are available in the Counseling and Advising Office, 140 Roberts Hall.

Withdrawal
A student who finds it necessary to leave the university permanently should file a petition for withdrew last day if the student is in good standing. Students who have withdrawn and who later decide to return must apply to the Admissions Office.

Graduating and Diplomas
Graduating seniors must complete the Application to Graduate (see the aforementioned details in Part 8c.) 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 they are in college. They believe that personal contact on a one-to-one basis is an important way to identify individual differences and needs of students. Faculty members can and should be an important source of information and advice on both academic and personal matters. Thus, 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 aid in developing a program of study.

The Counseling and Advising Office coordinates the faculty advising program, serves as the college’s central undergraduate advising office, and offers counseling to students. 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, commencement activities, and the activities of two student organizations, Ho-Nun-De-Kah, the college’s honor society, and CALS Student Organization Network. 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.

The Office of Minority Programs serves to recruit, admit, and monitor influence policy on behalf of all minority students within the College of Agriculture and Life Sciences. This population is defined as encompassing all African American, Latin American, Asian American, and Native American students. In the most recent academic year (1996–1997), this population represented approximately 20 percent of the college’s undergraduate population. In addition, we are charged with monitoring and programming for the Educational Opportunity Program and Prehealth Collegiate Science and Technology Entry Program, and some involvement with the Faculty Committee on Human Diversity. The Educational Opportunity Program (EOP) and the Collegiate Science and Technology Entry Program (CSTEP) are state-supported programs intended to assist New York State students who meet economic and academic criteria set by the college. State Programs Office, and New York State Board of Regents. For further information, please contact Catherine Thompson in 140 Roberts Hall.

Within the university, the Office of Minority Programs is charged with acting as the college liaison with the central Office of Minority Education Affairs, the Learning Skills Center, and the State Programs Office. Other university connections include the Undergraduate Admissions Office and the Office of Financial Aid regarding the concerns of the minority student population.

The duties of the Office of Minority Programs are primarily carried out by the director with a part-time assistant, part-time support staff, and 10 to 12 peer advisers. Together, the staff acts as a major advocacy and advising group and informational and referral center. Its constituency includes students, faculty, and the public.

Given the college's policy on non-exclusively programming, the Office of Minority Programs is a complement for some functions that serve the college’s entire population. Presently, that includes reading non-minority applicant folders, 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 in a friendly environment to all students and alumni of the college. Career development includes self-awareness and assessment, career exploration, decision making, and job search. Services are designed to assist students and alumni with those activities and to help them develop the career planning and job search skills they will find useful as their career paths progress and change.

The Career Library contains an extensive collection of current and useful material, including career information books, extensive internship files, employer directories, and job listings. Alumni Career Link is a database of several hundred 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. Active on-campus recruiting program brings more than 80 employers to campus each year to interview students for full-time and summer jobs.

The office, in conjunction with a network of college faculty members, assists students throughout their undergraduate years and beyond. For further information, students should contact Bill Alberta and the staff in 177 Roberts Hall.
**Financial aid** is administered through the university office in Day Hall. Endowment funds and annual donations provide supplemental aid for students in the college who are eligible for aid. Information about these college grants is available from the Office of Academic Programs in Roberts Hall, after students have a 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 advance permission
   - knowingly deprive other students of library resources, laboratory equipment, computer programs, and similar aids
   - in any other manner violate the principle of absolute integrity

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

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

Cornell’s Code of Academic Integrity spells out how individuals who have allegedly violated Cornell standards for academic integrity are to be confronted and, if found to be in violation of those standards, sanctioned. The code provides for 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 D. 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 college registrar maintains for each student a complete record of academic achievement. A permanent record is maintained for each matriculated student and updated whenever new information becomes available. Staff members in Roberts Hall 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.

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 college
- notifies the petitioner in writing of the action taken by the committee

Good academic standing means a student is eligible for, or has been allowed to register and enroll in, academic course work for the current semester. Whether an individual student is in good academic standing is determined by the college registrar and the Committee on Academic Achievement and Petitions. (See academic deficiency policies, below.)

A petition to be exempt 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 determines whether there is evidence of mitigating and unforeseen circumstances beyond the control of the student that would warrant an exemption or other action.

**Registration Procedures**

All students must register with the university and “check-in” with this college at the beginning of each semester. Check-in materials are available in 140 Roberts Hall as announced each term by the University Registrar.

**Course Enrollment Procedures**

To enroll in courses, students will receive information from the university registrar; plan a schedule in consultation with their adviser; and pre-enroll by computer, through CoursEnroll in “Just the Facts” on the Bear Access menu. Pre-enrollment is not valid until entering the student’s individual code, or adviser key, into the computer. Adviser keys change each semester and are obtained from the adviser to his or her advisee.

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 file the Intent to Study Off Campus form to ensure that proper registration will occur. These forms are available in the Registrar’s Office in 140 Roberts Hall.

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 non-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, then the instructor files a manual grade form to the college registrar. 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 course work for the first semester 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 at the Registrar’s Office, 140 Roberts Hall, on an official form provided for that purpose.

Add/Drop/Changes are made by filing properly signed forms in the Registrar’s Office, 140 Roberts Hall. Approval and signature of the faculty adviser and course instructor are required to add or to drop a course.

Students may add courses during the first three weeks of the term and may drop courses and change grading options or credit hours where applicable 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. 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 work load, and scheduling prior to the end of the seventh week of the semester.

If the petition to drop a course is approved after the end of the seventh week of classes, the course remains on the student’s record and a W (for “withdrawal”) is recorded on the transcript.

Grade Reports

Grade reports for the fall term are included in spring term check-in materials; grade reports for the spring term are mailed by the Office of the University Registrar to students at their home addresses unless alternative addresses are reported to the college or university registrar by mid-May.

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. In case of students not making satisfactory progress, the committee takes appropriate action, including, but not limited to, issuing warnings to students, placing them on probation, suspending them, decreeing that they may not reregister, granting them leaves of absence, and advising them to withdraw.

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

- semester GPA of at least 1.7
- cumulative GPA of at least 1.7
- satisfactory completion of 12 or more credits per semester
- reasonable progress toward completion of distribution requirements
- appropriate completion of college and university requirements

In general terms, regular participation in course work with academic loads at a level sufficient to assure graduation within eight semesters and grades averaging C- (1.7) or higher are prima facie evidence of satisfactory progress.

HONORS PROGRAM

The Bachelor of Science degree with honors will be conferred upon those students who, in addition to having completed the requirements for the Bachelor of Science, have satisfactorily completed the honors program in their area of major interest and have been recommended for the degree by the honors committee of that area.

An undergraduate wishing to enroll in the honors program must have completed at least 45 credits, at least 35 at the University of Cornell. Also, the student must have attained a cumulative grade-point average of at least 3.0 at the time of entry.

Interested students must make 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. An application form is available from the college registrar, 140 Roberts Hall, or from the area committee chair. (Biological sciences students should get applications at 200 Stimson Hall.)

Written approval of the faculty member who will direct the research and of the honors committee in the area is required. After the college registrar verifies the student’s grade-point average, the student will be officially enrolled in the honors program.

Academic credit may also be earned by enrolling in an independent study course. When applying for admission to the program, the student may, if appropriate, submit a budget and a modest request for funds to cover some of the costs the student incurs in doing the research.

The honors committee for each 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 honors.

Unless otherwise indicated in the following area descriptions, the research report in the form of a thesis or journal article should be submitted to the honors 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 honors program must be approved in one of the program areas as approved by the faculty. Students are not eligible for honors by participating in a program offered by another college or administrative unit.

Animal Sciences

Faculty committee: W. B. Currie, chair; Y. R. Boisclair, D. L. Brown, P. A. Johnson.

The objective of the animal sciences 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 an honors 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 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 honors project. That should be accomplished early in the second semester of the junior year.
- Preregister during the spring semester for AS 496, 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.
- Submit a written thesis to the honors committee by the scheduled deadline. Specific information regarding deadlines, format, and organization for the thesis will be provided.
- Meet with the honors committee for a short oral defense of the thesis following a review of the thesis by the student’s sponsor and the honors 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 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. Applications and details pertaining to the program requirements may be obtained from the Division’s Office for Academic Affairs, 200 Stimson Hall. Information on faculty research activities is available in the Behman Biology Center, 216 Stimson Hall.

Entomology

Faculty committee: B. L. Peckarsky, chair

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

The honors committee requires that an undergraduate who is interested in embarking upon an honors project proceed with the following steps:

1. Discuss the matter with his or her academic adviser, preferably in the junior year, so that a research project can be carefully planned. The possibility of conducting some research during the junior year and/or summer should be discussed.
2. Discuss the project with an appropriate faculty member in the Department of Entomology who can serve as a supervisor to oversee the honors research. (The faculty advisor will be of assistance in determining which faculty entomologist might be the best supervisor, the decision being based primarily on available faculty members' areas of expertise.)
3. Prepare a brief, tentative plan for the project for discussion and approval of the honors project supervisor. The plan should include a statement of objects or hypotheses, proposed methods for testing hypotheses, needs for laboratory space or shared equipment, and a budget outlining financial support needed for travel and supplies.
4. Present a completed application to the chair of the entomology honors committee no later than the end of the third week of the first semester of the senior year. Earlier submission is encouraged.
5. Submit a brief progress report, approved by the project supervisor, to the entomology honors committee by midterm of the semester in which the student will complete his or her graduation requirements.
6. Present a formal seminar reporting the significant findings of the research to the Department of Entomology (preferably as a Juggatae seminar) in the last semester of the senior year.
7. Submit two copies of the final project report (honors thesis) to the chair of the entomology area honors committee no later than two weeks before the last day of classes in the semester in which the student anticipates graduation. The thesis will be reviewed by the faculty honors project supervisor and one other referee from the department honors committee. The committee will return the thesis to the student one week before the last day of class. If reviewers indicate that changes must be made, the revised thesis should be submitted to the chair no later than the last day of classes.

**Natural Resources**

Faculty committee: M. E. Krasny, chair; B. A. Knuth, J. P. Lassoie, E. L. Mills

The honors program in natural resources provides an opportunity for undergraduates to pursue supervised independent research in the areas of (1) ecology and management of landscapes, (2) fish and wildlife biology and management; and (3) resource policy, management, and human dimensions. The subject matter and nature of the research experience may be quite varied, but require the guidance and supervision of a faculty member with substantial interest and expertise in the subject area chosen.

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

- Register for the honors program in the junior year or earlier.
- Select a faculty adviser who will help identify and formulate a research problem.
- Carry out an independent research effort that is original and separate from the work of others who may be investigating similar subjects.
- Describe and summarize the work in the form of a conventional master's thesis or scientific paper ready for journal submission. About half of the theses have been published.
- Work closely with at least two faculty or staff members who will agree to serve as readers for the thesis. Provide readers with a copy of the guidelines for evaluation of honors theses, available from the department's honors program committee.
- Take the lead role for meeting each of the above expectations.

**Nutritional Sciences**

Faculty committee: M. N. Kazarinoff, R. S. Parker

The honors program offers students a research experience structured to give them the opportunity to choose a research project, search the literature relevant to it, plan and execute the research, and write it up in the form of a thesis. As in other types of research available to undergraduates, each student is guided by a faculty mentor. The honors project is designed to be spread over both semesters of the junior and senior years.

Students who consider this option should be aware that it involves a number of deadlines and considerable time commitment. Before signing on for honors, they need to consult with their academic advisers to make sure that honors will not interfere with other academic objectives, such as preparation for admission to medical school or making the dean's list. Although honors research projects are designed for work in progress until the project has been fully completed, an outline of activities for both years is given below. Letters of invitation are sent to upcoming seniors during the summer.

**Junior Year**

**Fall Semester** Course No: NS 398 (1 credit, S-U): Students are oriented to the program, and provided material that summarizes the range of research activities in DNS. Students begin making arrangements with faculty members. When these arrangements have been completed, students will begin a literature search that focuses on their research problem.

**Spring Semester** Students register for NS 498 (1 credit, section 1). Additional faculty presentations of research opportunities are made and orientation to supportive services available through DNS are made. Placements with faculty mentors should be completed by spring break. Each student may also register under the number NS 499 for a convenient number of credits, to be determined in consultation with the chosen adviser. Work carried out will have two objectives:

1. to become familiar with literature and/or research methods appropriate to the problem for the honors research,
2. to develop a research proposal.

The semester outcome will be written reports/discussions of the method(s) or literature searches and a short research proposal, evaluated by the research adviser.

**Senior Year**

**Fall Semester** Students will register under the number NS 499 (2-4 credits, LET, by arrangement with their mentors). They may begin their research earlier than fall, e.g., during the summer, or even earlier, but should be prepared to begin research **early in the fall semester at the latest**. The objective for the semester will be to complete most of the hands-on research/data acquisition.

**Spring Semester** Students will again register under course number NS 499 for 2-4 credits LET, by arrangement with their research mentors. Much of the allotted time will be spent on data analysis and on writing the honors thesis.

Several important deadlines should be noted.

1. **Last week in March**: The names of thesis readers** are to be in the hands of the honors committee.
2. **Third to fourth week of April**: A final draft of the thesis is handed to the readers.
3. **First to second week of May**: Scheduled seminars for oral presentations of each student's research.
4. **Last day of classes**: Final form of the thesis is handed to the honors chairman.

To help students meet these deadlines, students register for NS 498 (1 credit, section 2) class sessions will be held before spring break for guidance in thesis writing and/or informal reporting of preliminary data. After spring break the group will meet once or twice (depending on number of students) to practice oral presentations of completed research.

*Grade is determined by each student's mentor.

**Two readers knowledgeable in the area of the student's research topic to be chosen by the honors committee and faculty advisers.

**Physical Sciences**

Faculty committee: C. E. McCulloch, chair; G. W. Fick, J.-Y. Parlange, S. S. H. Rizvi

The honors program in physical sciences provides outstanding students with an opportunity to do independent research under the supervision of a faculty member in the Departments of Agricultural and Biological Engineering, Soil, Crop, and Atmospheric Sciences; Food Science; or in the Biometrics Unit.
Students must be enrolled in the program for a minimum of two semesters and must also enroll in the appropriate departmental independent study course for a total of at least 6 credits. They must submit a report of their research, usually in the form of a journal article, to the honors committee by three weeks before the end of classes of the semester in which they expect to graduate. Details of the program can be obtained from the chair of the physical sciences honors committee.

**Plant Sciences**

Faculty committee: R. L. Obendorf, chair; L. L. Creasy, A. M. Petrovics, W. A. Sinclair

Students perform independent scientific research under the guidance of faculty members in fields of horticultural, agronomic, and soil sciences; plant biology; plant breeding; and plant pathology. For admission to the program, students must meet college requirements and submit to the Plant Sciences Honors Committee a project proposal (2-3 pages) which includes a title; a brief background to the problem (justification and literature review); a clear statement of objectives (and how they will be tested); methodology and experimental plan, necessary space, equipment and supplies; and a project budget. The proposal must be accompanied by a letter from the faculty supervisor stating that he or she has approved the project plan and that its completion within the remainder of the student's undergraduate tenure is feasible. Successful completion of the honors program requires acceptance by the honors committee of two copies of a research report. The report should be written in the format of a research publication in the appropriate scientific field. The acceptable report must have been reviewed and corrected according to recommendations of the research supervisor before the report is submitted to the honors committee. It must be accepted by the honors committee at least two weeks before the last day of classes of the semester in which the degree is sought and must be accompanied by a letter from the research supervisor stating that the student is graduated with honors. The honors committee will review the report within one week and may accept it or return it to the student with specific recommendations for revisions. A suitably revised version must be submitted to the committee before the second day of the examination period. When the committee accepts an honors report, the chair will recommend to the Director of Academic Programs and to the College Registrar that the student be graduated with honors. One copy of the accepted report will be returned to the student with review comments from the committee.

**Social Sciences**

Faculty committee: R. V. Lewenstein, chair; K. A. Strike, M. J. Pfeffer, W. H. Lesser

Students are accepted into the social sciences honors program of the College of Agriculture and Life Sciences after meeting all the criteria described above, after evaluation of the student's written application, and on approval of a detailed thesis proposal. The application and proposal are due 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 first semester of the junior year. The purpose of the proposal is twofold. First, it formalizes a plan of study and establishes a set of expectations between the student and his or her faculty adviser. Second, the Honors Committee reviews the proposal to determine whether it is consistent with honors thesis requirements, and to make suggestions for improvement. The proposal must be 5-10 typed, double-spaced pages in length and include the following sections:

- **Research Topic**: State the problem to be studied or the topic of interest. Review the relevant literature and the background of the problem or topic; include a more extensive bibliography.

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

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

- **Expected Significance**: State what new knowledge or information is likely to be forthcoming and why it is important.

Faculty advisers must be members of the graduate faculty. Exceptions to this rule will be granted for persons with special expertise who are deemed capable of thesis supervision; exceptions will be granted pending petition to the social science honors committee. Students may register for independent study directed by the faculty adviser in conjunction with an honors project.

Honors degrees are awarded upon approval of the honors thesis by the social science honors committee. Honors theses should deal with a substantive issue within one of the fields in the social sciences. Both the results of the research and the methodology (or the argument by which the results were achieved) must be reported in the literature. The models, practical conclusions or applications, or broad characterizations of an area of inquiry may constitute part of the research report but are not themselves sufficient to count as research. Honors theses should be written according to the form of any standard journal within the appropriate fields. 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. Approval of the thesis requires a majority vote of the honors committee.

**INTERCOLLEGE PROGRAMS**

The College of Agriculture and Life Sciences does not participate in any dual-degree programs. Study for the Bachelor of Science is the only undergraduate degree program offered.

The College of Veterinary Medicine may accept students who are then permitted to double-register in their seventh 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 faculty adviser, in 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** upon completion of the B.S. degree in Agriculture and Life Sciences may accept a program of independent study in their senior year if it is approved by their college faculty adviser as part of their undergraduate program. In certain cases an "upset" tuition charge, equal to the endowed undergraduate tuition rate, will be applied for undergraduate statutory college students taking excess credit hours from endowed colleges and schools. Inquiries should be directed to the university bursar.

**Students in the Field Program in Agricultural and Biological Engineering** are usually enrolled in the College of Agriculture and Life Sciences during the freshman and sophomore years and jointly enrolled in this college and the College of Engineering in the junior and senior years. Students pay the engineering college tuition rate in the junior year. The curriculum is accredited by the Accreditation Board for Engineering and Technology. The B.S. degree is awarded in cooperation with the College of Engineering.

**The Program in Landscape Architecture** is cosponsored by the Department of Floriculture and Ornamental Horticulture in the College of Agriculture and Life Sciences and by the College of Architecture, Art, and Planning. The program offers a first professional degree curriculum in landscape architecture at both undergraduate and graduate levels, as well as a graduate second professional degree program.

**The Division of Nutritional Sciences** is an intercollege unit affiliated with the College of Human Ecology and the College of Agriculture and Life Sciences. The undergraduate nutrition major is based in the College of Human Ecology, and the graduate nutrition and agriculture major is based in the College of Agriculture and Life Sciences. Students may study nutrition in areas such as animal sciences; food industry management; food science; microbiology; nutrition, food, and agriculture; and fruit or vegetable science. Students may also plan a concentration in biological sciences or a concentration in general studies in agriculture to include a human nutrition component.

**The Department of Science and Technology Studies** is an academic unit that engages in teaching and research involving the interactions of science and technology with social and political institutions. The program draws its students, faculty, and research staff from the various divisions of the university, including the College of Agriculture and Life Sciences. It offers an interdisciplinary undergraduate major in Biology and Society. A general studies major may be planned in consultation with a faculty adviser to fulfill a biology and society program. Further information, including a list of courses, may be obtained from the undergraduate office, 275 Clark Hall.
The American Indian Program (AIP) is a multidisciplinary intercollege 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 Indian peoples and their relationship to other peoples in the United States and Canada. Students are challenged by such topics as the sovereign rights of Indian Nations and the contemporary relevance of Indian attitudes toward the environment. The program's instructional core consists of courses focusing on American Indian life from pre-contact times to the present, and from the perspectives of Native people as much as possible. Core courses are supplemented by a variety of offerings in several different departments.

Research areas among faculty active in the program include Indian education, social and economic development, agriculture, environmental issues, history, literature and the arts, and cultural preservation. Their research, teaching, and outreach efforts within the program seek to develop solutions to problems identified by Indian communities and to facilitate the application of institutional resources, research, and expertise to community needs.

The American Indian Program publishes its own multidisciplinary journal, Native Americas, and sponsors conferences, guest lectures, and forums on important local, national, and international issues. Akwesasne, 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 will be earned upon completion of five courses: Rural Sociology 100 (Introduction to American Indian Studies) and Rural Sociology 175 (Issues in Contemporary American Indian Studies), plus three other courses selected from the following course listing: ANTHR 230, ANTHR 665, ENGL 260, ENGL 269, ENGL 278, ENGL 659, ENGL 669, ENGL 687, HIST 200, HIST 276, HIST 277, HIST 370, HIST 429, HIST 624, R SOC 100, R SOC 175, R SOC 318, R SOC 440, R SOC 442), 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 300 Caldwell or consult with K. Shanley, associate director of academic development, American Indian Program, 300 Caldwell Hall, 255-8402.

Science of Earth Systems (SES) is a new program for students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Engineering. The SES program emphasizes an 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. The program, detailed in more detail in the "Interdisciplinary Centers, Programs, and Studies" and the CALS "Interdepartmental and Intercollege Courses" sections, coalesces Cornell's teaching and research strengths across a broad range of earth and environmental sciences to provide students with a rigorous scientific foundation for the study of our complex, highly interactive earth.

The SES curriculum includes a freshman/sophomore emphasis on strong preparation in mathematics, physics, chemistry, and biology. In the junior and senior years, students take a set of common SES core courses and an additional set of four advanced disciplinary or interdisciplinary courses that build on the basic sequences. Students wishing to explore the new field are encouraged to enroll in the SES Colloquium (register for ABEN 120-121, GEOE 123-124, or SCAS 101-102). (See the Courses of Study section mentioned above for course descriptions.)

Several interdisciplinary tracks are available within the SES program, and these are chosen by the student according to interests and career goals. This tracking is accomplished through the selection of courses beyond the core sequence. These courses build on the program's instructional core and generally include junior and senior level courses with prerequisites in the basic sciences and mathematics. Effective tracks can be designed to prepare students for careers or graduate study in specific environmental science disciplines including atmospheric sciences, hydrology, biogeochemistry, ecology, oceanography, and geophysics. Meaningful and effective combinations of these disciplines are also possible. The selection of these sequences must be approved by the SES Coordinating Committee to ensure that depth as well as breadth is attained.

The SES courses are listed in the college's "Interdepartmental and Intercollege Courses" section. For more information, see the website at http://www.ge.cornell.edu/sez/sez_home.html.

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, 16 Farnow Hall. See also the Interdisciplinary Centers, Programs, and Studies section at the front of this catalog.

The Cornell Laboratory of Environmental Applications of Remote Sensing (CLEAR) is an interdisciplinary intercollege center with teaching, research, and extension components affiliated with the College of Agriculture and Life Sciences and the School of Civil and Environmental Engineering. A description of the program and general information is available from the director through the CLEAR office in Hollister 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.

An Intent to Study Off Campus form should be filed with the college registrar before leaving campus. Tuition may be reduced. In some cases stipends or cost of living allowances are provided. If receiving financial aid, students should consult the Office of Financial Aid and clear all accounts with the bursar prior to departure.

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. Students receive an intensive orientation to state government and attend a lecture-seminar program composed of three two-credit components offered by professors-in-residence. An internship experience, supervised by an internship committee, provides up to six additional academic credits. Independent study and research courses offered by the various departments in DSL and/or courses offered by academic institutions in the Albany areas may be elected.

Three opportunities are available. The Assembly Intern Program provides a placement with a member of staff of the New York State Assembly. The Senate Assistants Program has placements with New York State senators and selected staff. The Albany Semester Program provides experience with a state agency such as the Departments of Environmental Conservation, Education, or Labor.

Applications are collected and processed by the ALS 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 twelve credits must be carried to meet the residence requirement. Seniors should note that the last term average must be 1.7 or above.

All interns will audit the orientation sessions and meet participation requirements in at least two of the lecture-seminar sections. The paper required in each section constitutes an independent study project to be directed and evaluated by a Cornell faculty member in an appropriate discipline. Normally a faculty member will not sponsor more than one of the independent study courses for any one student. To receive academic credit for the internship, students enroll in ALS 400, for an S-U grade only.

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

Cornell-in-Washington

The Cornell-in-Washington Program offers students from all colleges within 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 Cornell-in-Washington Program offers two study options: 1) courses 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, the Cornell-in-Washington program. Students in the College of Agriculture and Life Sciences must register for ALS 500 and cannot receive credit for the externship experience alone. For further information, see p. 19 or inquire at 471 Hollister Hall, 255-4000.

**SEA Semester**
The Sea Education Association is a nonprofit educational institution offering ocean-focused academic programs and the opportunity to live, work, study, and research. Science, the humanities, and practical seamanship are integrated in small, personal classes. The 17-credit program is twelve weeks in length. Six weeks are spent in Woods Hole, the following six weeks are spent on either one of SEA’s two sailing vessels: the R/V Westward, or the R/V Corwith Cramer. For more information, students should contact the Cornell Marine Programs office, G14 Stimson Hall, 607-255-3717.

**Internships**
Several departments in the college offer supervised internships for academic credit. Arrangements should be made with the offering department for assignment of a faculty member who will be responsible for placement, for planning the program of work, and for evaluating student performance.

For internships not governed by an established internship course, the student must be placed in a 497 course for the number of credits to be assigned. If the work is done during the summer, the student must enroll in the Cornell summer session for the agreed-upon credits. In cases where the work is not done at Cornell, the awarding of credits depends upon a prior contractual arrangement between a Cornell professor and the student. Specific terms for receiving credit and a grade should be recorded, using the Independent Study, Research, Teaching, or Internship form, available in the Registrar’s Office, 146 Roberts Hall.

A maximum of 15 (pro-rated for transfer students) of the 120 credits required for the major degree may be taken in internships, independent study courses, and undergraduate teaching or research. No more than 6 of the 15 credits allowed for independent study may be awarded for internships consisting of off-campus work experiences that do not have the continued presence of a Cornell faculty member. The 6-credit allotment includes transfer credit and credit for internships in other colleges at Cornell. The 6-credit limit does not apply to secondary, postsecondary, and cooperative extension teaching internships in the Department of Education.

The College of Agriculture and Life Sciences does not offer a field study option. In general, a rather narrow view is taken toward awarding academic credit for work experience, "life" experience, or apprenticeships. Credit will only be assigned or accepted in cases where a professor is directly involved in determining both the course content and in evaluating a student's work. 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 nor in cases where the student has received financial remuneration.

All students enrolling for an internship must file an Independent Study, Research, Teaching, or Internship form with the Office of the Dean of the College Registrar. If the study is to take place off campus, the Intent to Study Off Campus form should also be filed with the college registrar.

**Overseas Academic Programs**
All students planning to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of Courses of Study. The Cornell Abroad program is open to students in all colleges of the university. Students in the College of Agriculture and Life Sciences should consult with their faculty advisor and the college Study Abroad Adviser to ensure that credit received for academic work abroad will meet requirements for graduation. The Study Abroad Adviser is in the Counseling and Advising office, 146 Roberts Hall, and has walk-in hours scheduled to advise students on study abroad options.

Students in the College of Agriculture and Life Sciences are eligible to participate in three student exchange programs. Applications are accepted by sophomores to spend their junior year at one of the following universities:

**Agriculture College of Sweden at Uppsala**
In this exchange program, one Cornell student and one Uppsala student "switch places" for the year. The Cornell student will travel to Sweden in mid-June to live and work with an agriculture-related family, get acquainted with the customs, and become familiar with the language. Swedish language classes begin in mid-August in Uppsala, and regular classes begin in mid-October. The academic year ends in June.

**Instituto Tecnologico de Estudios Superiores de Monterrey (ITESM)**
This program exchanges one Cornell student and one ITESM student for one full year or two students for one semester each. The student will travel to Mexico in the middle of June and begin Spanish language classes immediately. After completing the classes in August, there is time for a week or two of travel before the fall semester begins. The spring semester ends in May.

**Nanyang Technological University in Singapore**
This program exchanges two Cornell students for two Nanyang students for one full year and is available to Communication majors only. Courses are taught in English. The academic year is divided into two semesters of sixteen weeks each with a ten-week vacation following each semester. Semester One runs from July through October and Semester Two runs from January through April.

For additional information on these programs, see the CALS Study Abroad Adviser, 140 Roberts Hall.

**MAJOR FIELDS OF STUDY**
The college curriculum emphasizes the biological and physical sciences and the technology basic to the study of agriculture and life sciences. The sixteen major program areas 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. 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 minimum distribution requirements of the college.
bioprocessing, soil and water management, bioenvironmental and facilities engineering, bioinstrumentation, engineering aspects of animal physiology, environmental systems analysis, and waste treatment and disposal. Students select other courses in the College of Engineering that reflect their concentration, such as environmental engineering or biomedical engineering. Students planning for medical school also take organic chemistry. Throughout the curriculum, emphasis is placed on communications and teamwork skills.

Specific course requirements and other information for the Agricultural and Biological Engineering joint program are in the College of Engineering section in this publication.

The department also offers two technology programs: environmental systems technology and agricultural systems technology. The two technology programs emphasize applied and technical aspects of agricultural, biological, and environmental 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 teaching assistantships, research assistantships, design teams, Engineering Coop, and study abroad. Students can 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, biomechanical engineering, management consulting, and international agriculture.

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Biological Sciences

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

The major in biological sciences at Cornell is offered by the Division of Biological Sciences to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Student services in the division's Office for Academic Affairs and the Behrman Biology Center 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; cell biology; ecology and evolutionary biology; general biology; genetics and development; microbiology; neurobiology and behavior; and plant biology. A special program of study is available for qualified students with an interest in nutrition. Students interested in the marine sciences may consult the Cornell Marine Programs Office (G14 Stimson Hall, 255-3717) for academic advice and career counseling. For more details about the biology curriculum see the section in this catalog on the Division of Biological Sciences.

Communication

A generation ago, college graduates were thought to be equipped with the knowledge and skills needed to carry them through their entire career. Today we know that the single most important thing we can prepare you for is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change. The amount of information the public receives and is expected to understand in the 21st century is change.

The communication major is a program with a strong core (eight courses) of contemporary communication knowledge, theory, and practice. The series of freshman required courses include:

Fall semester:
Comm 120 Contemporary Mass Communication
Comm 121 Investigating Communication

Spring semester:
Comm 116 Communication in Social Relationships
Comm 117 Writing about Communication

This set of courses will provide you with a basic understanding of communication and the communication process. The 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, communication majors take:

Fall semester:
Comm 201 Oral Communication
Comm 230 Visual Communication

Spring semester:
Comm 253 Information Gathering and Writing
Comm 282 Communication Industry Research

After completing the eight courses in the core curriculum, you can choose to concentrate your advanced study in one of four focus areas:

• Communication in the Life Sciences. (Studies of the impact of communication on environmental, health, science and agricultural issues, as well as public perceptions of risk.)

• Communication Systems and Technology. (Principles of how we use communication technologies and how we are influenced by these technologies.)

• Communication Planning and Evaluation. (Development of communication plans to solve problems for individuals or for organizations and evaluating the success of these plans.)

• Communication as a Social Science. (Study of communication research and methods with emphasis on communication as a new social science discipline.)

The department requires that all majors take 18 credits (six courses) in communication after the core curriculum. Detailed information on the distribution of these courses is available from the department.

In designing the communication major, the faculty of the department has kept in mind the necessity for students to understand contemporary research-based knowledge about communication as well as their need to be competent communicators in the workplace and within society at large. Both are critical to successful careers and enlightened citizenship in the twenty-first century.

Education

The focus of the Department of Education is on the improvement and teaching of education within school and nonschool settings, as well as on the role of education in society. Students study concepts and develop competencies necessary to analyze educational situations critically and to plan, implement, and evaluate educational programs. Study at the undergraduate level is structured around a core curriculum:

• An introductory course in current educational issues (Education 101) (3 credits)

• Course work in the social, philosophical, psychological, and social foundations of education (e.g., Education 271, 311, 317, 370, 378, 472, 477) (12 credits)

• Supervised field experience (e.g., Education 240 for non-majors and Education 420 for majors) (1–4 credits)

• A capstone course to integrate the students' undergraduate experience (Education 495) (2 credits)

Three specializations and three certification programs are available within the department.

Agricultural, extension, and adult education. Agricultural, extension, and adult education is a program that combines preparation in both the agricultural and social sciences. The program prepares students for teaching careers in agriculture, science, and technology in public schools, the Cooperative Extension service, and extension and adult programs of agricultural businesses, government agencies, and a variety of private and not-for-profit organizations. Students take a college program that includes a balance of courses in education as well as courses in a technical area of agriculture/biotechnology, community/economic development, natural resources, human ecology, or communication. Education courses prepare students to succeed as educators in a broad range of careers. Courses are selected to develop professional leadership and teaching competence. Students may elect to focus their study on one or more of these areas: agricultural education, extension education, or adult education. As an alternative, students may elect to major in one of the college's technical departments and develop a complementary program of study in one or more of the three areas of agricultural, extension, and adult education. Further information is available from the agricultural, extension, and adult education coordinator, Kennedy Hall (Tel: 607-255-7755).

Educational psychology. Studies in educational psychology have traditionally focused on teaching and learning in schools. Yet schools are only one location in which learning and teaching take place. An undergraduate emphasis in educational psychology at Cornell applies principles of teaching and learning to educational enterprises, broadly defined. While graduate study is required for many careers in psychology, an undergraduate emphasis in educational psychology provides excellent preparation for leadership in educational work or for many post-baccalaureate positions. Educational psychologists develop and supervise training programs in business, industry, the military, and government; design and evaluate curriculum and instructional materials for publishers; develop tests for educational and
Professional associations; evaluate social
educational research organizations.
Total of 20-25 hours in educational psychology
Systems Design and Development; Human
adviser a student may design a program in
Relations; Individual and Social Development;
or the Educational Psychology of Human
Development.

Students interested in careers in educational
psychology should apply for admission to the
Department of Education. For more informa-
tion regarding a concentration in educational
psychology, contact: Coordinator, Educational
Psychology Program, Education Department,
Kennedy Hall (Tel: 607-255-9258).

General Education. The concentration in
general education is appropriate for students
seeking a solid foundation in the disciplines
underlying the education professions.

Students will take courses in areas such as the
art of teaching, philosophy of education,
social foundations of education, curriculum
and instruction, methods of teaching, the
instructional applications of microcompu-
ters and related areas. Graduates of the
concentration in general education may
continue their studies in various areas of
education or pursue careers in educational
and human resource areas in business and
industry, the human services, or government
agencies. There are growing opportunities for
employment of education graduates in the
human resource management areas of
agribusiness firms. Further information about
the general undergraduate education is
available from the undergraduate coordinator
(Tel: 607-255-9269).

Teacher Certification
Students at Cornell may pursue secondary
grade 7-12 teaching credentials in agriculture,
mathematics, biology, chemistry, physics,
easphalt science, and general science.

Agriculture. Students completing the
registered program as undergraduates in
agriculture are eligible to teach agricultural
subjects, introduction to occupations,
occupational science or math, and introduc-
tory technology for grades 7 and 8. Passing
scores on the National Teacher Examination
(NTE) or New York State Teacher Certification
Exam (NYSTCE) and one year of agricultural
work experience are required for provisional
certification, which is valid for five years. The
master's degree required for permanent
certification as a school administrator is
usually recognized in other states.
The program is unique in that it is specifically
designed to prepare administrators for small
and rural school districts. Course work, the
internship, and the doctoral dissertation are all
oriented toward addressing the practical
problems that characterize such districts and
to prepare candidates to assume a leadership
position in them. To earn certification, a
student must complete at least one year of
full-time, on-campus study followed by a
one-year, half-time administrative internship in
a cooperating school district. To be eligible
for this program, students should possess
the equivalent of a master's degree, have a
satisfactory graduate and undergraduate
record, three years of teaching experience,
and the recommendation of his or her
superintendent of schools.

For more information, contact the coordinator
for Administrator Certification Program (Tel:
607-255-7758).

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 immedi-
ately begin careers in various aspects of basic
or applied insect biology including integrated
pest management, insect pathology, environ-
mental assessment, medical or veterinary
entomology, insect toxicology, apiculture,
insect systematics, or insect ecology. Because
of the diversity of career options, the major
includes a common core of requirements
allowing flexibility in electives selected by
students in consultation with their advisers.

Specific Requirements
Basic Sciences
College mathematics, including a course in
calculus
A year of physics
Chemistry 103-208 or 207-208
Chemistry 257 (organic)

General Biology
Introductory Biology
Biological Sciences 281 (Genetics)
A choice of one: Biological Sciences 261
(Principles of Ecology) or
Biological Sciences 350 or 331 (Principles
of Biochemistry)
Biological Sciences 387 (Evolutionary
Biology)

Entomology
Entomology 212 (Insect Biology)
Entomology 322 (Insect Morphology)
Entomology 351 (Insect Systematics)
Entomology 483 (Insect Physiology)

It is strongly recommended that students who
wish to undertake graduate training in
entomology include coursework beyond the
minimum in their program, including
enrollment in more than one of the general
biology courses, and in other entomology
courses on more specialized topics.

Food Science
The mission of the Food Science Program is to
educate students for careers in food science
and technology. Graduates are prepared for
entry level positions in industry, government,
and research organizations or for advanced
study in food sciences and related disciplines.

Food scientists qualify for satisfying careers
which focus on ensuring 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 choose one of five specialization
options: 1) Basic Food Science, 2) Food
Engineering, 3) Food Processing, 4) Food
Industry Operations and Management,
5) Food Biotechnology. The first three
options meet minimum curriculum standards
set by the Institute of Food Technologists, the
premier professional society for food
scientists. Students choose an option based
on individual interests and career goals. The
choice should be made as early as possible.

The first two years of the program are focused
on establishing a solid background in the
physical and biological sciences, math, and
communication. Required courses include
chemistry (intro and organic), biology,
microbiology, calculus, physics, freshman
seminar, food science, and nutrition. The
second two years emphasize the application
of basic science and technology to the
processing, storage, distribution, marketing,
and final preparation of foods. Required
courses include Food Engineering Principles,
Unit Operations in Food Manufacturing, Food
Safety Assurance, Food Chemistry, Sensory
Evaluation of Foods, Food Microbiology,
and statistics. Students choose electives to satisfy
college distribution requirements and
individual interests.

Students are strongly encouraged to partici-
pate in research supervised by a faculty
member and/or to work as an intern in a food
company during summers. Most faculty in the
department have active research programs and
welcome participation by undergraduate
students. Students may receive academic
credit or wages for undergraduate research
on campus. Many food companies recruit on
campus for their summer internship programs.
These internships are excellent opportunities
for students to gain experience and establish
contacts for future employment.
A state-of-the-art food processing and development laboratory, a full-scale dairy plant, and extensive laboratory facilities are available on campus for training, research, and employment.

**Landscape Architecture**

Landscape Architecture focuses on the art of landscape design as an expression of cultural values combined with the natural processes of the environment. The program's unique place within the university promotes interaction among the areas of horticulture, architecture, and city and regional planning. The program is co-sponsored by the colleges of Agriculture and Life Sciences and Architecture, Art, and Planning.

The course of study prepares students intellectually, technically, artistically, and ethically for the practice of landscape architecture. The curriculum focuses on graphic communication, basic and advanced design methods, landscape history and theory, plant materials, construction 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 urban design and housing to parks and garden design.

Landscape Architecture offers two professional degree alternatives: a four-year bachelor of science degree administered through the College of Agriculture and Life Sciences; 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 several parts: 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 concentrations in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site, landscapes 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:**

### First Year

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>LA 141, Grounding in Landscape Architecture</em></td>
<td>3</td>
</tr>
<tr>
<td>Biological sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Physical sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Social sciences or humanities elective</td>
<td>3</td>
</tr>
<tr>
<td>Written or oral expression elective</td>
<td>3</td>
</tr>
<tr>
<td>Spring Term</td>
<td>15</td>
</tr>
<tr>
<td><em>LA 142, Grounding in Landscape Architecture</em></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>
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</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>LA 491, Design and Plant Establishment in the Urban Environment</em></td>
<td>3</td>
</tr>
<tr>
<td><em>LA 201, Medium of the Landscape</em></td>
<td>5</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>HORT 335, Woody Plant Materials for Landscape Use</td>
<td>3</td>
</tr>
<tr>
<td>Spring Term</td>
<td>17</td>
</tr>
<tr>
<td><em>LA 202, Medium of the Landscape</em></td>
<td>5</td>
</tr>
<tr>
<td><em>LA 315, Site Engineering I (1st 7 weeks)</em></td>
<td>2</td>
</tr>
<tr>
<td>Historical studies</td>
<td>3</td>
</tr>
<tr>
<td>Written or oral expression elective</td>
<td>3</td>
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<tr>
<td>Physical sciences elective</td>
<td>3</td>
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</table>

### Third Year

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<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td><em>LA 301, Integrating Theory and Practice</em></td>
<td>5</td>
</tr>
<tr>
<td><em>LA 316, Site Engineering II (2nd 7 weeks)</em></td>
<td>2</td>
</tr>
<tr>
<td><em>LA 317, Site Construction I (1st 7 weeks)</em></td>
<td>2</td>
</tr>
<tr>
<td>Historical studies</td>
<td>3</td>
</tr>
<tr>
<td><em>LA 480, Principles of Spatial Design and Aesthetics</em></td>
<td>3</td>
</tr>
<tr>
<td>Spring Term</td>
<td>15</td>
</tr>
<tr>
<td><em>LA 302, Integrating Theory and Practice</em></td>
<td>5</td>
</tr>
<tr>
<td>Concentration</td>
<td>6</td>
</tr>
<tr>
<td>Free elective</td>
<td>3</td>
</tr>
<tr>
<td><em>LA 318, Site Construction II (2nd 7 weeks)</em></td>
<td>2</td>
</tr>
</tbody>
</table>

### Fourth Year

**Fall Term**

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<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>Concentration</td>
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<tr>
<td>Social sciences or humanities elective</td>
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<tr>
<td>Free elective</td>
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<tr>
<td>(Optional landscape architecture study abroad semester in Denmark or Rome)</td>
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</tbody>
</table>

**Spring Term**

<table>
<thead>
<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>LA 402, Urban Design in Virtual Space</td>
</tr>
<tr>
<td>Concentration</td>
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<tr>
<td>LA 412, Professional Practice</td>
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<tr>
<td>Free elective</td>
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**Summary of credit requirements**

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<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>Specialization requirements</td>
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<tr>
<td>Distribution electives</td>
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<td>Free electives</td>
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<td>Concentration</td>
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<td>Total</td>
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**Master of Landscape Architecture (M.L.A.) License Qualifying Degree**

Requirements of the three-year M.L.A. curriculum include 90 credits, 6 resident units of satisfactory completion of the core curriculum courses, and a thesis or a capstone studio.

**First Year**

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>LA 505, Graphic Communication I</td>
<td>3</td>
</tr>
<tr>
<td>LA 480, Principles of Spatial Design and Aesthetics</td>
<td>3</td>
</tr>
<tr>
<td>LA 501, Composition and Theory</td>
<td>5</td>
</tr>
<tr>
<td>HORT 335, Woody Plant Materials for Landscape Use</td>
<td>3</td>
</tr>
<tr>
<td>LA 491, Design and Plant Establishment in the Urban Environment</td>
<td>3</td>
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<tr>
<td>Spring Term</td>
<td>17</td>
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<tr>
<td>LA 502, Composition and Theory</td>
<td>5</td>
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<tr>
<td>Historical Studies</td>
<td>3</td>
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<tr>
<td>Concentration</td>
<td>3</td>
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<tr>
<td>LA 615, Site Engineering I (1st 7 weeks)</td>
<td>2</td>
</tr>
<tr>
<td>Free elective</td>
<td>3</td>
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**Second Year**

<table>
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<tr>
<th>Fall Term</th>
<th>Credits</th>
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<tbody>
<tr>
<td>LA 601, Integrating Theory and Practice</td>
<td>5</td>
</tr>
<tr>
<td>LA 616, Site Engineering II (2nd 7 weeks)</td>
<td>2</td>
</tr>
<tr>
<td>LA 617, Site Construction I (1st 7 weeks)</td>
<td>2</td>
</tr>
<tr>
<td>Historical Studies</td>
<td>3</td>
</tr>
<tr>
<td>Concentration</td>
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</tbody>
</table>
Spring Term
*LA 602, Integrating Theory and Practice 5
*LA 618, Site Construction II (2nd 7 weeks) 2
Historical Studies 3
**Concentration 6

Third Year
Full Term
*LA 590, Theory Seminar 3
*LA 701, Urban Design and Planning 5
Free elective(s) 3
**Concentration 3

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

Summary of credit requirements
*Specialization requirements 63 or 67
**Concentration 15
Free electives 12 or 8

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 are therefore expected to 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 are permitted some flexibility in establishing programs that take full advantage of the teaching and research resources of the university.

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. This must include at least two advanced studies, a graduate seminar, two concentrations, and a thesis.

Undergraduate Concentration for Non-Majors

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. Baugher.

Required.
Visual Studies (choose one):
Arch 11 Introduction to Architectural Design (4 cr)
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)
DAE 101 Design I: Fundamentals (3 cr)
DFA 114 Drawing (3 cr)
LA 141 Grounding in Landscape Architecture (3 cr)
The Landscape
LA 282 The American Landscape (3 cr)
Electives (choose two):
LA 261 Urban Archaeology (3 cr)
LA 262 Laboratory in Landscape Archaeology
LA 360 Pre-Industrial Cities and Towns of North America (3 cr) offered alternate years [1997-98/1999-2000]
LA 363 American Indians, Planners, and Public Policy (3 cr)
LANAR 525 History of American Landscape Architecture (3 cr)
LA 569 Archeology in Preservation Planning and Design (3 cr) offered alternative years [1997-98]

+Distribution Elective
Natural Resources

The undergraduate curriculum is designed to provide an enduring and broadly applicable education. The focus of study is on the systems that yield our renewable natural resources (water, forests, fish, and wildlife) and includes emphasis on both the ecological and human dimensions of resource management. Students are encouraged to understand the scientific, ethical, and societal basis of the protection and management of renewable resources through the application of ecological principles and knowledge of social needs.

Required Core Curriculum

Students who desire to graduate with a specialization in Natural Resources are expected to complete, as a minimum, the courses specified in the following two-part Core Curriculum. First is a broad group of courses taken primarily outside the department, which, as their presentation suggests (Groups A–D), also fulfill this college’s course distribution requirements described on page 30.

Group A - Physical Sciences

Mathematics—2 courses 6-8
Chemistry—2 courses 7-8

Group B - Biological Sciences

Introductory biology (BIOG 101–104 or 105–106) 8 cr. hours
General ecology—1 course

Group C - Social Sciences

3 credits in addition to
3 credits in economics

Humanities

6 credits in addition to a course in
"normative" ethics (NTRES 407, 411 or PHIL 241, 246, or 247)

Group D - Written and Oral Expression

Freshman Writing Seminars—2 courses
Oral communications—1 course

Courses outside the Distribution Groups

Statistics—1 course
Computer applications or programming—1 course

The Core Curriculum’s second portion is composed entirely of courses offered by the Department of Natural Resources; a minimum of 19 hours in department courses is required.

YEAR 1

One of 2 introductory courses:
NTRES 100 Principles of Conservation (Fall, 3 cr.)
NTRES 201 Environmental Conservation (Spr., 3 cr.)

YEAR 2

both courses listed:
NTRES 210 Introductory Field Biology (Fall, 4 cr.)
NTRES 253 Applied Ecology and Ecosystem Management (Spr., 3 cr.)

YEARS 3 AND 4

At least 9 credit hours from selected upper-level courses, with a minimum of 3 credit hours in ecology and 3 credit hours in management emphasis. Consult the current course list at http://www.dnr.cornell.edu/ ungrad or in G12 Femow Hall for courses meeting this requirement.

Students pursuing this specialization have remaining approximately 40 credit hours available to develop one or more concentrations of their choice within or outside this field.

Students who wish to do so may specialize further in natural resource ecology and management (including wildlife, fishery, forest, and aquatic sciences), or natural resource policy, management, and human dimensions.

Opportunities for field-oriented studies are available at Cornell’s nearby Arnot Teaching and Research Forest, the Cornell Biological Field Station on Oneida Lake near Syracuse, as well as at numerous natural areas near campus. An honors program is available for qualified students.

Students should seek relevant work experience to complement their academic studies.

Nutrition, Food, and Agriculture

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

The program in nutrition, food, and agriculture provides students with strong training in human nutrition in the context of an understanding and appreciation of the agricultural and life sciences. The program responds to the growing and important interrelationships between human nutrition and the agricultural and life sciences. Growing public interest in health and nutrition has placed great 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 as diverse 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 electives 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 and Health: Concepts and Controversies, NS 245 Social Science Perspectives on Food and Nutrition, NS 345 Nutritional and Physiocochemical Aspects of Foods, NS 331 Physiological and Biochemical Bases of Nutrition, and NS 332 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, and the life sciences.

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 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 jobs in industry, government, or supplementing the core requirements with additional courses in the areas of their interest.

For additional information about the nutrition, food, and agriculture program, contact the Division of Nutritional Sciences Academic Affairs Office, 335 MVR, 607-255-2628.

**Plant Sciences**

Plant sciences students can specialize in plant biology, plant genetics and breeding, plant pathology, course in plant disease management, and horticultural sciences, including floriculture and ornamental horticulture, and fruit and vegetable science. Students with well-defined interests upon arrival at Cornell can specialize in one of these programs beginning as freshmen. Others may prefer to start in the general plant sciences curriculum and specialize after exploring the program offerings.

Plant sciences is a multidisciplinary program, sponsored by the Department of Plant Breeding in Emerson Hall, and the Departments of Floriculture and Ornamental Horticulture, Fruit and Vegetable Science, Plant Pathology, and the Section of Plant Biology, located in the Plant Science Building.

**General plant science** is intended for students whose interest in studying plants has not yet centered in any one of the specializations within the area. Students may continue with this option throughout their undergraduate years, particularly if they are likely to be interested in and qualified for advanced studies beyond the bachelor's degree. Students who plan to seek employment upon graduation may prefer to specialize. There are, however, excellent opportunities for general plant science graduates at the bachelor's degree level in the service and supply industries, as Cooperative Extension agents, as teachers, and as research technicians.

More than one hundred courses are offered that deal directly with some area of plant science. Other courses relating to plant science are offered in other departments. In addition, another area of science may be combined with another specialization, such as agricultural and biological engineering, education, statistics, international agriculture, food science, or agricultural, resource, and business management.

Undergraduates are encouraged to obtain practical experience, which may involve internship and/or research under the direction of a faculty member or work in a commercial industry, research institute, botanical garden or arboretum, nursery, greenhouse, or farm operation. Departments will assist students in finding positions that will provide useful experience.

**Floriculture and ornamental horticulture** applies principles of plant science and business management to the production and marketing of florist, nursery, and turfgrass crops, as well as to the selection and management of plants in both indoor and outdoor landscapes. Programs prepare students for careers at the professional and managerial levels in horticultural business, landscape management, botanical gardens and arboretas, research, teaching, communications, and extension and public education.

The core curriculum consists of the following courses:

- BIO G 109 and 110, Biological Principles or an equivalent course
- CHEM 103 or 207 and 208 or an equivalent course
- HORT 101, Introduction to Horticultural Science
- HORT 102, General Horticulture
- HORT 230, Woody Plant Materials
- HORT 243, (BIO PL 243), Taxonomy of Cultivated Plants
- HORT 300 and 301, Garden and Interior Plants
- HORT 400, Principles of Plant Propagation
- BIOPL 241, Plant Biology (Introductory Botany)
- BIOPL 242, Plant Physiology (lecture)
- BIOPL 244, Plant Physiology (laboratory)
- SCAS 260, Introduction to Soil Science
- ENTR 241, Applied Entomology
- PLPA 241, Plant Diseases and Disease Management or PL PA 401, Basic Plant Pathology

Although mastery of these subject areas is considered essential for students planning to enter a floriculture or landscape horticulture career, justifiable exceptions to the core curriculum may be granted by the student's adviser.

With permission of the adviser, a transfer student may receive core curriculum credit for similar courses taken at other institutions provided that transfer credit is granted by the College of Agriculture and Life Sciences. In addition, all transfer students must complete a minimum of 12 credits in floriculture and ornamental horticulture courses at Cornell. No more than two of the following landscape architecture courses may be included in this 12-credit requirement: LA 141, 142, 282, 315, 316, 317, 318, 410, 480. No other landscape architecture or freehand drawing courses may be applied to the requirement because they do not contain horticultural subject matter.

Students may select an area of emphasis in either floriculture or landscape horticulture, or they may study generally across the specialization. Concentration in floriculture prepares students for careers in management of florist and greenhouse crop production, crops in controlled environment agriculture, and wholesale- and retail-florist marketing. Specialization in landscape horticulture trains students for careers in nursery-crop production, turfgrass management, golf course management, exterior and interior landscape contracting and service, retail- and wholesale-marketing of nursery products and services, public and botanical garden and arboretum management, urban horticulture, agroforestry, arboriculture, and related areas. Some students choose to pursue a general program in floriculture and landscape horticulture, including courses in both areas. Similarly, programs in horticultural business management, research, teaching, extension and public education, and communications/journalism may be arranged across two specialization areas. Students wishing to prepare for graduate study may develop a program in basic sciences and their application in horticultural science. Lists of recommended courses for the areas of specialization are available from student advisers and from the undergraduate program coordinator.
Working with his or her faculty adviser, each student will tailor a program to achieve individual educational objectives in floriculture, landscape horticulture, horticultural business management, or general horticultural science. A core of management courses also is strongly recommended for students planning horticultural business careers. Students are also encouraged to take courses in these areas: agricultural and biological engineering, soil science, computer science, ecology, entomology, geology, plant breeding, plant pathology, plant physiology, oral and written expression, plant taxonomy, and weed science. Use of electives to pursue study in the humanities and in other areas of special interest to the student is encouraged! Numerous opportunities to become familiar with the horticultural industries and professions are provided through field trips, guest lectures, undergraduate seminars, independent or small-group study, optional internships, and work-experience programs.

Questions concerning the undergraduate curriculum, advising, and related manners should be addressed to Professor Carl F. Gortzig, Undergraduate Program Coordinator, Department of Floriculture and Ornamental Horticulture, 23 Plant Science Building, Rm. 216, Ithaca, New York 14853-5508; telephone: 607-255-1787; e-mail: cfg@cornell.edu.

The department's office is 20 Plant Science Building. Departmental facilities include classrooms and laboratories in the Plant Science Building; greenhouse and laboratory facilities at the Kemper Post Laboratory, the Test Garden, the Turfgrass Research Field and Laboratory, and freehand drawing studios in Mann Library.

Plant biology provides undergraduates with preparation for graduate study in the plant sciences that stresses basic, rather than applied, research. In cooperation with an adviser, each student plans a curriculum with a concentration in basic sciences supplemented by courses in applied areas that seem appropriate. Options include molecular biology, plant physiology, plant biology, genetics, cytology, organic chemistry, biochemistry, anatomy, taxonomy, ecology, and evolution, and statistics. A core of courses, including mathematics, plant biology and physiology, and cytology, is strongly suggested. However, different specialties within plant biology afford a flexible curriculum.

Plant genetics and breeding provides undergraduates with (1) preparation for graduate study leading to advanced degrees in plant breeding and plant genetics and (2) preparation for work in producing and marketing plant varieties and making varietal recommendations, for positions in seed analysis, regulation, and quality control, and for work in biotechnology laboratories.

In cooperation with an adviser, each student plans a curriculum with a concentration in basic sciences supplemented by courses in applied fields best suited to his or her individual goals. Options include plant breeding and plant genetics; genetics, cytology, and cytogenticist; statistics; organic chemistry and plant physiology; plant anatomy, ecology, taxonomy, and physiology; crop production; plant pathology; entomology; and molecular biology and biotechnology.

Students are encouraged to gain hands-on experience in plant genetics and breeding by conducting independent research under direction of a faculty adviser and/or by working for a faculty member on his/her research. Field, greenhouse, and laboratory facilities are available.

Plant pathology is the study of the causes of plant diseases, the mechanisms of the interactions of disease-causing agents and plants, and the methods of preventing or controlling plant diseases. For most students, a concentration in plant pathology as an undergraduate prepares them for graduate study in plant pathology or another field of plant science. However, this concentration also prepares students for careers as technical representatives for agribusiness, as Cooperative Extension agents, as state or federal regulatory agents, or as research technicians in laboratories of plant pathology, mycology, microbiology, and biotechnology.

Courses include chemistry, mathematics, introductory biology, botany, plant physiology, and introductory plant pathology. Additional courses in plant pathology, courses, and other relevant courses from other fields are selected according to the particular interests of the student. Options include entomology; plant breeding; pomology; vegetable crops; floriculture and ornamental horticulture; and soil, crop, and atmospheric sciences.

Plant protection is offered for 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. This concentration can prepare students for careers in agribusiness, the agricultural industry, Cooperative Extension, pest management consulting, state and federal regulatory work, and a variety of other technical positions. Although designed as a terminal program for students desiring a practical preparation in general plant protection, this specialization can also provide an adequate background for graduate work in entomology, plant pathology, or weed science.

The following subjects are considered essential to the professional specialization: botany and plant physiology, general ecology, soils, crop science, and microbial ecology. Additional courses in introductory entomology, introductory plant pathology, plant disease control, weed science, and integrated pest management are recommended.

In addition, a number of other subjects pertinent to plant protection are recommended, depending upon the student's interests: agricultural economics, agricultural and biological engineering, soil, crop, and atmospheric sciences; biochemistry; communication; pathology and entomology; general physics; genetics; meteorology; mycology; pesticides in the environment; and plant anatomy. Employment involving practical experience in students between the junior and senior years is encouraged. The job may be on a farm, at an experimental station, with an agrichemical company, or with a regulatory agency.

Pomology (the science of fruit growing) provides students with knowledge of the scientific technology and the influence of environmental factors on the production, handling, and storage of deciduous fruit crops.

New York is a national leader in fruit production. Courses are selected by students in consultation with a faculty adviser. Flexibility in programs makes it possible to establish a course of study to fit the desired goals of individual students. The diverse pomology curriculum, complemented by courses in basic sciences and arts and electives in a student's area of interest, prepares pomology majors for a career in fruit production, agricultural business related to the fruit industry, storage and merchandising, or professional pomology. Job opportunities for knowledgeable students can be found in fruit production, marketing, sales and service, research, teaching, and extension.

Vegetable crops is offered for students with an interest in either applied or basic aspects of vegetable production. The high value of vegetables and their importance in the human diet assures a continued demand for trained personnel in all aspects of vegetable technology. A flexible curriculum is provided to prepare undergraduates for careers in a diversity of fields, including: horticultural research, teaching, extension, processing, and marketing. A faculty adviser assists individual students in the selection of courses, which usually include: general horticulture, soils, botany, vegetable types and identification, vegetable production, and post-harvest handling or marketing. Additional course work depends upon the interest of the student, and may include: vegetable physiology, plant breeding; entomology; plant pathology; weed science; ecology; soil, crop, and atmospheric sciences; mycology; agricultural economics; international agriculture; and agricultural and biological engineering.

The vegetable industry is an economically important component of agriculture in New York and in the United States. Recently, there has been increased interest in growing vegetables in tropical countries. Exciting challenges are facing the industry. Greater awareness of environmental and health issues is driving a change toward farming practices that depend less upon agricultural chemicals than in the recent past. New technologies are being developed and implemented to help growers make this change while remaining profitable. Among these technologies are: integrated pest management, genetic engineering, breeding for insect and disease resistance, low-input and organic cropping systems, and cultural practices that improve production efficiency and conserve agricultural resources.

The Department of Fruit and Vegetable Science has on-campus greenhouses and laboratories as well as two research farms in the Ithaca area that support our teaching program. Students are encouraged to gain hands-on experience growing vegetables and to pursue their individual interests through course work and by taking advantage of the many resources available in the College of Agriculture and Life Sciences.

Rural Sociology

Technological, economic, demographic, and environmental change have affected social processes, and each has major impacts on individuals, social groups, and societies, and the international order. At Cornell, rural sociology students study these and other facets of social change in both domestic and international settings.
Among the topic areas in which faculty members in the Department of Rural Sociology specialize are international agricultural and rural development, community and regional development and changes in the United States, rural sociology, aging and the life course, sociology of agriculture, rural industrialization and labor markets, technology and social change, population and development, political economy, women in development, race and ethnic relations, and research methodology. Most courses provide background in both domestic and international aspects of the subject matter. Normally, students will develop a specialty with either a domestic or international 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.

Recognizing that students are concerned with rural development, the undergraduate program emphasizes acquisition of skills as well as general knowledge in preparation for jobs or further study upon graduation. Accordingly, students are expected to become interested in each of theory, methodology, principles, and concepts in the analysis of practical problems.

Rural sociology offers degree programs at both the undergraduate and graduate levels (B.S., M.S., M.P.S., or Ph.D.). These programs are offered through the Department of Rural Sociology and the Graduate Field of Developmental Societies, both of which are located in Warren Hall. For many years, the department and graduate field have been recognized as among the top programs in the country, and both are known for innovative program orientations. The department is particularly well known for providing instruction in international as well as domestic aspects of community and rural development, environmental sociology, sociology of agriculture, population studies, and other topics. Faculty members in this department are committed to both quality instruction and research programs. Being located in a college of agriculture, faculty members maintain strong ties with the college in the college as well as with the International Agriculture Program, the Biology and Society Program, the Cornell Institute for Social and Economic Research, the Community and Rural Development Institute, the Gender and Global Change Program, the Life Course Institute, the Rural Development Program, the Hispanic Studies Program, the Program on Science, Technology, and Society, and the Center for International Studies. Nearly half of the undergraduate faculty are associated with one or more area studies programs (the Southeast Asia Program, South Asia Program, Latin American Studies Program, East Asia Program, or the Institute for African Development). Department members also maintain working relations with faculty in the Department of Sociology and other social science units located in other colleges at Cornell. Students are encouraged to complement their course work by electing courses in these other departments and programs, thereby rounding out their educations by acquiring different perspectives. The courses offered in rural sociology can be grouped in three broad categories: development sociology; population, environment, and society; and social data and policy analysis. All students majoring in Rural Sociology are required to take five core courses: an introductory course (R SOC 101), methods (R SOC 213), theory (R SOC 301), social stratification (R SOC 370), and a course in statistics. Four elective Rural Sociology courses are also required.

The focus area in development sociology provides an understanding of the processes and policies that influence social and economic development in rural settings in North America and low-income countries in the developing world. Courses provide background of development in both the advanced and developing countries. Students normally select a set of elective courses in which either domestic or international development is emphasized. These courses provide background in several aspects of development sociology, including (1) an understanding of the processes of socioeconomic development in low-income or Third World countries and training in the formulation of policies to enhance the socioeconomic well-being of citizens of those countries, (2) analysis of the social structures and processes for development in nonmetropolitan settings in the United States, (3) analysis of agriculture change and development in industrialized and low-income countries, and (4) an understanding of the processes of technological development and change in agriculture and other rural industries in developed and developing countries.

Students are encouraged to complement courses in the department with course work in the history and economics of development, area studies, and the policy sciences.

Courses in the population, environment, and society focus area provide an understanding of (1) the causes and consequences of the major components of population change—fertility, mortality, and migration; (2) the major patterns of population distribution and population characteristics in the United States and the developing world, (3) the relationships between social structure and the biophysical environment, (4) the relationships between population change and natural resource utilization in development, and (5) the impacts of public policy interventions on population size, growth and composition or on nature and biodiversity. Students normally select the elective courses for the major in such a way as to stress either population studies or sociological aspects of natural resources and the environment.

Students are encouraged to complement courses in the department with course work in demographic methods, household analysis, ecology and evolution, environmental studies, natural resources, and policy sciences.

Courses in the social data and policy analysis focus area provide (1) knowledge of research methodology, statistics, and computer applications, (2) an understanding of social, economic, political, and historical concepts essential for conducting meaningful analyses of practical problems and issues faced by organizations, communities, regions, and states, (3) knowledge and practice in policy analysis. Students ordinarily select electives in order to specialize in either policy analysis or in a particular area of public policy (international development policy, domestic rural development policy, environmental policy, or population policy, etc.).

Students are encouraged to complement courses in the department with course work in data collection and research design, evaluation research, computing, and advanced statistics.

**Soil, Crop, and Atmospheric Sciences**

The Department of Soil, Crop, and Atmospheric Sciences provides instruction in five specializations: atmospheric science, agronomy, crop science, science of earth systems, and soil science. Employment opportunities are centered 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 some of these specializations.

**Atmospheric science** is the study of the atmosphere and the processes that shape our weather. The core curriculum in meteorology is designed to provide students with an understanding of the fundamental physical and dynamic properties and processes of the atmosphere. All students are required to complete a minimum of five semesters of calculus, two semesters of physics, a semester each of chemistry, computer science, and statistics; and a sequence of eight courses covering observational, general, theoretical, and synoptic meteorology. Additional courses are available for students interested in specialized areas of meteorology. The curriculum satisfies the basic requirements for employment as a professional meteorologist and provides a sound background for graduate study or work in the numerous specialized areas of meteorological science. Students are encouraged to take additional course work in related or complementary areas of interest, such as agriculture, biology, computer science, mathematics, statistics, physics, chemistry, or engineering.

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

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

**Science of Earth Systems** integrates atmospheric and soil science as well as other earth studies to develop a scientific basis for managing the basic resources of the planet.
This is an interdisciplinary program described in detail elsewhere (see index).

**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 of agricultural and environmental and agriculture management related to soil. Students take 18 credits in soil science, including 4 credits in the introductory course. In addition, chemistry, mathematics, physics, and microbiology are required, as well as 6 credits of crop science to satisfy the major.

### Special Programs in Agriculture and Life Sciences

**General Studies.** Some students are interested in pursuing a general education in the agricultural sciences. Others are uncertain about career objectives in agriculture and the life sciences. The opportunity to develop an independent major in general studies in agriculture and the life sciences is available for such students. In consultation with a faculty advisor, they 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 or several academic units of the university.

Students completing this major are often planning a career in agriculturally related food and service enterprises. Many of the fast-growing occupations require the broad perspective, the scientific and technical skills, the attitudes, and the analytical ability that a general education fosters. A course of study for a special program must be planned with and approved by a college faculty advisor. Information on the options and names of faculty advisors prepared to advise in general studies programs is available in the Counseling and Advising office, 140 Roberts Hall.

General studies include production agriculture as well as technical work in the agricultural and life sciences. Many biotechnology concerns deal with aspects of agriculture, especially plant and animal systems 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 from the areas of individual interest or career aspiration.

**International Agriculture** provides students with an understanding of the special problems of applying basic knowledge to the processes of agricultural modernization in low-income countries. The student typically specializes in a particular region and works with an adviser to plan a program oriented toward international agriculture. The courses in International Agriculture are designed to acquaint students with the socio-economic factors in agricultural development, with the physical and biological nature of tropical crops and animals, and the various world areas for which study programs exist. Study of a foreign language is required.

In addition to the college distribution requirements, students in International Agriculture must take a minimum of 30 credits toward the major. A minimum of 7 credits in International Agriculture and 3 credits in a modern foreign language are required. 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.

### 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 'A' 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 'T' grades.

**Bachelor of Science with Distinction.** Students who rank in the top 10 percent of the college's graduates on the basis of the GPA for the last 60 credits completed at Cornell will be graduated with distinction.

**Bachelor of Science with Honors.** Students will graduate with a bachelor of science degree with honors when, in addition to having completed all the graduation requirements, they have satisfactorily completed the honors program in their area of interest and have been recommended for the degree by the honors committee of that area. Special requirements are given in the section on the Honors Program.

**Ho-Nun-De-Kah.** Founded in 1929, is the undergraduate honor society of the College of Agriculture and Life Sciences. Members are recruited from the top 20 percent of the senior class and top 10 percent of the junior class. In keeping with the ideals of encouraging scholarship, leadership, and citizenship, members provide free tutoring and a variety of service activities to both the college and the community.

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

**Phi Kappa Phi** is an honor society that recognizes outstanding scholarship in all academic disciplines. Members are nominated from among juniors, seniors, graduate students, and faculty. Seniors must be in the top 10 percent of their class, and juniors in the top 5 percent of their class to be eligible.

**Sigma Xi** is an honor society that recognizes outstanding achievements in research. It was founded at Cornell University in 1906. Its membership is selected mainly from graduate students, faculty, and alumni who have made "noteworthy achievement as an original investigator in a field of pure or applied science". Seniors who have demonstrated research aptitude with publishable independent investigations are also eligible for associate membership.

### DESCRIPTION OF COURSES

Undergraduate and graduate courses in the college are offered through the sixteen academic departments and units and also through the Divisions of Biological Sciences and Nutritional Sciences.

Descriptions of courses, both undergraduate and graduate, are given by department, arranged in alphabetical order.

Graduate study is organized under graduate fields, which generally coincide with the departments. Graduate degree requirements are described in the Annoucement of the Graduate School. Courses for graduate students are described in the section on the academic department that offers them.

### 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 relationship to other peoples in the United States and Canada. Students are challenged by such topics as the sovereign rights of Indian Nations and the contemporary relevance of Indian attitudes toward the environment. The program's instructional core consists of courses focusing on American Indian life from pre-contact times to the present, and from the perspectives of Native people as much as possible. Core courses are supplemented by a variety of offerings in several different departments.

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 will be earned upon completion of five courses: American Indian Studies 100 (enroll for Rural Sociology 100) and American Indian Studies 175 (enroll for Rural Sociology 175), plus three other courses selected from the American Indian Studies
AIS 100 American Indian Studies: An Introduction (enroll for Rural Sociology 100) Fall. 3 credits. S-U grades optional. W 7:30–10:30 p.m. R. W. Venables. Early American Indian history and the postcontact period will be reviewed with an emphasis given to developments since 1789. Topics such as land claims, treaties, education, mineral and water rights, social problems, militant organizations, and civil rights will be covered with guest lecturers and media presentations.

AIS 175 Issues in contemporary American Indian Societies (enroll for Rural Sociology 175) Spring. 3 credits. S-U grades optional. W 7:30–10:30 p.m. R. W. Venables. This course provides a foundation for the study of American Indians. Emphasis will be placed on social, cultural, historical, educational, and human development. Guest lecturers from Cornell's staff and the Indian communities and media presentations.

AIS 209 Political History of American Indians in the U.S. (enroll for History 209)

AIS 230 Cultures of Native North America (enroll for Anthropology 230)

AIS 260 Introduction to American Indian Literatures (enroll for English 260)

AIS 261 Urban Archaeology (enroll for Landscape Architecture 261)

AIS 269 Topics in American Indian Literature (enroll for English 269)

AIS 276 American Indian History 1500-1850 (enroll for History 276)

AIS 277 American Indian History since 1850 (enroll for History 277)

AIS 278 Native American Poetry (enroll for English 278)

AIS 318 Ethnomedicine of the Iroquois (enroll for Rural Sociology 318)

AIS 329 Indians, Settlers, and Slaves in the South (enroll for History 329)

AIS 360 Preindustrial Cities and Towns of North America (enroll for Landscape Architecture 360)

AIS 363 American Indians, Planners, and Public Policy (enroll for Landscape Architecture 363)

AIS 367 American Indian Tribal Governments (enroll for Rural Sociology 367)

AIS 370 Resistance and Adaptation: Native American Responses to the Conquest (enroll for History 370)

AIS 429 Undergraduate Seminar in Indians of Eastern North America (enroll for History 429)

AIS 442 American Indian Philosophies: Selected Topics (enroll for Rural Sociology 442)

AIS 471 American Indian Women's Literature (enroll for English 471)

AIS 494 Special Topics in American Indian Studies

AIS 624 Graduate Seminar in American Indian History (enroll for History 624)

AIS 659 Trickster in American Indian Literature and Culture (enroll for English 659)

AIS 665 Native American Contributions to Anthropological Thought (enroll for Anthropology 665)

AIS 687 American Indian Literature: Issues of Transition, Collaboration and Alternate Discourse (enroll for English 687)

Science of Earth Systems

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

A new major in the Science of Earth Systems (SES) is now available for students in the College of Agriculture and Life Sciences. As described in the "Interdisciplinary Centers, Studies, and Programs" section at the front of this catalog, SES is an intercollege major which is also accessible to students in the Colleges of Engineering and Arts and Sciences.

The Science of Earth Systems provides a foundation for the study of American Indians. Emphasis will be placed on social, cultural, historical, educational, and human development. Guest lecturers from Cornell's staff and the Indian communities and media presentations.

For complete information about the SES major, see the Web site at http://www.geo.cornell.edu/SES/SES_home.html

For more information, contact a contact a SES adviser to explore the possibility of entering the SES major in the College of Agriculture and Life Sciences. K. H. Cook (SCAS), T. E. Dawson (Ecology and Systematics), L. O. Hedin (Biological Sciences), Y.-Y. Parmage (ABEN), S. J. Riha (SCAS), and J. Yavitt (NTRES).

Science of Earth Systems Courses

SES 101/102 Science of Earth Systems Colloquium (enroll for ABEN 120/121, GEO 123/124, or SCAS 101/102)

SES 301 Climate Dynamics (enroll for ASTRO 331 or SCAS 331)

SES 302 Evolution of the Earth System (enroll for GEO 302 or SCAS 332)

SES 321 Biogeochemistry (enroll for GEO 321 or NTRES 321)

SES 402 Mechanics in the Earth and Environmental Sciences (enroll for ABEN 385)

Department of Statistical Science

The university-wide Department of Statistical Science coordinates undergraduate and graduate study in statistics and probability. 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.

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The SES curriculum emphasizes strong preparation in mathematics, physics, chemistry, and biology during the freshman and sophomore years. In addition, students take a two-credit SES Colloquium (SES 101, 102). In the junior and senior years, students take a set of common SES core courses (SES 301, 302, 402) and an additional set of advanced disciplinary or interdisciplinary courses that build on the basic sequences.

The SES program provides strong preparation for graduate school in any one of the Earth Systems sciences and related engineering fields, in addition to preparing students for a wide variety of careers in environmental work with the B.S. degree. The SES major also provides a sound background for students who are interested in careers in fields such as environmental law and policy with a strong scientific understanding of the environment.

For complete information about the SES major, see the Web site at http://www.geo.cornell.edu/SES/SES_home.html

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Department of Statistical Science
Agricultural and Biological Engineering


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.

ABEN 102 Introduction to Microcomputer Applications
Fall or spring. 3 credits. S-U grades optional. Mac or PC labs available. All students, including those pre-enrolled, must attend the first lecture to guarantee admittance to a laboratory section. Lec, W 12:20-1:10, labs, M 1:25-4:25 or T 7:30-10:30 p.m., or T 7:25-8:25 or W 7:45-8:45 or 7:30-10:30 p.m., or R 1:25-4:25 p.m. Fee: $15. 1 evening prelim. P. E. Hillman.

Introduction to application packages on microcomputers. Laboratories provide experience with word processing, spreadsheets, database management, presentation graphics, and a choice between Web page authoring or one of Mann Library’s workshops (e.g., Photoshop). An independent project related to the student’s major is required. Mac and PC labs cover the same software material. These packages and others such as desktop publishing, multimedia, statistical software, searching the Internet for information are discussed and demonstrated in the lectures, as well as computer hardware and operating systems.

ABEN 104 Introduction to Programming in Java and Fortran

An introductory course in computer programming with an emphasis on handling data and algorithm development. Problem sets are on topics of general interest. The first third of the course utilizes Fortran 90 to introduce students to procedural programming concepts and style. For the remainder of the course, students will be introduced to object-oriented programming using Java. Students are expected to spend 5 to 8 hours outside their scheduled laboratory periods to complete problem sets. No prior knowledge of computers or computer language is necessary.

ABEN 110 Introduction to Metal Fabrication Techniques
Spring. 3 credits. Each lab limited to 18 students. Lec, T 8:00-9:05, labs T or R 8:30-9:25, M or T 7:30–8:25, T 1:25–2:25, R 1:25–2:25, or W 7:45–8:45, or 7:30–10:30 p.m., or R 1:25–4:25 p.m. Fee: $15. 1 evening prelim. P. E. Hillman.

Weekly one-hour seminars followed by one-hour discussion of current topics in the study of the earth systems. Introduces the student to scientific issues relating to understanding our planet and managing the environment.

ABEN 122 Introduction to Wood Construction
Fall. 3 credits. Each lab limited to 15 students. Lecs, T R 9:05-10:00, labs, T R 1:25-2:25, or W 1:25-2:25, or 7:30-10:30 p.m., or R 1:25-4:25 p.m.

An introductory course in wood construction. To include 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 will plan and construct an approved carpentry project.

ABEN 151 Introduction to Computing
Fall. 4 credits. Prerequisite: Math 191 or equivalent (cow-registra­tion permissible). Lecs, T R 11:15-12:05, labs, T 8:00-9:00, R 12:20–2:15, R 3:30-4:25, R 12:20–2:15, R 3:30-4:25, R 12:20–2:15; sec, M 7:30–8:20 p.m., 8:30–9:20 p.m., W 7:30–8:20 p.m., W 8:30–9:20 p.m., each lab and recitation section limited to 22 students. D. J. Aneshansley.

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

ABEN 200 Life after Graduation

A forum to discuss the curriculum requirements of the Agricultural and Biological Engineering programs and the contemporary and future role of agricultural and biological engineers in society. A required course for freshmen majors in Agricultural and Biological Engineering. A series of seminars will be given by practicing engineers, Cornell faculty members, alumni, and students. Students are expected to develop personalized, written career plans and select future courses to meet their career goals.

ABEN 250 Engineering Applications in Biological Systems (also Engineering Distribution 250)
Fall. 3 credits. Prerequisite: enrollment in an engineering curriculum. Recommended for the sophomore year. Lec, MWF 12:20. B. A. Ahner.

Case studies of engineering problems in agricultural and biological systems, including animal and crop production, environmental problems, energy, biomedicine, and food engineering. Emphasis is on the application of mathematics, physics, and the engineering sciences to energy and mass balances in biological systems.

ABEN 301 Energy Systems

Introduction to energy systems with emphasis on quantifying costs and alternative systems for conversion of environmental inputs into useful forms of energy. Course will cover solar energy, small-scale hydropower, wind, bio-conversion processes, house energy balances, energy crops and the public policy implications of alternative energy sources. Use of spreadsheet sheets will be extensive.

ABEN 305 Principles of Navigation (also Nav B 301)
Fall. 4 credits. Four classes each week (lecture-recitation-project work). Lecs, MWF 8:00-8:50; lab, R 8:00 or 9:05, J.-Y. Parlange.

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.

ABEN 310 Advanced Metal Fabrication Techniques
Spring. 1 credit (2-credit option available). Prerequisite: ABEN 110 or permission of instructor. Lab, F 1:25–4:30. T. J. Cook.

Principles and practices extending beyond the scope of ABEN 110. To include out-of-position, high carbon steel and cast iron welding. Soldering and brazing of aluminum, hard surfacing, both tungsten (TIG) and metallic (MIG) inert gas welding, plasma-arc and oxy cutting of metals. Planning, development, and fabrication of a metal construction project for the 2 credit option.
ABEN 331 Environmental Control for Agricultural Production Systems
Fall. 3 credits. Lecs., MWF 12:20-1:10. 2 evening prelms. K. G. Gebremedhin.
The focus of the course is modeling and solution of practical problems related to
designs of cooling, heating, air conditioning and distribution systems; design of heat
exchangers; ventilation design of livestock housing, greenhouses, and fruit and vegetable
storage facilities for control of temperature, humidity and/or air quality. Engineering
principles and linear programming concepts and applications are introduced at
the beginning of the course to the extent of solving problems in the allocation of
resources among competing alternatives and choosing the most economical system.
The course includes a semester-long project that provides a real-life design experience.
ABEN 350 Biological and Environmental Transport Processes
Fall. 3 credits. Prerequisites: MATH 294 and PHYS 162 (Computer-aided registered
Integration of heat and mass transfer in the context of biological and environmental systems.
Emphasis on the physical understanding of transport processes and simplified reaction
rates with application examples from plant and animal biology, the environment (soil/
water/air), and industrial processing of food and biomaterials.
ABEN 351 Computational Tools for Engineers
Spring. 3 credits. S-U or letter grade optional. Prerequisite: completion of the
undergraduate engineering math sequence or permission of instructor. Labs, MWF 2:30. J. R. Cooke.
This laboratory course provides a hands-on exposure to contemporary engineering software applications with
from applied mathematics and the engineering sciences. The symbolic computational software,
Mathematica, is the focus of the class. Topics from Math 191-294 and more
advanced topics relevant to the upper-level undergraduate curriculum and research are
treated.
ABEN 365 Properties of Biological Materials
Spring. 3 credits. S-U or letter grade optional. Prerequisites: one semester of math and
Mechanics and structural properties of biological materials. Mechanical damage of
animal, plant, and food products. Laboratory exercises in quasi-static and dynamic testing of
materials and interpretation of test results. Development and implementation of experimental techniques for
obtaining engineering properties and the use of this information in a design process.
ABEN 367 Introduction to Biological Engineering
Spring. 3 credits. Prerequisites: one year each calculus and introductory biology;
minimum one term each college chemistry and physics (freshmen. S-U
grades optional. Lecs., T R 10:10; lab R or F 1:25-4:25. J. B. Hunter.
Explores the use of engineering principles to solve biological problems in the context of
laboratory experiments. Topics may include artificial organs, neuromuscular electrical
signals, mass transfer in fermentation, enzyme kinetics, mechanics of plant or animal tissue;
and DNA transfer. Many topics relate to ongoing research at Cornell. Appropriate for
engineering and life science students. Field trips, demonstrations, and readings in current
literature.
ABEN 371 Hydrology and the Environment (also Civil, Crop, and Atmospheric Sciences 371 and
Geology 204)
Spring. 3 credits. Prerequisite: one
course in calculus. 2 lecs., 1 lab, Lecs., T R 9:05; lab, S. S. Vahdani; P. C. Baveye, J.-Y. Parlange, M. F. Walter,
L. Cathles.
Introduction to hydrology: the hydrologic cycle and the role of water and chemicals in
the natural environment. Includes precipitation, infiltration, evapotranspiration, ground
water, surface runoff, river meandering, floods, and droughts. Case studies, short field
trips, computer programs, and laboratories.
ABEN 385 Mechanics In the Earth and Environmental Sciences
Spring. 4 credits. S-U option. Lecs., MWF 11:15; sec, W 2:30-4:25. P. Baveye,
J.-Y. Parlange, and W. Brouwer.
The study of the earth and the environment requires an understanding of transport and other
physical processes within and at the surface of the earth. This course encourages the students to develop
knowledge of mechanics and its application to the earth and environmental sciences,
providing the background necessary to study the professional literature.
ABEN 425 Science and Technology of Environmental Management
Fall. 3 credits. Prerequisite: graduate or senior. Letter only. Lecs., T R 2:55-4:10.
W. J. Jewell.
Quantitative description of decline in environmental quality caused by human
activities, and exploration of science and technology solutions to pollution and their
limits. Tools used by engineers and scientists to understand the environment will be used to
focus on water quality problems (two-thirds), air quality (one-sixth) and land quality (one-
sixth).
ABEN 435 Principles of Aquaculture
Spring. 3 credits. Prerequisite: junior standing and above. Lecs., T R 12:25-2:15;
An in-depth treatment of the principles of aquaculture: fish biology, waste treatment,
engineering design, fish health, nutrition, processing, etc. This course is intended to
build upon the undergraduate’s previous course background and interests. Supervised
“hands-on” laboratory experiences. An ABEN 496 capstone design project can also be taken in
conjunction with this course.
ABEN 450 Instrument Design: Signal Processing and Data Acquisition
Fall. 4 credits. Prerequisites: Linear
Differential Equations, physics or electrical science, computer programming and use
An introduction to static and dynamic characteristics of electronic sensors, transduc-
ers, digital and analog signal conditioning circuits and conversion techniques, data
acquisition and instrument control with personal computers are considered. Biologi-
cal and agricultural examples of instrument problems and designs are used. A capstone
design project is an option with this course. See instructor for details. This course satisfies
the capstone design experience requirement.
ABEN 453 Computer-Aided Engineering: Applications to Biomedical and Food Processes
Spring. 3 credits. Prerequisites: Computer Programming (ABEN 151 or CS 100) and
heat and mass transfer (ABEN 350 or equivalent). Lecs., MW 11:15; computation
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. Biomedical processes and
industrial food processing applications of heat and mass transfer are covered. Computational
topics introduce the finite-element method, pre-
and post-processing, and pitfalls of using
computational software. Students choose their
own term project, which is the major part of the
course (no final exam). The course satisfies
the College of Engineering upper-
level computing application requirement. It also satisfies the capstone design experience
requirement.
ABEN 454 Physiological Engineering
Fall. 3 credits. Corequisite: fluid
Engineering analysis and design in the
physiology of animals and humans. Use of
engineering principles to study how animals
work in nature and to intervene in physiologi-
cal functions. The two major engineering
themes are: frequency analysis as applied to
neural conduction, sound processing, vision,
and image processing; and systematics as applied to cardiovascular and respiratory
systems, biomechanics, and bird flight.
Laboratories involve experiments, field trips, and live animal demonstrations. An ABEN 496 capstone
design project can also be taken in conjunction with this course.
ABEN 456 Biomechanics of Plants
Fall. 3 credits. Prerequisites: upper
division undergraduate or graduate status,
completion of introductory sequence in
biology and one year of calculus, or
permission of instructor. S-U or letter
grade optional. Lecs., T R 11:15-12:05; disc.,
An engineering approach is taken to plant
t form and function following the text, Plant
Biomechanics. Topics include: mechanical
behavior of materials, effect of geometry on
mechanical behavior solutions for water
reactions, plant cell walls, mechanical behavior of
tissues, mechanical attributes of organs,
the plant body, fluid mechanics and biomechanics
and plant evolution.
ABEN 471 Geohydrology (also Civil and
Environmental Engineering 431 and
Geology 445)
Fall. 3 credits. Prerequisites: Mathematics
294 and Engr 202. 2 lecs., 1 disc., lecture,
field trip. W. 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 hydraulics, soil water, and solute transport.

**ABEN 473 Watershed Engineering**
Fall. 3 credits. Prerequisite: Fluid Mechanics or Hydrology. Lecs, T R 9:05; disc, R 1:25-4:30. M. A. Walter. Engineering principles are applied to the design of soil and water management technologies aimed at solving natural resource problems in the context of watersheds. Emphasis will be placed on rural and countryside engineering and small-scale design for water conveyance, soil erosion control, flood damage control, earthen dams, ponds, moisture conservation, drainage, and water supply. This course satisfies the capstone design experience requirement.

**ABEN 474 Drainage and Irrigation Design**
Spring. 3 credits. Prerequisite: Fluid Mechanics or Hydrology. Lecs, M W F 12:20. T. S. Steenhuis and L. D. Geohring. This course will focus on design of drainage and irrigation systems for agriculture and non-agricultural 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 wherever possible. One major design project is required of each student. This course satisfies the capstone design experience requirement.

**ABEN 475 Environmental Systems Analysis**
Fall. 3 credits. Prerequisites: computer programming and one year of calculus. Lecs, M W F 1:25-2:15. D. A. Haith. System analysis and its use in environmental quality management. Emphasis is on modeling of environmental problems, translation of models into efficient computational algorithms, and use of computer simulation and computer-aided procedures (search techniques, linear programming, dynamic programming, and separable programming) to evaluate management alternatives. Applications include pollution control and resource management problems.

**ABEN 476 Solid Waste Engineering**
Spring. 3 credits. Prerequisites: 1 semester of physics and chemistry. Lecs, M W F 1:25. 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; hazardous waste management. Emphasis on quantitative analyses.

**ABEN 477 Treatment and Disposal of Agricultural Wastes**
Fall. 3 credits. Prerequisites: One environmental science course and at least junior-level standing, or permission of instructor. T R 2:30-3:45. Not offered 1999-98. W. J. Jewell. Overview of pollution problems in agriculture, legal restrictions, and technologies used to control pollution. Biological, physical, and chemical processes are applied to solve problems associated with animal wastes, food production, and food and fiber processing.

**ABEN 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. Natural waste treatment systems are sustainable, driven by solar power, and generate useful and valuable by-products. Constructed wetlands, hydraulic applications of plants, wastewater farming, sludge and industrial residue application, and soil restoration. Bioremediation of toxins, and biofilters for air purification are examples of pollution control systems that depend on natural processes. Pollution control mechanisms in soils and plants are defined and used to design innovative treatment systems for agriculture, municipalities, and industry. This course satisfies the capstone design experience requirement.

**ABEN 481 Design of Wood Structures**
Spring. 3 credits. Prerequisite: ENG 202. Lecs, M W F 12:20 (Holister Hall). K. G. Gebremedhin. Two evening prelims. Computer-aided and manual computation procedures of engineering wood structures. Topics include national design codes; estimation of design loads (dead, live, wind, snow, and seismic properties of wood and wood products; designs of beams, columns, trusses, frames, arches, bridges, diaphragms; connections, and special wood structural systems. Engineering judgment and individual responsibility in engineering design are also emphasized. The course includes a semester-long project that provides a real-life engineering design experience.

**ABEN 482 Bioenvironmental Engineering**
Spring. 3 credits. Prerequisites: ABEN 250 and 350, or equivalent. Lecs, T R 11:15, lab, W 1:25-4:35. L. D. Albright. Analysis and design of structures to modify the thermal and aerial environment of animals and plants. Environmental requirements of animals and plants, and the design of buildings to act as buffers between biological systems and climate. Heat flow, air flow, psychrometrics, energy balances, temperature biology, animal and plant models, thermal modeling, mechanical and natural ventilation, solar energy, and weather phenomena. This course satisfies the capstone design experience requirement.

**ABEN 491 Highway Engineering (also Civil and Environmental Engineering 462)**
Fall. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently). Lecs, T R 10:30; lab, T 1:25-4:35; L. H. Irwin. An introduction to highway engineering with an emphasis on design. Students will work in teams to apply theories and design criteria used in professional practice to several highway design projects. Topics of discussion include route location and design, traffic engineering, economic analysis, human factors and psychology, hydrology and drainage design, highway materials, pavement design, and maintenance. This course satisfies the capstone design experience requirement.

**ABEN 494 Special Topics in Agricultural and Biological Engineering**
Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged.

The department teaches "trial" courses under this number. Offerings vary by semester and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

**ABEN 496 Senior Design in Agricultural and Biological Engineering**
Fall and spring. 1-3 credits. Prerequisite: senior standing in ABEN engineering program or permission of instructor. Note: Completing an independent study form is required to register. Hours to be arranged. Staff. Involves capstone design experience, including a team project, incorporating analysis, design, evaluation, synthesis, and a written report of the end-product. This course may be taken in conjunction with an approved ABEN course (for an approved ABEN course, see ABEN Undergraduate Program publication).

**ABEN 497 Individual Study in Agricultural and Biological 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 upper two-fifths of their class. Students must register with an independent study form (available in 140 Roberts Hall). Hours to be arranged. Staff. Special work in any area of agricultural and biological 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.

**ABEN 498 Undergraduate Teaching Assistantship**
Fall and spring. 1-4 credits. Prerequisite: written permission of instructor. Students must register with an independent study form (available in 140 Roberts Hall). Hours to be arranged. Staff. The student assists in teaching an agricultural and biological engineering course appropriate to his/her previous training. The student meets with a discussion or laboratory section, prepares course materials, grades assignments and regularly discusses objectives and techniques with the faculty member in charge of the course.

**ABEN 499 Undergraduate Research**
Fall and spring. 1-3 credits. Prerequisites: normally reserved for seniors in upper two-fifths of their class. Adequate training for work proposed. Written permission of instructor. Students must register with an independent study form (available in 140 Roberts Hall). Hours to be arranged. Staff. Research in any area of agricultural or biological engineering on problems under investigation by the department or of special interest to the student, provided that adequate facilities can be obtained. The student must review pertinent literature, prepare a project outline, carry out an approved plan, and submit a formal final report.

**ABEN 501-502 M.P.S. Project**
Fall and spring. 1-6 credits. Required of each M.P.S. candidate in the field. Hours to be arranged. ABEN graduate faculty. A comprehensive project emphasizing the application of agricultural technology to the solution of a real problem.
ABEN 551-552 Agricultural and Biological Engineering Design Project
Fall and spring. 3-6 credits. Prerequisite: admission to the M.Eng. (Agr.) degree program. Hours to be arranged. ABEN 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. However, there is a formal orientation during the first four weeks of the semester. A formal report and public presentation of the results of the design project are required for completion of the course(s). A minimum of 5 credits are 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 6 design projects credit is desired in one semester, both 551 and 552 may be taken.

ABEN 652 Instrumentation: Sensors and Transducers
Spring. 3 credits. Prerequisites: Linear differential equations, introductory chemistry and introductory physics, or permission of instructor. Not offered 1997-98. D. J. Aneshansley.
Application of instrumentation concepts and systems to the measurement of environmental, biological, and agricultural phenomena. Construction and characterization of electronic sensors and transducers will be emphasized. Image processing techniques will be introduced. A final project is required.

ABEN 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisite: Mathematik 293 or equivalent. Lecs, R 2:30-4:30. J.-Y. Parlange.
Thermodynamics and its applications to problems in engineering and agriculture. Topics include basic concepts (equilibrium, entropy, processes, systems, potentials, stability analysis) and applications (soil and water processes, dilute solutions, electromagnetism, surface phenomena, heat and mass transport, structure of organizations).

ABEN 671 Analysis of the Flow of Water and Chemicals in Soils
Fall. 3 credits. Prerequisites: four calculus courses and fluid mechanics. Lecs, R 3:35-4:50 (first meeting—TBA after that).
J.-Y. Parlange.
The course encompasses the 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 alternatively with Civil and Environmental Engineering 653—a complementary, but not identical, course.

ABEN 672 Drainage
Theory of water and solute flow in aquifers, hillslopes, and the vadose zone as it relates to artificial drainage is discussed. Drainage design as it relates to agricultural land, landfills, and land application sites will be critically reviewed. The importance of preferential flow and matrix flow on water quality of drainage waters is examined. Laboratories are used for hands-on experience with measurement of soil parameters and for actual drainage design. This course satisfies the capstone design experience requirement.

ABEN 677 Treatment and Disposal of Agricultural Wastes
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1997-98. Lecs, TR 2:30-3:45. W. J. Jewell.
Emphasis is on the causes of agricultural waste problems and the application of fundamentals of treatment and control methods to minimize related pollution. Fundamentals of biological, physical, and chemical pollution control methods are used in design problems with animal wastes, food production, and food and fiber processing. A semester-long design project is required. This course satisfies the capstone design experience requirement.

ABEN 678 Nonpoint Source Models
Spring. 3 credits. Prerequisites: computer programming and calculus. Lecs, MWF 2:30. D. A. Haith.
Development and programming of simulation models for management of water pollution from runoff and percolation. Emphasis is on prediction of water and chemical inputs to surface waters and groundwater. Applications include urban and rural runoff, lake eutrophication, groundwater water loading from land disposal sites, pesticides and nutrients in agricultural drainage, irrigation return flows, and watershed stream flow and sediment yield.

ABEN 680 Biological Engineering Analysis
Spring. 4 credits. Prerequisite: T&M 310 or permission of instructor. Lecs, MWF 11:15. 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.

ABEN 682 Pavement Engineering (also Civil and Environmental Engineering 643)
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: one introductory course in soil mechanics or highway engineering. Lecs, W 1:25-2:15. L. H. Irwin.
Application of geotechnical engineering principles to the selection of materials and the design of highway and airfield pavements, computer-based methods for pavement design, structural evaluation of pavements, and pavement systems management. Topics of discussion will include bituminous mixture design, base course, soil stabilization methods, seal-coat design, design of flexible and rigid pavements, pavement design for frost conditions; and pavement evaluation using nondestructive test methods. Laboratory will provide a case study of pavement systems management.

ABEN 694 Graduate Special Topics in Agricultural and Biological Engineering
Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. ABEN graduate faculty.
The department teaches "trial" courses under this number. Offerings vary by semester, and will advertised by the department. Courses offered under this number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

ABEN 697 Graduate Individual Study in Agricultural and Biological Engineering
Fall or spring. 1-6 credits. Prerequisite: permission of instructor. S-U grades optional. Hours to be arranged. ABEN graduate faculty.
Topics are arranged by the staff at the beginning of the term.

ABEN 700 General Seminar
Fall. 1 credit. S-U grades only. M (time to be announced). Staff.
Presentation and discussion of research and special developments in agricultural and biological engineering and related fields.

ABEN 750 Orientation for Research
Fall. 1 credit. Limited to newly joining graduate students. S-U grades only. Lecs, first 7 weeks, R 3:35-4:25. Remainder to be arranged. J. A. Bartsch.
An introduction to departmental research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

ABEN 754 Sociotechnical Aspects of Watershed Development (also ARME 754 and Government 644)
Examines watershed development and its relation to agriculture, irrigation and other activities within its basin. Provides an introduction to sociotechnical systems and the relation of social, technical and economic processes within watersheds, including political and administrative aspects. Provides an opportunity to examine systematically the interaction of various aspects of watershed management and design in developing countries.

ABEN 771 Soil and Water Engineering Seminar
Fall and spring. 1-3 credits. Prerequisite: graduate status or permission of instructor. S-U grades optional. Hours to be arranged. T. S. Steenhuis, J.-Y. Parlange and M. F. Walter.
Study and discussion of research or design procedures related to selected topics in irrigation, drainage, erosion control, hydrology, and water quality.

ABEN 781 Structures and Related Topics Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only. Hours to be arranged. Staff.
Advanced analysis and design of production systems with emphasis on structural and environmental requirements, biological responses, and economic considerations. Hours to be arranged.

ABEN 782 Advanced Production Systems Seminar
Fall and spring. 2 credits. Prerequisite: graduate status or permission of instructor. S-U grades only. Hours to be arranged. Staff.
Advanced analysis and design of production systems with emphasis on environmental science, engineering, economics, and biological responses. Hours to be arranged.
Agricultural, Resource, and Managerial Economics


Courses by Subject

ABEN 785 Biological Engineering Seminar
Spring. 1 credit. Prerequisite: graduate status or permission of instructor. S-U grades only. Hours to be arranged. 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.

ABEN 800 Master's-level Thesis Research
Fall and spring. 1–15 credits. Prerequisite: permission of adviser. S-U grades. ABEN graduate faculty.

ABEN 900 Graduate-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 before the "A" exam is passed.

ABEN 901 Doctoral-level Thesis Research
Fall and spring. 1–15 credits. Prerequisite: passing of Admission Candidacy Exam and permission of adviser. S-U grades. ABEN graduate faculty.

ABEM 100 Tradeoffs in Global Economic Issues: There's No Free Lunch

In this course students learn why a free lunch does not exist, analyze tradeoffs, and critically evaluate the impact of economic changes in global economic issues. Economic concepts will be used to assess tradeoffs in such issues as economic growth and natural resource availability; business profit making and corporate stewardship; international free trade and domestic protectionism; population growth and food production, safety, and service. Articles, case studies, experiments, and simulation will be used to evaluate these tradeoffs and relate the issues to the role of business in a global economy.

ABER 210 Introductory Statistics
Fall. 4 credits. Prerequisite: EDUC 115 or equivalent level of algebra. Lecs. M W F 1:25–2:15; sec T 10:10–12:05, 12:20–2:15 (2 secs), or 2:30–4:25 (3 secs); W 10:10–12:05 or 2:30–4:25 (3 secs); or R 12:20–2:15 (2 secs) or 2:30–4:25 (3 secs). 3 evening prelims C. van Es.

An introduction to statistical methods. Topics to be 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.

ABER 220 Introduction to Business Management
Spring. 3 credits. Lecs. M W F 10:10–11:00; sec M 12:20–2:15, 2:30–4:25 (2 secs), 7:30–9:25 p.m. (2 secs); T 10:10–12:05 (2 secs), 12:20–2:15 (2 secs); W 7:30–9:25 p.m. (2 secs); or R 10:10–12:05 (2 secs), or 12:20–2:15 (2 secs). In the weeks sections are held, there will be no W lecture.

2 evening prelims. J. M. Hagen.

This course provides an overview of management and business. Human resources, marketing, finance, and strategy concerns are addressed with regard to current issues such as globalization, ethics, quality, and strategic alliances. Case studies and guest executives are an important part of the course.

ABER 221 Financial Accounting

Staff.

A comprehensive introduction to financial accounting concepts and techniques, intended to provide a basic understanding of the accounting cycle, financial statements, underlying theory of GAAP, and statements interpretation. Elements examined include inventory, depreciation, internal control of assets, time value of money, notes, stocks, bonds, and the statement of cash flows. Limited use of a financial data base of publicly held companies; introduction to financial information on the World Wide Web.
ARME 320 Business Law I
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Lecs, M W F 9:05–9:55, 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, property, and the landlord-tenant relationship.

ARME 321 Business Law II
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisite: a course in business law. Lecs, T R 10:10–11:25. A. A. Knoblach. 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 will review selected topics in business law, like employment discrimination, secured transactions, product liability, unfair competition, and electronic media law.

ARME 323 Managerial Accounting
Fall. 3 credits. Prerequisite: ARME 221 or equivalent. Lecs, M W 12:20–1:10; disc, R 10:10–12:05 (2 secs), or 12:20–2:15 (2 secs). E. L. LaDue. 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, inventory control, variance analysis, measuring divisional performance, and accounting systems in the manufacturing environment. Limited use of electronic spreadsheets.

ARME 324 Financial Management
Spring. 4 credits. Prerequisite: ARME 220 or equivalent. Recommended: ARME 221 or 210 or equivalents. Lecs, M W F 9:05–9:55; disc, W 2:30–4:25 or R 10:10–12:05, 12:20–2:15, or 2:30–4:25, or F 10:10–12:05 or 12:20–2:15. 2 evening prelims. R. L. Streeter. Focuses on three major questions facing management: how to evaluate capital investment decisions, how to raise the capital to finance the firm, and how to generate sufficient cash flows to meet the firm’s cash obligations. Major topics include methods to analyze investment decisions, impact of taxes, techniques for handling risk and uncertainty, effects of inflation, sources and costs of debt and equity, capital structure, leverage, and working capital management. Microcomputers are used for analyzing financial problems. Previous computer experience is preferred, but optional instruction offered.

ARME 325 Personal Enterprise and Small Business Management
Spring. 3 credits. Limited to juniors and seniors. Prerequisites: ARME 220 and 221 or permission of instructor. Absolutely no add or drop after second class meeting. Lecs, T R 11:40–12:55. D. Streeter. Acquaints students with the challenging role of small business in the global economy. Special emphasis on the problems of planning, starting, managing a new business, including strategic planning, marketing, financing, and managing growth. Term project, development of a business plan, is done in teams of no fewer than three. Case studies and visiting entrepreneurs illustrate various small business issues.

ARME 326 Human Resource Management in Small Businesses
Fall. 3 credits. Prerequisite: ARME 220 or ARME 302 or equivalent. S-U grades optional. Lecs, T R 10:10–11:25. R. A. Milligan. An introduction to the management of human resources in small businesses. The focus is on developing and utilizing all of the capabilities of all small business personnel including owners, family, and employees. Topics include recruitment, selection, compensation, training, empowerment, team building, leadership, performance management, and conflict resolution. Student involvement and active learning experiences are emphasized.

ARME 340 Futures and Options Trading
Spring. 3 credits. Prerequisites: ECON 101. S-U grades optional. Lecs, T R 10:10–11:25. W. H. Lessier. The focus of the course is on the use of agricultural futures and options as marketing and management tools. A primary objective is to understand how companies, financial institutions, and farm businesses can employ hedging strategies to manage risk. Students will participate in a simulated trading exercise in which they will use real-time price and market information and input from industry experts to manage a hedge position.

ARME 342 Marketing Management
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: ARME 240 and ECON 101–102. Lecs, M W F 10:10–11; disc, R 12:20–2:15 (2 secs) or 2:30–4:25 (2 secs), F 10:10–12:05 (2 secs), or 12:20–2:15 (2 secs). In weeks discs are held, there will be no F lecture. R. D. Christy. Deals with the central link between marketing at the societal level and everyday consumption by the general public. As such, this course emphasizes the management aspects of marketing by considering consumer behavior, strategies in product and brand selection, pricing, promotion, sales forecasting, and channel selection. Identification and generation of economic data necessary for marketing decisions are considered. Public policy and ethical dimensions of marketing are examined.

ARME 347 Marketing Fruits, Vegetables, and Ornamental Products
Fall. 3 credits. S-U grades optional. A mandatory 2-day field trip. Estimated cost of field trip, $50. Lecs, M W F 12:20–1:10. Not offered 1997–98. Staff. A study of fruits, vegetables, and ornamental products of the horticultural product market orders in the Northeast, and an actual farm consulting and study trip and upon return from trip. A paper, critical-thinking management context. Topics include recruitment, selection, compensation, training, empowerment, team building, leadership, performance management, and conflict resolution. Student involvement and active learning experiences are emphasized.

ARME 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" for complete catalog. Provides qualified students an opportunity to conduct original research under supervision. Information available in ARME undergrad program office in Warren Hall.

ARME 402 Seminar in Farm Business Planning and Managerial Problem Solving
Fall. 3 credits. 5 half-day field trips. On days field trips are taken, class ends at 5:30. Prerequisite: ARME 302 or equivalent. Lecs, T R 12:20–1:10; disc, R 1:25–4:25. G. J. Connerman. A capstone seminar/workshop designed for juniors and seniors who plan to return to the family business or home farm or to take positions in banking, credit, or agribusiness, as well as those who wish to establish entrepreneurial businesses. The objective of the course is to pull together interdisciplinary knowledge and apply it in a problem-solving, critical-thinking management context. Topics include managerial analysis and strategic planning, human resource management, and business and family arrangements.

ARME 403 Farm Management Study Trip
Spring. 1 credit. Prerequisite: ARME 302. Open by application only. Secs, arranged. B. L. Anderson. A special program to study production and management systems in diverse agricultural regions of the U.S. 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.

ARME 404 Advanced Agricultural Finance Seminar
Spring. 2 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. W 2:30–4:25. 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 field trip to observe FSA financing during fall term, a two- to four-day trip to financial institutions in the Northeast, and an actual farm consulting and credit analysis experience in the spring term.

ARME 405 Farm Finance
Spring. 4 credits. Prerequisite: ARME 302 or equivalent. Lecs, M W F 9:05–9:55; disc, T 2:30–4:25. E. L. LaDue. The principles and practices used in financing farm businesses, from the perspectives of the farmer and the farm 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.

ARME 406 Farm and Rural Real Estate Appraisal
Spring, weeks 7–15. 2 credits. Limited to 40 students. Prerequisites: ARME 302 or equivalent and permission of instructor. Lecs, R 11:15–12:05; sec, R 1:25–4:25. 6 half-day field trips, 1 all-day field trip. On days of field trips, class ends at 5:30. G. J. Connerman. The basic concepts and principles involved in appraisal. Factors governing the price of
farms and rural real estate and methods of valuation are studied. Practice in appraising farms and other rural properties.

ARME 410 Business Statistics
Spring. 3 credits. Prerequisite: ARME 210 or equivalent. Lecs. M W F 11:15-12:05. 2 evening prelms. C. van Es.

This course focuses on fourator topics useful 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. The course will involve a student research project designed to give experience in collecting and interpreting data.

ARME 411 Introduction to Econometrics
Spring. 3 credits. Prerequisite: ARME 210 or equivalent. Lecs. T R 10:10-11:25. L. S. Willett.

The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple regression procedures are discussed and simultaneous equation models are introduced. Students are required to specify, estimate, and report the results of an empirical model using econometric methods.

ARME 412 Introduction to Mathematical Programming
Fall. 3 credits. Primarily for juniors, seniors, and H.S. degree candidates. Prerequisite: ARME 210 or equivalent. Lecs. T R 11:40-12:55. J. E. Pratt.

This is a course in applied linear programming. Following a review of linear algebra, the emphasis will be on formulation, specification, and interpretation of solutions to mathematical models of economic problems. Standard LP problems such as work scheduling, blending, resource allocation, capital budgeting, transportation and financial planning, inventory management, etc., will be studied. Integer and nonlinear programming will be introduced, if time permits.

ARME 415 Price Analysis (also Economics 415)
Fall. 3 credits. Primarily for juniors, seniors, and H.S. degree candidates. Prerequisite: ECON 313 or CEH 210 or equivalent, ARME 210 or equivalent. Lecs. M W F 9:05-9:55. H. M. Kaiser.

The focus of this course is on the analysis of supply and demand characteristics of commodities with particular attention to agricultural products. Special attention is paid to empirical analysis. Institutional aspects of pricing, temporal and spatial price relationships, price forecasting, and the economic consequences of pricing decisions are included.

ARME 416 Demographic Analysis in Business and Government (also Rural Sociology 331)
Spring. 3 credits. S-U with permission of instructor. Prerequisite: RSCS 213 or a statistics course. Lecs. W F 1:25-2:15; lab M 1:25-2:15 or 2:30-3:20; W. Brown.

For description, see RSCS 331.

ARME 417 Decision Models for Small and Large Firms
Spring. 3 credits. Prerequisites: ARME 210 and ECON 101 or equivalents. Lecs. T R 2:30-3:20; lab W 2:30-4:25 C. L. van Es and D. H. Streeter.

The course is focused on economic and statistical models of decision analysis and their application in large and small business settings. It will be shown how use of models can improve the decision 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 will be emphasized, as well as the need to combine both quantitative and qualitative considerations in decision-making. Cases will be drawn from small business scenarios, the public research arena, and corporate settings. Implementing decision models with computers will be the focus of lab sessions.

ARME 422 Estate Planning
Fall. 1 credit. Limited to juniors, seniors, and graduate students. S-U grades only. M. C. Peeler.

ARME 424 Business Policy
Fall. 3 credits. Limited to seniors majoring in business management and marketing. T R 8:40-9:55; 10:10-11:25 or 12:30-1:40. B. L. Anderson.

An integrating course that examines business policy formulation and implementation from the standpoint of the board and chief executive of an organization. Focusing on decision making and leadership. The course is built around a series of cases and several guest executives. Emphasizes improving oral and written communication skills.

ARME 425 Small Business Management Workshop
Fall. 4 credits. Limited to seniors. Prerequisite: ARME 325 or NBM 300 and permission of instructor. Term project work will amount to approximately $100 per team. Lecs. W M 2:30-4:25.

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.

ARME 426 Cooperative Management and Strategies
Spring. 3 credits. Recommended: ARME 220 or equivalent. Estimated cost of field trip, $450. Lecs. M W F 12:20-1:10. 2-day field trip required. B. L. Anderson.

Investigates the unique aspects of cooperative, membership, and for-profit organizations. Issues are approached from the point of view of management, board of directors, and members. Topics include characteristics of various types of business organizations, cooperative principles, legislation, taxation, as well as the unique nature of corporate strategies, management, financing, and marketing in cooperative, membership, and for-profit organizations. Primary focus is on operating cooperatives in agriculture although alternative types of cooperative organizations are discussed, such as credit unions, insurance cooperatives, employee stock ownership plans, housing cooperatives, flexible manufacturing networks, consumer cooperatives, and membership organizations.

ARME 428 Technology: Management and Economic Issues (also Economics 428)
Spring. 3 credits. Prerequisites: ECON 101-102, or permission of instructor. Limited to juniors and seniors. Not offered 1997-98. R. J. Kalter.

Designed to acquaint students with the role of technology in modern society, business, and education. Emphasis is placed on the context for managerial analysis and decisions with respect to technological adoption. Topics include the historical influence of technology on economic structure and activity, contemporary technological trends, implications for business managers, adoption and diffusion, public acceptance, implications for future structural and spatial organization of economic activity, impediments to technological advancement, and public policy considerations.

ARME 430 International Trade Policy
Spring. 3 credits. Prerequisites: ECON 101-102 or equivalents. Lecs. T R 1:25–2:40. Optional disc to be arranged. D. R. Lee.

This course examines the economic principles underlying international trade and monetary policy, and the policies, practices, and institutions that influence trade and foreign exchange markets. Applications to current topics in international trade policy in primary commodities, and to both developed and developing countries are also emphasized.

ARME 431 Food and Agricultural Policies

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 international role of agricultural trade and agricultural policies in other countries is emphasized.

ARME 443 Food-Industry Management
Fall. 4 credits. Limited to juniors and seniors. Prerequisite: ARME 448 or 342 or permission of instructor. Lecs. T R 10:10–11:25; sect T 12:25–2:40. 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, distribution, and international trade are included. Guest speakers from the food industry present case-study solutions at the Tuesday session.

ARME 446 Food Marketing Colloquium
Fall. 1 credit. Limited to juniors and seniors with extensive course work in food industry management and marketing. Permission of the instructors. S-U grades only. R 12:25–2:40. G. A. German, E. W. McLaughlin, and D. J. Perosio.

ARME 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 will cover advanced
topics in food marketing, many of which will have an important international dimension and will be presented by industry members. A number of field trips will be taken, including an international trip during January intersession and a five-day trip to the Food Marketing Institute Convention in Chicago during the first week in May. Students will prepare research topics on various aspects of the food industry.

**ARME 447 Food Marketing Colloquium**
ARME 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 will cover advanced topics in food marketing, many of which will have an important international dimension and will be presented by industry members. A number of field trips will be taken, including an international trip during January intersession and a five-day trip to the Food Marketing Institute Convention in Chicago during the first week in May. Students will prepare research topics on various aspects of the food industry.

**ARME 448 Food Merchandising**
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: ARME 240. Lecs, T R 10:10–11:25. G. A. German and D. J. Perosio.
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 in this course. The consequences of food industry trends and initiatives for other industry members, public policymakers, and consumers are considered.

**ARME 449 Global Marketing Strategy**
This course examines opportunities and challenges in the rapidly changing global marketplace. Topics include the decision to serve a foreign market, alternative strategies for entry into foreign markets (such as exporting or establishing a local subsidiary), and issues in implementing those strategies. The course includes case analysis and discussion.

**ARME 450 Resource Economics (also Economics 450)**
Fall. 3 credits. Prerequisites: MATH 111 and ECON 313. Lecs, M W F 2:30–3:20. J. M. Zorn.
Dynamic models of renewable, nonrenewable, and environmental resources will be constructed to examine market allocation and optimal resource management.

**ARME 451 Environmental Economics and Policy (also Economics 408)**
This course applies economic concepts to public decision making about environmental commodities and natural resources. Emphasis will be placed on exploring the two leading economic paradigms of allocating public goods: the conventional economic approach, with specific emphasis on market failure, externalities, benefit-cost analysis, and the use of non-market valuation techniques; and a property rights/institutional perspective. Ecological economics concepts will also be examined.

**ARME 464 Economics of Agricultural Development (also Economics 464)**
Spring. 3 credits. Prerequisites: ECON 101–102, or permission of instructor. Lecs, T R 11:40–12:55. 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 will be covered in order 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 will be used to illustrate the basis for economic analysis.

**ARME 494 Undergraduate Special Topics in Agricultural, Resource, and Managerial Economics**
Fall or spring. 4 credits maximum. S-U grade. optional. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department.

**ARME 497 Individual Study in Agricultural, Resource, and Managerial Economics**
Fall or spring. Variable credit. S-U grade optional. Students must register with an Independent Study form (available in 140 Roberts Hall). To be used for special projects designed by faculty members.

**ARME 498 Supervised Teaching Experience**
Fall or spring. 1–3 credits. Total of 4 credits maximum during undergraduate program. Students must register with an Independent Study form (available in 140 Roberts Hall). Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty. 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.

**ARME 499 Undergraduate Research**
Fall, spring, or summer. 1–4 credits. Limited to students with grade-point averages of at least 2.7. Prerequisite: written permission of the staff member who will supervise the work and assign the grade. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grade optional. Staff. Permits outstanding undergraduates to carry out independent research that is necessary under appropriate supervision. Students cannot receive both pay and credit for the same hours of work.

**ARME 605 Agricultural Finance and Capital Management**
Fall. 3 credits. Prerequisite: ARME 405 or equivalent. Offered alternate years. Not offered fall 1997; next offered fall 1998. $35 charge for reading materials; no text. T R 8:40–9:55. E. L. LaDue and L. W. Tauer.
Advanced topics in capital management and financing of agriculture. Special emphasis on current issues. Examines farm-sector funds flows, financial risk and decision analysis, agricultural finance policy, financial intermediation and intermediaries, firm growth, inflation, loan evaluation, and selected topics on financing agriculture in developing countries.

**ARME 608 Production Economics (also Economics 408)**
Fall. 3 credits. Recommended: ECON 313 and MATH 111 or equivalents. Lecs, M W F 10:10–11. L. W. Tauer.
The theory of production economics with emphasis on applications to agriculture. Topics include the derivation, estimation, and use of production, cost, profit, demand, and supply functions. Production response over time and under risk is introduced.

**ARME 630 Policy Analysis: Welfare Theory, Agriculture, and Trade (also Economics 430)**
Spring. 4 credits. Prerequisites: ARME 608 or CERH 603, ECON 313, or equivalent intermediate micro theory incorporating calculus. Lecs, T R 8:50–9:55. H. de Gorter and staff.
The first half of the course surveys the theory of welfare economics as a foundation for public policy analysis. Major issues addressed include the problem of social welfare measurement, the choice of welfare criteria, and the choice of market or nonmarket allocation. Basic concepts covered include measurement of welfare change, including the compensation principle, consumer and producer surplus, willingness-to-pay measures, externalities, and the general theory of second-best optima. The second half of the course focuses on public policy analysis as applied to domestic agricultural policy and international trade. The domestic policy component examines 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.

**ARME 640 Analysis of Agricultural Markets (also Economics 440)**
Fall, weeks 1–7 (ends Oct. 16). 2 credits. Prerequisites: ARME 441 and 415 or equivalents. Lecs, T R 2:30–4:25. W. G. Tomek.
This course is about agricultural product markets. Focus is placed on their distinguishing characteristics, consumer behavior, market structure, performance, models of price determination, and selected topics related to price behavior.

**ARME 641 Commodity Futures Markets (also Economics 441)**
This course is primarily about markets for agricultural 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 understanding hedging, speculation, and public-policy issues.

**ARME 651 Environmental and Resource Economics**
Spring. 4 credits. Limited to graduate students. Lecs, T R 10:10-11:25. W. D. Schulze.

Applied welfare economics with specific applications to environmental and resource issues. Review of welfare economics, environmental externalities, and common property resources, and a survey of current environmental and natural resource policy. Techniques for measuring benefits and costs— including property value and wage hedonic approaches, travel models and contingent valuation—are covered. Survey/data collection methods are described in detail. Explore innovative market mechanisms for resolving public good, common property, and externality problems. Students will be required to complete a paper describing their own formal economic analysis of a natural resource or environmental problem. ARME 651 is a core course for the Environmental Management concentration/option.

**ARME 652 Land Economics Problems (co-listed with Civil and Environmental Engineering 529)**
Fall or spring. 1 or more credits. Limited to graduate students. Prerequisite: permission of instructor. S-U grades optional. W 7:30-9.25 p.m. D. J. Allee. Special work on any subject in the field of land and resource economics.

**ARME 660 The World's Food**

Designed to introduce first-year graduate students to food economics, the world food situation, and the linkages between food, population, and employment in developing countries. Among the topics considered are the extent of hunger, income and dietary change, colonization growth, and the outlook for feeding an eventual population of 10-12 billion.

**ARME 665 Food and Nutrition Policy (also Nutritional Sciences 685)**
Spring. 3 credits. Prerequisites: Introductory microeconomics and intermediate statistics (i.e. through multiple regression), or permission of instructor. S-U grades optional. Lecs, M W 2:30-3:40. D. Sahn and P. Dorosh.

For description, see NS 685.

**ARME 666 Economics of Development (also Economics 466)**
Spring. 3 credits. Prerequisites: ECON 513 and 314 or permission of instructor. S-U grades optional. Lecs, T R 11:40-12:55. S. C. Kyle.

The course is designed as an introduction to the economics of development at the graduate level. The course is split into two major sections, the first dealing with the micro-economics of households in developing countries and the second covering macroeconomic strategy and performance. A principal goal will be to illuminate the particular features of low-income countries which are important to economic analysis and policy. Special attention will be given to issues facing countries with important agricultural and resource sectors.

**ARME 694 Graduate Special Topics in Agricultural, Resource, and Managerial Economics**
Fall or spring. 4 credits maximum. S-U grades optional. Staff.

The department offers "special topics" courses under this number. Offerings vary by semester, and will be advertised by the department.

**ARME 698 Supervised Graduate Teaching Experience**
Fall or spring. 1-3 credits. Total of 4 credits maximum during graduate program. Students must register with an independent study form (available in 140 Roberts Hall). Open only to graduate students. Undergraduates should enroll in ARME 498. S-U grades optional. Prerequisite: permission of instructor. 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 laboratories and tutorials. Students are expected to achieve 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.

**ARME 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.

**ARME 700 Individual Study in Agricultural, Resource, and Managerial Economics**
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.

**ARME 708 Advanced Production Economics**
Fall. 3 credits. Prerequisite: ARME 608, 710, or equivalents; ECON 609 is highly recommended. Offered alternate years. Offered fall 1997 and 1999. Not offered fall 1998. Hours to be arranged. R. N. Boisvert.

Theoretical and mathematical developments in production economics, with emphasis on estimating production relationships, scale economies, technical change, factor substitution. Developments in flexible functional forms, duality and dynamic adjustment models are emphasized. Discussions of other topics (risk, supply response, and household production functions) based on student interest.

**ARME 710 Econometrics I**
Spring. 4 credits. Prerequisite: matrix algebra and statistics at the level of BTRY 417 and 601 (BTRY 409 or ECON 619 preferred). Undergraduate students must have permission of instructor. Lecs, T R 2:30-4:25. W. G. Tomek.

This intermediate-level course covers selected statistical models and associated estimators used in econometrics, dynamic and other stochastic regressor models, seemingly unrelated regression and simultaneous equation models, and models with non spherical error terms and specification errors. Students seeking an introduction to econometrics should take ARME 411.

**ARME 711 Econometrics II**
Fall. 4 credits. Prerequisite: ARME 710 or equivalent. BTRY 417 recommended. Lecs, M W 10:10-12:05. T. D. Mount.

Coverage beyond that of ARME 710 of linear regression models, including alternative methods of incorporating non-sample information and testing restrictions, diagnostic techniques for collinearity and influential observations, pooling data, stochastic coefficients, limited dependent variables and latent variables.

**ARME 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. Lecs, M W 8:40-9:55; sec, F 9:05-9:55. 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 and their role in social accounting matrices and computable general equilibrium models are discussed. Applications are made to agricultural, resource, and regional economic problems.

**ARME 713 Quantitative Methods II**

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 numerical and econometric 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.

**ARME 714 Experimental Economics**

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, implement, and write a paper describing their own experiment testing an economic theory.
ARME 717 Research Methods in Agricultural Economics  
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.

ARME 730 Seminar on International Trade Policy, Agriculture, Resources and Development  
Spring. 3 credits. Limited to graduate students. Prerequisites: ARME 630 or equivalent. Offered alternate years. Offered spring 1998 and 2000. Not offered spring 1999. Hours to be arranged. 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.

ARME 731 Seminar on the Political Economy of Agriculture and Trade  

ARME 740 Agricultural Markets and Public Policy  
Spring. 2 credits. Limited to graduate students. Prerequisite: familiarity with multiple regression techniques at the ARME 411 level or higher. Recommended: ARME 640. T R 12:20–2:15. W. H. Lesser. Develops the concepts and methodology for applying and analyzing the effects of public-policy directives to the improvement of performance in the U.S. food marketing system. Prospective topics include a survey of industrial organization principles, antitrust and other legal controls, and coordination schemes in agriculture. Topics can be adjusted to students’ interests.

ARME 741 Space, Trade, and Commodity Analysis  
Principal topics are spatial micro-economics of the firm, spatial pricing and location decisions, the forms of spatial competition, and quantitative methods for spatial analyses, which include techniques for finding spatial equilibriums and selected network optimization algorithms.

ARME 750 Resource Economics  
Fall. 4 credits. Prerequisites: ECON 609 and 618, or ARME 713. Lect, T R 2:30–4:25. J. M. Conrad.  
Optimal control and other methods of dynamic optimization will be used to study the allocation and management of natural resources.

ARME 751 Environmental Economics  
Spring. 4 credits. Prerequisites: ECON 609 and 618, or ARME 713. S-U grades optional. Hours to be arranged. R. N. Boisvert and L. D. Chapman. Economic theory will be applied to the problems of managing environmental quality. Static and dynamic forms of externality, decisions to preserve or develop natural environments, and methods of valuation will be presented.

ARME 754 Sociotechnical Aspects of Watershed Development (also Agricultural and Biological Engineering 754, and Government 644)  
Spring. 2 or 3 credits. S-U grades optional. T. Steenhuis, M. Walter, N. Uphoff, and staff.  
For description, see ABEN 754.

ARME 763 Macro Policy in Developing Countries  
Spring. 3 credits. Prerequisites: ECON 609, 610, 613 (may be taken concurrently), or permission of instructor. Offered alternate years. Not offered spring 1998; next offered spring 1999. Lect; T 2:45–4:25. S. C. Kyle.  
This course examines macroeconomic policies in developing countries and their interaction with economic growth, development, and stability. Theoretical models useful for analysis of macro policies will be covered as well as an examination of empirical studies. Emphasis will be on research topics of current interest to students and professionals in the field, particularly those relating to the interaction of macro policy with micro and sectoral analysis.

ANIMAL SCIENCE 61
AN SC 215 Exotic Avian Husbandry and Development
Spring. 2 credits. Limited to 100 students. Prerequisites: AN SC 100, 150 or Bio G 103, 104 or equivalent. Lec, M 2:30-4:30. J. Parks and D. Muscarella.
Natural history, care, management, health and breeding of exotic species with emphasis on psittacines (parrots and related species) and raptors (birds of prey). Lectures, demonstrations, and local field trips.

AN SC 221 Introductory Animal Genetics
Spring. 3 credits. Prerequisite: 3 years of college biology. Lecs, T R 9:05; sec. T W R or F 2-4:35. J. E. Parks.
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 250 Dairy Cattle Principles
Fall. 3 credits. S-U grade optional. Lecs, T R 10:10; lab, W or R 2-4:25. 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 and AN SC 455.

AN SC 251 Dairy Cattle Selection
Application of scientific principles of genetic programs in herds with different breeding programs. Emphasis on economical traits to be used to improve genetic progress and herd profitability.

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

AN SC 290 Meat Science (also Food Science 290)
Fall. 2 or 3 credits. Lecs, T R 11:15; lab, M or R 12:20-3:20. D. H. Beermann and staff. Lecture only, 2 credits; lecture plus lab, 3 credits; lab cannot be taken without lecture.
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 surgery, meat cutting, wholesale and retail cut identification, inspection, grading, curing, sausage manufacture and quality control. An all-day field trip to commercial meat plants is taken.

AN SC 300 Animal Reproduction and Development
Spring. 3 credits. Prerequisite: AN SC 100-150 or equivalent and one year of introductory biology. Lecs, M W F 10:10. J. E. Parks.
Comparative anatomy and physiology of mammalian and avian reproduction, with emphasis on domestic and laboratory animals. Fertilization through embryonic development, pregnancy, and growth to sexual maturity, emphasis on physiological mechanisms and application to genetic improvement and conservation programs. 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 AN SC 300 required to register. Labs, M W or F 1:25-4:25. Each lab limited to 30 students. J. E. Parks.
Demonstration of fundamental principles and applied aspects of mammalian and avian reproduction. A limited number of live animals will be used in some demonstrations. Dissection and examination of tissues from vertebrate animals will be included in selected laboratories.

AN SC 305 Farm Animal Behavior (also BIOP 312)
Spring. 2 credits. Prerequisites: introductory course in animal physiology, at least one animal production course or equivalent experience is recommended. S-U grades optional. Lec, T R 11:15. E. F. A. Olenburs and K. A. Houpt.
The behavior of production species (avian and mammalian) influences the success of any management program. Students study behaviors relating to communication, learning, social interaction, 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 312 Applied Cattle Nutrition
Spring. 4 credits. Prerequisites: AN SC 100 and 212 (or equivalent) Dairy Fellows enrollment during AN SC 455. Lecs, M W F 10:10; lab, M or T 1:25-4:25. M. E. Van Amburgh.
An applied approach to predicting nutrient requirements and feed utilization to meet requirements with wide variations in cattle type, feed composition, and environmental conditions. Dairy cattle are emphasized. Nutrient management to minimize cost of production and environmental effects is discussed. (General Nutrient, Carbohydrate and Protein System) are used in the laboratory to apply the information presented in lectures, including evaluation of feeding programs on case study farms. Course is designed for advanced juniors, seniors, and entering graduate students.

AN SC 321 Applied Animal Genetics Seminar
Fall. 1 credit. Prerequisite: AN SC 221 or equivalent. S-U grades only. Lec, M 12:20. P. A. Olenburs and E. J. Pollak.
Topics of interest related to the genetic definition and control of quantitative and qualitative traits in various species of animals are presented. Genetic conservation programs and current animal improvement strategies as well as challenges presented by new developments in reproductive biology and molecular genetics are addressed in a lecture-discussion-type format.

AN SC 322 Applied Animal Genetics-Laboratory
Fall. 1 credit. Prerequisite: concurrent registration in AN SC 321 or instructor's permission. S-U grades only. M 2-4:25. P. A. Olenburs and F. J. Poliak.
Many genetic concepts addressed in AN SC 321 are explored in depth using a computer-assisted instruction environment. Mendelian inheritance of qualitative traits, detection of carriers of recessive genes, artificial selection, inbreeding and heterosis, design and evaluation of genetic improvement and conservation programs, and role of population size are among the topics considered.

AN SC 323 Equine Genetics
Fall. 1 credit. Prerequisite: AN SC 221 or equivalent. S-U grades only. Disc, T 1:25-2:15. P. A. Olenburs and staff.
Topics of equine genetics will be presented and discussed. Independent laboratory research, a short written paper, and an oral presentation will be important parts of this course. Lecture topics may include the genetic aspects of color, abnormalities, metabolic diseases, unsoundness, and performance.

AN SC 330 Commercial Poultry Production
Spring. 3 credits. Prerequisites: AN SC 100, 150, and 230 or permission of instructor. Offered alternate years. Next offered spring 1998, 2000; not offered spring 1999, 2001. M 2-4:25 (occasional field trips run past 4 p.m.) K. Keshavarz.
The course emphasizes production and business management aspects of commercial poultry farm operation and is designed to acquaint the student with current technology involved in commercial poultry production.

AN SC 341 Physiology of Lactation
Spring. 3 credits. Prerequisite: AN SC 150 or AN SC 300 or equivalent. Lecs, T R 9:05; lab R 2-4:25. Staff.
The physiology of milk production is covered with emphasis on mammary gland development, anatomy, hormonal control of milk secretion, and the biosynthesis of milk constituents. The dairy cow serves as the model system, but all livestock species are considered.

AN SC 351 Dairy Herd Management
Spring. 4 credits. Prerequisites: AN SC 250 or permission of instructor. Recommended: ARME 302. Lecs, M W F 11:15; labs, M or R 1:25-4:25, and F (alternate weeks) 1:25-4:25. D. M. Galton and T. L. Batchelder.
Application of scientific principles to practical herd management with components of reproduction, milking, housing, records, and production economics. Laboratories emphasize practical applications, analyses of alternatives, decision making, field trips, and discussion.

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 the management skills through computerized
simulation and working directly with cattle. Students are required to spend several days during the semester feeding and caring for cattle and observing calving.

AN SC 365 Equine Nutrition
Fall. 2 credits. Prerequisites: AN SC 100, 212, and 265. S-U grades optional. Lec, T R 8–8:50. H. F. Hintz.
The principles of nutrition for horses will be presented. Digestive physiology, sources of nutrients, feeding regimes for various classes of horses and interactions of nutrition and diseases will be discussed.

AN SC 370 Swine Nutrition and Management
X. G. Lei and K. Roniker.
This course focuses on swine nutrition, feeding, and management. Lectures are integrated based nutrition and swine system including pig biology, digestive and metabolic development, nutritional biochemistry and physiology, impact of swine nutrition on environmental, use of pig model in medicine, and current swine nutrition and biotechnology. Laboratories, animal projects, and problem troubleshooting are offered.

AN SC 380 Sheep
The breeding, feeding, management, and selection of sheep from a production-system approach. Lectures and laboratories are designed to give students a practical knowledge of sheep production as well as the scientific background for improved practices.

AN SC 390 Animal Growth Biology
Fall. 2 credits. Not open to freshmen; sophomores by permission of instructor only. Prerequisites: one year of college biology and one course in animal or human physiology. AN SC 212 and 221. Lec, R 1:25–3:20; sec, F 1:25–2:15.
D. H. Beermann and staff.
A detailed discussion of the morphological and physiological aspects of growth of domestic and laboratory animals. Overview of the cycle and early embryo growth pattern, differentiation and cellular aspects of tissue development and growth, maternal influences on fetal growth and allometric patterns of postnatal growth are discussed. Endocrine, genetic and nutritional influences on protein and lipid metabolism, nutrient requirements and composition of growth will be emphasized.

AN SC 400 Tropical Livestock Production
An analysis of constraints on livestock production in developing countries of the tropics, with specific objectives and risk, and production methods. Emphasis is on strategic use of animal and plant resources, animal performance with inputs restricted, decision making, and alternative systems of production. Primes: Laboratory examples, independent study projects, and classroom interactions will aid problem-solving efforts to improve food security.

AN SC 401 Dairy Production Seminar
Spring. 1 credit. Limited to juniors and seniors. D. E. Bauman.
Capstone course where students, with the help of faculty members, complete a study of the research literature on topics of current interest in the dairy industry. Students then make an oral and a written report on their topic with emphasis on integrating theory and practice.

AN SC 402 Seminar in Animal Sciences
Review of literature pertinent to topics of animal science or reports of undergraduate research and Honors projects. Students present oral reports of their work for class discussion in addition to written reports.

AN SC 403 Tropical Forages
A. N. Pell.
An overview of tropical grassland, 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. Bauman.
A fundamental approach to nutrition focusing on the metabolic rate of nutrients and the interrelationships among nutrients, nutritional state, and metabolic processes. The overall goal is to induct the student into the fundamental principles of nutrition and metabolism through an integration of nutrition, biochemistry, and physiology.

AN SC 412 Livestock and the Environment
Spring. 2 or 4 credits. No prerequisite for 2 credits; with permission of the instructor, students who have taken or are concurrently taking AN SC 312 can sign up for 2 additional credits for completing an independent project on whole-farm environmental planning. Lec, T R 11:15–12:05. Disc, TBA for the 2 extra credits.
D. G. Fox and R. E. Pitt.
This course will explore environmental issues surrounding livestock and the environment, including competition with humans for food resources, impact of livestock on human health, and impact of livestock farms on environmental/community problems, including odor, and pathogens and excess nutrient effects on water quality. Those taking 2 additional credits will use computer software tools to evaluate aspects of whole-farm nutrient and environmental management on case study farms. Data collection and analysis will continue throughout the semester.

AN SC 414 Ethics and Animal Science
Fall. 2 credits. Enrollment limited to seniors only. Lecs, M 12:20; disc, W 12:20–1:10. One evening session (7–9 pm, Oct. 1): Susceptible to Kindness, Miss Ever's Boys. The Tuskegee Syphilis Study. Mandatory farm tour (9 am–1 pm, Saturday, Sept. 27). D. J. Cherney and A. van Tienhoven.
An exploration of the place of humans in the biological world, origins and development of ethics and morality, specism, animals for research, transgenic animals, animal husbandry, and its ethical dilemmas. A book review, participation in discussions, and a final project of the student's choice will be used to evaluate the performance of the student.

AN SC 415 Poultry Nutrition
Spring. 1 credit. Prerequisite: AN SC 212 or permission of instructor. Not offered spring 1998. Lec, F 11:15. R. E. Austic.
A practical consideration of principles of nutrition applied to feeding poultry, including use of linear programming techniques in diet formulation.

AN SC 420 Quantitative Animal Genetics
Spring. 2 credits. Prerequisite: AN SC 221 or equivalent. Limited to 50 students. Lec, R 12:20; sec, M 2–4:25. 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 program for problem solving.

AN SC 425 Gamete Physiology and Fertilization
J. E. Parks.
Study of the formation, growth, differentiation, and maturation of mammalian sperm and oocyte, gamete transport and interaction with male and female reproductive tract; and cytoplasmic, physiological, and molecular changes required for fertilization. Lecture, discussion, and aspects of gamete physiology and in vitro technologies such as cryopreservation, oocyte maturation and fertilization.

AN SC 427 Fundamentals of Endocrinology
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 455 Dairy Nutrition and Health
Fall. 3 credits. Prerequisite: AN SC 351 and permission of instructor. Lecs, M W F 9:05; lab, M or T 2:00–4:25. D. M. Galton, L. E. Chase and T. L. Batchelor.
Application of scientific principles to practical herd management with components of nutrition and herd health. Laboratories emphasize practical applications, analyses of
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The program is designed for undergraduates who have a stronger interest in dairy farming. The objective is to gain further understanding of the integration and application of dairy farm management principles and practices with respect to progressive dairying and related industries.

**AN SC 457 Livestock Fellowship**
Spring. 2 credits. Prerequisite: Permission of instructor. Not offered spring 1998. S-U grades only. Lec, F 1:00-4:25. A program for students with particular interests in meat animal production, beef cattle, sheep, and swine. Objectives are to gain a thorough understanding of the production of these species and their integration in various farm management situations. Students will participate in extension education programs and have contact with livestock producers as well as the agribusiness organizations important to livestock production.

**AN SC 490 Commercial Meat Processing**

D. H. Beermann.
A study of the classification, formulation, and production of commercially available processed meat products. Physical and chemical characteristics of meat and nonmeat ingredients; their functional properties; various processing methodologies; microbiology; packaging, handling, and storage; and quality assurance are discussed.

**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 will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

**AN SC 498 Undergraduate Teaching**
Fall or spring. 1, 2 or 3 credits; limited to two experiences under graduate teaching career. Limited to students with grade-point averages 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 faculty member or laboratory teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

**AN SC 499 Undergraduate Research**
Fall or spring. 6 credits maximum during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with grade-point averages 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 receive pertinent literature, prepare a project outline, conduct the research, and prepare a report.

**AN SC 601 Amino Acids (also NS 601)**
A course emphasizing the dynamic aspects of protein digestion, absorption, amino acid transport and amino acid and nitrogen metabolism, and their relationships to the requirements for amino acids.

**AN SC 603 Mineral Nutrition: Metabolic, Health, and Environmental Aspects (also NS 603)**
This course focuses on the metabolic roles and environmental impacts of mineral nutrition in animal, human, and food systems. Team-taught lectures include general biochemical and physiological aspects of mineral metabolism and specific mechanisms of gene expression, regulation, and mammalian health disorders associated with individual elements. Methodology and facility of mineral research is also discussed.

**AN SC 604 Vitamins (also NS 604)**
Fall. 2 credits. Lec, T R 10:10. G. F. Combs, Jr.
Text-based discussion sessions on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

**AN SC 605 Ruminant Nutrition: Microbial Ecology and Forage Chemistry**
Ruminant nutrition, microbial ecology, fiber digestion, forage chemistry, and rumen function.

**AN SC 610 Seminar**
Fall and spring. 1 credit. S-U grades only.

**AN SC 611 Field of Nutrition Seminar**
Fall and spring. No credit. No grades given.

Lectures on current research in nutrition.

**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 to be arranged.

**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. Lec, W 4:00. W. B. 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)**
Toxic doses of nutrients and interference with the metabolism of nutrients by other toxic compounds represent the two principal branches of the course. Introduction to poisons plants and general toxicology will be provided. Course will focus on poisons found in feeds and foods.

**AN SC 630 Bioenergetics/Nutritional Physiology**
Spring. 3 credits. Prerequisites: AN SC 410 and biochemistry or physiology, or permission of instructor. S-U grades optional. Offered alternate years. Not offered spring 1997, 1999. Lec, M W F 10:10. A. W. Bell and D. E. Bauman.
An integrated systems approach to the nutritional physiology and energy metabolism of productive animals. Emphasis on extracellular regulation of tissue and organ metabolism of specific nutrients in relation to pregnancy, lactation, and growth. Critical discussion of techniques and approaches to the study of animal bioenergetics.

**AN SC 640 Individual Study in Animal Science**
Fall or spring. 1 or more credits. S-U grades optional. Hours to be arranged. 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.
A laboratory course designed for students with little or no experience with techniques in molecular biology. Emphasis will be on techniques used in conducting research in nutrition and physiology (e.g., subcloning, mutagenesis of DNA, RT-PCR, DNA sequencing and analysis, analysis of gene expression, protein expression). Animal science and mammalian biology provide the context for the experiments. Lectures will introduce laboratory exercises, supplement laboratory topics, and discuss selected readings from the literature. Students will perform an independent project requiring time outside scheduled laboratories and will give a scientific presentation.

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)

The program of study in biology is offered by the Division of Biological Sciences. For course descriptions, see the section on the Division of Biological Sciences.

COMM 116 Communication in Social Relationships

Spring or summer. 3 credits. Not open to first-semester freshmen. Spring: Lecs, M W F 1:25–2:15, C. Trumbo.
An overview of current knowledge about communication, with particular emphasis on interpersonal communication. Introduction to a wide range of contemporary theories and research about effective communication in contexts such as friendships, small groups, organizations, and health care settings.

COMM 117 Writing about Communication

Spring. 3 credits. Concurrent enrollment in COMM 110 required. TR 10:10–11:25, L. VanBuskirk and staff. Students develop skill in various writing styles and genres. The class explores communication practices and theories as they are observed and studied in personal and professional contexts. Assignments polish students’ ability to gather information, to analyze information, to integrate ideas about communication, and to express those ideas clearly and cogently.

COMM 120 Contemporary Mass Communication

Fall. Lecs, M W F 12:20–1:10, J. Shanahan and D. G. McDonald. The processes and effects of communication systems. Topics include the evolution of communication media, current knowledge about mediated communication, and the role of communication in contemporary social issues. Discussion sections relate the course topics to students’ personal experience. Assignments include case studies, experiential learning exercises, and short papers.

COMM 121 Investigating Communication

An examination of research methods in communication, with particular emphasis on the mass communication process. Exercises in writing, speaking, and working in small groups focus on topics such as gender, depictions, violence in the media, and social roles.

COMM 191 Topics in Communication

Summer. 1–3 credits. Hours to be arranged. Staff. Study of topics in communication at lower-division level. Special emphasis on topics reflecting the expertise of visiting faculty available in summer session and on topics suitable for entry-level college students.

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. Druckman, T. Russo, R. Thompson, and staff.

Theories and practical exercises in self-confidence and competence in research, organizing, and presenting material to audiences. Students give four graded speeches, write short papers, perform speaker evaluations, and engage in other speech-related activities.

COMM 203 Argumentation and Debate

Fall. 3 credits. T R 10:10–11:25, P. Stepp. The student will learn the principles of argumentation and the rules of debate. Classroom debates on the CEDA national topic will provide experience in critical thinking, rapid organization of thoughts, employment of research, and writing and speaking in a logical, persuasive manner.

COMM 204 Effective Listening

Fall and spring. 3 credits. Limited to 25 nonfreshman students per section. B. Earle. No students accepted or allowed to drop after the second week of classes. Lecs, M 2:55–4:10, sec, W 1:25–2:40, 2:55–4:10, R 1:25–2:40, 2:55–4:10, R. Thompson. Lecture and sections are used to present an analysis of the process of listening, to identify barriers to effective listening, and to develop students’ listening skills. Topics include audiology, cultural contexts, intercultural communication, linguistics, therapeutic listening, and critical analysis of information. Students are involved in skill-building exercises and in writing self-analytical papers, as well as attending seminars.

COMM 230 Visual Communication

An introduction to visual communication theory. Course examines how visuals influence our attention, perspectives, and understanding. Examples of visuals drawn from advertising, TV, newspapers, documentaries, entertainment movies, print and interactive media are used to develop a theoretical

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)

A laboratory course designed for students with little or no experience with techniques in molecular biology. Emphasis will be on techniques used in conducting research in nutrition and physiology (e.g., subcloning, mutagenesis of DNA, RT-PCR, DNA sequencing and analysis, analysis of gene expression, protein expression). Animal science and mammalian biology provide the context for the experiments. Lectures will introduce laboratory exercises, supplement laboratory topics, and discuss selected readings from the literature. Students will perform an independent project requiring time outside scheduled laboratories and will give a scientific presentation.

For students admitted to candidacy after the ‘A’ exam has been passed.

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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. Druckman, T. Russo, R. Thompson, and staff.

Through theory and practice students develop self-confidence and competence in researching, organizing, and presenting material to audiences. Students give four graded speeches, write short papers, perform speaker evaluations, and engage in other speech-related activities.

COMM 203 Argumentation and Debate

Fall. 3 credits. T R 10:10–11:25, P. Stepp. The student will learn the principles of argumentation and the rules of debate. Classroom debates on the CEDA national topic will provide experience in critical thinking, rapid organization of thoughts, employment of research, and writing and speaking in a logical, persuasive manner.

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COMM 230 Visual Communication

An introduction to visual communication theory. Course examines how visuals influence our attention, perspectives, and understanding. Examples of visuals drawn from advertising, TV, newspapers, documentaries, entertainment movies, print and interactive media are used to develop a theoretical
framework for becoming more visually aware and for thinking more critically about how visuals influence us.

COMM 232 Art of Publication
Fall. 3 credits. Each lab limited to 24 nonfreshman students. Students missing the first two classes without university excuse are dropped so others may register. Project materials cost $75-$100. Lecs. M W 10:10-11:00 or 11:15-12:05; labs M 2:30-4:25, W 2:30-4:25. M. Toor.

A basic course designed to explore visual concepts that increase communication effectiveness through the printed word. The importance of selecting and coordinating format, layout, typography, and illustrations is stressed. Lectures, in-class laboratory assignments, and outside projects examine opportunities and problems in publication design and desktop publishing.

COMM 240 Communication Systems and Technologies
Spring. 3 credits. T R 10:10-12:05. D. G. McDonald.

An exploration of the nature of communication systems and technologies. Topics include a brief history of communication and information technologies, descriptions of the uses, and impacts of technologies within the social system, and an introduction to electronic message design and construction. Lab includes practical application of course topics.

COMM 250 Newswriting for Newspapers
Fall, spring. 3 credits. Limited to 25 students. Prerequisite: Major in communication, or permission of instructor. Keyboarding ability essential. Students missing first two classes without university excuse will be dropped. Lecs., M W 9:05-9:55; labs, R 2:30-4:25 or F 9:05-11:00. Staff.

Writing and analyzing news stories. A study of the elements that make news, sources of news, interviewing, writing style and structure, press problems, and press-society relations. Concentration on newswriting as it is practiced by newspapers in the United States. Two writing assignments each week, one done in class, one done out of class.

COMM 253 Information Gathering and Presentation

Students learn how to locate information from data bases, inventories, and printed materials, to evaluate it, and to present it in written, tabular, and graphic form. Formats include media stories, research reports, and materials for public information. Special emphasis is placed on presenting numerical information and on writing for specific audiences.

COMM 260 Science Writing for Public Information
Fall, spring, or summer. 3 credits. Limited to 35 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: M W F 9:05-9:55. Sections to be announced. L. Cowdery.

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 will be emphasized. Not oriented to the mass media, or writing for scientists.

COMM 263 Organizational Writing
Fall, spring, or summer. 3 credits. Limited to 25 junior, senior, or graduate students per section. Prerequisite: any college-level writing course. Lecs. F 11:15-12:05; Fall: Sec M 12:20-2:15, W 10:10-12:05; Spring: Sec M 12:20-2:15, W 10:10-12:05. L. Van Buskirk and staff.

Students write as members of different organizations, in the position of supervisor, subordinate, colleague, and representative of business, government, community, and other organizations. Emphasis on adapting tone to the audience and the purpose of the message. Weekly writing assignments include various kinds of internal and external reports, memoranda, proposals, and letters. Assignments based on the Exxon Valdez oil spill and other case studies.

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

Survey of the fields of public relations and advertising. Descriptions of organizations, jobs, and functions in the industry. The roles of public relations and advertising in society. The economic system, and organizations. Psychological and sociological principles as bases for appeals. Strategies for media selection and message execution. Introduction to research and regulation.

COMM 273 Communication Institutions

A survey of the history, organization, and social importance of communication institutions. Institutions to be analyzed include advertising/PR, media industries, propaganda and political communication, news/journalism, and new technologies. Cases and examples will be drawn from areas relevant to CALS programs, including environment, agricultural policy and land use. Communication 116 or 120 are suggested but not required.

COMM 274 Communication Industry Research
Spring. 3 credits. Prerequisite: COMM 116, 120, 121. Lecs., M W 12:20-1:10; labs, F 9:05-11:00 or F 9:05-11:00. D. G. McDonald and J. Shanahan.

Public opinion polls, readership/viewership studies, audience segmentation techniques, and media and message effect evaluation are all widely used in communication industries. This course covers the use of basic research design, measurement, sampling, and simple descriptive statistics in conducting these studies.

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

The course explores the personal, career, social, and economic implications of gender categories. Topics include theories of gender construction, social structures, personal relationships, and gender concerns in the workplace.

COMM 285 Communication in Life Sciences

Environmental problems...public health issues...scientific research... In each of these areas, communication plays a fundamental role. From the mass media to individual conversations, from technical journals to textbooks, from lab notes to the World Wide Web, communication helps define social issues and research issues. This course examines the institutional and intellectual contexts, processes, and practical constraints on communication in the life sciences.

COMM 301 Business and Professional Speaking
Fall, spring, or summer. 3 credits. Prerequisite: COMM 201. Limited to second term sophomores, juniors and seniors during fall and spring. Lecs. M W 11:15-12:05; sec., T 2:30-4:25, W 12:20-2:15, R 10:10-12:05. B. Earle.

The study and practice of oral and written 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 presentation 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 one-year trial basis. Hours to be arranged. P. Stepp.

Students will learn preparation for practice in CEDA (Cross Examination Debate Association) debate, Lincoln Douglas debate, or individual speaking events. The class will be divided into four groups according to level of experience; therefore it may be repeated to a maximum of 8 credits.

COMM 315 Introduction to Health Communication
Fall. 3 credits. COMM 116 or COMM 120 or permission of instructor. Juniors and seniors only. M W F 10:10. Not offered 1997-98. Staff.

An overview of health communication, examining topics such as physician-patient relationships, the role of support groups, communication in health care organizations, cultural differences in health beliefs and communication, and public health campaigns. Instruction techniques include class discussion, presentations, and group projects.

COMM 330 Information Systems Management and Use
Spring. 2 credits. Prerequisite: COMM 240. Offered even-numbered years. M W F 1:25. A. Plummer.

An overview of information systems, examining topics such as organizational structures, roles of support groups, communication in health care organizations, cultural differences in health beliefs and communication, and public health campaigns. Instruction techniques include class discussion, presentations, and group projects.

COMM 342 Electronic Media
Spring or summer. 3 credits. Limited to 21 communication majors. Prerequisite: COMM 120. Lecs., T R 1:25-2:40. T. Russo.

The process of audio and video message design and production is explored. Emphasis is on development of skills needed for the
creation of effective audio/video production. Students complete exercises designed to develop specific competencies and work on productions from conception through completion.

COMM 350 Writing for Magazines
Fall or spring. 3 credits. Limited to 25 juniors, seniors, and graduate students, or others with permission of instructor. No drops after third week. Extensive off-class writing assignments. Fall: M 1:25-4:25; spring: T R 12:20-1:50. W. Ward and staff.

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
Fall. 3 credits. Not open to freshmen. Prerequisite: one college-level writing course. Lecs. M W 9:05; lab, W 12:20-2:15. 2:30-4:25 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 368 Text Editing and Management
Fall. 3 credits. Limited to 25 junior, senior, or graduate students. Prerequisite: COMM 250, 260, 263, 350 or 352. M W F 12:20-1:10. L. Coadwyre.

How to guide a manuscript from draft to presentation. Topics include production, copy editing and design, document management, and editorial decision making. Publications include books, magazines, newsletters, and promotional and educational materials for internal and external use. Appropriate for those who will oversee publications as part of their work.

COMM 376 Planning Communication Campaigns
Spring. 3 credits. Limited to 20 juniors and seniors. Prerequisite: COMM 116 or 120 or permission of instructor. T R 10:10-11:25. D. F. Schwartz.

Overviews theories that guide and influence social change efforts. Research techniques and communication tools used in communication planning and campaign design are reviewed. Class discussions focus on social change efforts in nutrition and health, rural development, marketing, and the environment. Students work closely with a client in designing a communication campaign.

COMM 380 Independent Honors Research in Social Science
Fall or spring. 1-6 credits. Limited to undergraduates who have met the requirements for the honors program. B. Lewenstein.

COMM 382 Communication Research Design
Spring. 3 credits. Lecs. T R 3:35; lab, W 2:30-4:25. Prerequisite: COMM 282 or equivalent. Course in statistics (may be concurrent). J. P. Yarbrough.

Discussion of advanced communication research methods. Emphasis on research design and measurement techniques. Final paper will be a complete research proposal for a senior or Honors thesis in Communication.

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. Hours to be arranged. P. Stepp.

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 Behavior and Communication
Fall. 3 credits. Labs limited to 15 junior, senior, or graduate students. Prerequisite: COMM 116 or equivalent. Lec. M W 11:15-12:05; Sec 01, W 2:30-4:25; Sec 02, F 10:00-12:05. D. Schwartz.

Study of management and leadership in formal organizations with emphasis on the psychology of communication between supervisor and employee; examination of formal and informal communication networks, and interpersonal communication in an organizational context. Case studies analyzed in lab.

COMM 411 Leadership from a Communication Perspective

Leadership is a product of human communication. Leadership competence can be increased by increasing communication competence. Leadership theories, particularly transformational leadership will be studied, and gender/minority responsive leadership will be stressed. Practical application will include leadership exercises and observation of leaders.

COMM 418 Communication and Persuasion
Spring. 3 credits. Prerequisite: COMM 116 and 120 or introductory psychology or social psychology. M W 2:55-4:10 (one evening mid-semester prelim). Not offered 1997-98. M. Shapiro.

The course focuses on theories of communication influence on persuasion and attitude change. Students will become familiar with a variety of social-psychological theories of attitude change and persuasion. Those theories also will be applied to a variety of communication situations including mass communication/advertisements, 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

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 for Third World and practical applications. Analysis and interpretation of public opinion polls and trends in public opinion on specific issues. Lectures concurrent with COMM 620; graduate students should enroll in COMM 620.

COMM 421 Communication and the Environment
Spring. 3 credits. Limited to 20 junior, senior, or graduate students or permission of the instructor. Lec. T R 2:55-4:10. Not offered 1997-98. J. Shanahan.

Students will investigate how values, attitudes, social structure, and communication affect public perceptions of environmental risk and public opinion about the environment. A primary focus will be mass media's impact in public perceptions of the environment, how the media portray the environment, and discussion of the implications of public consumption of environmental content.

COMM 422 Psychology of Television
Fall. 3 credits. Prerequisites: Introductory psychology and COMM 120. M W F 12:20-1:10 (one evening mid-semester prelim). M. Shapiro.

A survey of knowledge about the psychological influence of television and other audio-visual communication technologies. Topics may include the history of concerns about television and movies, who watches television and why, how people understand and mentally process television, how television influences thinking and emotions, the effects of various forms (including entertainment, news, and advertising), the future forms of mass media including multimedia and virtual reality. Lectures concurrent with COMM 622; graduate students should enroll in COMM 622.

COMM 424 Communication in the Developing Nations
Fall. 3 credits. Limited to juniors and seniors. T R 2:55-4:10. R. Colle.

The role of communication in development programs, particularly in 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 426 Impact of Communication Technologies
Fall. 3 credits. M W 2:55-4:10 P. Yarbrough.

Examine emerging technologies of communication, such as computer-based information systems and satellites and their potential for influencing communication processes and social systems. Also examine the effects of previous communication innovations from cave painting to television. Lectures concurrent with COMM 626; graduate students should enroll in COMM 626.

COMM 428 Communication Law
Spring. 3 credits. Limited to junior, senior, and graduate students; others by permission of the instructor. Lec. M W F 11:15-12:05 D. Grossman.
A practical survey of the law governing mass media, primarily for those working in the field. Coverage includes restraints on news gathering and publication, privacy, defamation, copyright, broadcast and cable regulation, access, electronic media and other issues of current interest.

COMM 439 Interactive Multimedia: Design and Research Issues
Fall. 3 credits. Prerequisite: permission of instructor. Lee, T R 11:15-12:05; lab T 12:20-2:15. G. Gay
An overview of interactive multimedia technologies (videodisc, CD-ROM, digital video technologies, computer graphics, and text). Course will focus on theories and research applicable to interactive multimedia such as visualization, learner control, mental models, knowledge representations, and information processing. Course will also emphasize interactive multimedia design, application, and evaluation.

COMM 440 Computer Mediated Communication: Theory and Practice
Course will focus 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. Lectures concurrent with COMM 640; graduate students should enroll in COMM 640.

COMM 446 Public Communication of Science and Technology
Fall. 3 credits. Limited to 15 students. Prerequisite: COMM 352 or 360, or Engineering 350, or permission of instructor. M W 2:55-4:10. Not offered 1997-98. 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, analyze the functions of PCST. The 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. M 2:55-4:10. Prerequisites: permission of instructor; limited to Communication seniors selected based on goals and academic preparation. B. O. Earle
A series of lectures, seminars and guest speakers exploring the planning, evaluation and policy-making process. Includes a three-day trip to a metropolitan area to visit corporate leaders, administrative agencies and policy makers. Fee charged.

COMM 488 Risk Communication
Spring. 3 credits. T R 2:55-4:10. C. Scherer
An examination of theory and research related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks. Course will concentrate on social theories related to risk perception and behavior. Case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors will be examined. Emphasis will be placed on understanding, applying, and developing theories of risk communication. Lectures concurrent with COMM 686; graduate students should enroll in COMM 686.

COMM 490 Senior Thesis in Communication
Fall, spring. 3 credits; may be repeated for a maximum of 6 credits. Prerequisite: Comm 382. Staff
Seniors conduct research based on a thesis proposal written in COMM 382. Supervision provided by a member of the Communication graduate faculty assisted by a Ph.D. candidate. Thesis will be reviewed by faculty readers before approval.

COMM 494 Special Topics in Communication
Fall, spring, summer, and intercession. 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 498 Internship
Fall, spring, summer, and intercession. 1-3 credits. Students must apply no later than the spring pre-course enrollment period for a fall internship or the fall pre-course enrollment period for a spring or summer internship. Prerequisites: Limited to communication juniors or seniors, 3.0 average in communication courses, and approval of academic advisor. S-U grades only.
Structured: on-the-job learning experience under supervision of communication professionals in a cooperating organization. Maximum of 6 credits total may be earned; no more than 3 per internship but flexibility allows 6 for 1 credit each, 3 for 2 credits each, or 2 for 3 credits each. Internship must be approved in advance by the student's academic advisor and must be supervised by a communication professional in fields of public relations, advertising, publishing, or broadcasting. Minimum of 60 on-the-job hours per credit required.

COMM 497 Individual Study in Communication
Fall or spring. 1–3 credits; may be repeated to 6 credits with a different supervising faculty member. Prerequisite: 3.0 cumulative average. Students must register 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 498 Communication Teaching Experience
Fall or spring. 1–3 credits; may be repeated to 6 credits with different courses. Limited to juniors and seniors. Intended for undergraduates desiring classroom teaching experience. Prerequisite: 3.0 cumulative average (2.7 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 140 Roberts Hall).
Periodic meetings with the instructor cover realization of course objectives, evaluation of teaching methods, and student feedback. In addition to aiding with the actual instruction, each student prepares a paper on some aspect of the course.

COMM 499 Independent Research
Fall or spring. 1–3 credits; may be repeated to 6 credits. Limited to seniors and graduate students. Prerequisite: 3.0 cumulative average. Students must register with an Independent Study form (available in 140 Roberts Hall).
Permits outstanding students to conduct laboratory or field research in communication under appropriate faculty supervision. The research should be scientifically controlled, empirical. Research goals should include description, prediction, explanation, or policy orientation and should generate new knowledge.

COMM 510 Organizational Behavior and Communication
Fall. 3 credits. Not offered 1997-98. Study of management and leadership in formal organizations with emphasis on the psychology of communication between supervisor and employee; examination of formal and informal communication networks, and interpersonal communication in an organizational context. Case studies analyzed in lab. Lectures concurrent with COMM 410; graduate students should enroll in COMM 510.

COMM 610 Seminar in Organizational Communication
Spring. 3 credits. Prerequisites: COMM 410/510 or one course in organizational behavior or permission of instructor. Lee, M W 11:15-12:05; lab, F 10:10-12:05. Not offered 1997-98. D. Schwartz
Examination of contemporary research on the social psychology of interpersonal communication in organizations including supervisor-employee relations, leadership style, work motivation, organizational socialization, and formal and informal communication networks.

COMM 618 Communication and Persuasion
Spring. 3 credits. Prerequisite: introductory psychology or social psychology or introductory research methods course. M W 2:55-4:10. Not offered 1997-98. M. Shapiro
The course focuses on theories of communication influence on persuasion and attitude change. Students will become familiar with a variety of social-psychological theories of attitude change and persuasion. Those theories also will be applied to a variety of communication situations including mass communication, advertising, public relations/public information, and interpersonal communication. Lectures concurrent with COMM 418; graduate students should enroll in COMM 618.
COMM 620 Public Opinion and Social Processes
Fall. 3 credits. T R 10:10-11:25. C. Glynn.
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 polls and trends in public opinion on specific issues.

COMM 622 Psychology of Television
Fall. 3 credits. Prerequisites: introductory psychology or social psychology and introductory research-methods course. M W F 12:20-1:10. M. Shapiro.
A survey of knowledge about the psychological influence of television and other audio-visual communication technologies. Topics may include: the history of concerns about television and movies, who watches television and why, how people understand and mentally process television, how television influences thinking and emotions, the effects of various forms (including entertainment, news, and advertising), the future forms of mass media including multimedia and virtual realities. Lectures concurrent with COMM 422; graduate students should enroll in COMM 622.

COMM 624 Communication in the Developing Nations
Fall. 3 credits. Open to juniors, seniors, and graduate students. T R 2:55-4:10. 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 626 Impact of Communication Technologies
Examines emerging technologies of communication, such as computer-based information systems and satellites and their potential for influencing communication processes and social systems. Also examines the impacts of previous communication innovations from cave painting to television. Lectures concurrent with COMM 426; graduate students enroll in COMM 626.

COMM 639 Interactive Multimedia: Design and Research Issues
Fall. 3 credits. Prerequisite: permission of instructor. Lect. T R 11:15-12:05; lab, T 12:20-2:15. G. Gay.
An overview of multimedia technologies (voice, text, graphics, video technologies, computer graphics, and text). Course will focus on theories and research applicable to interactive multimedia such as visualization, learner control, mental models, knowledge representation, and information processing. Course will also emphasize interactive multimedia design, application, and evaluation.

COMM 640 Computer Mediated Communication: Theory and Practice
Spring. 3 credits. Prerequisite: permission of instructor. Lect. T R 11:15-12:05; lab, T 12:20-2:15. G. Gay.
Course will focus 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 perception and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues. Lectures concurrent with COMM 440; graduate students should enroll in COMM 640.

COMM 676 Communication Planning for Social and Behavioral Change
Spring. 3 credits. T R 10:10-12:05. R. D. Colle.
Overview theories that guide and influence social change efforts. Research techniques and communication tools used in communication planning and campaign techniques and communication tools used in communication planning and campaign design are reviewed. Class discussion focuses on social change efforts in nutrition and health, rural development, marketing, and the environment. Course seeks to integrate theory, data-based generalizations, and planning processes into an integrated communication plan.

COMM 680 Studies in Communication
Fall. 3 credits. Limited to graduate students in communication; others by permission of instructor. M W F 9:05-11:00. D. McDonald and J. Shahanan.
A review of classical and contemporary readings in communication, including key concepts and areas of investigation. An exploration of the scope of the field, the interrelationships of its various branches, and an examination of the role of theory in the research process.

COMM 681 Seminar in Communication Research
Spring. 3 credits. Prerequisite: graduate students in communication; others by permission of instructor. M W 3:55-4:10. M. Shapiro.
An introduction to theory and research in the mental processes of the communicating individual. Discussions and readings may include how individuals process and remember communication information, how communication information is used in decision processes, how motivation influences processing of mass communication information, and how attitudes form and change.

COMM 682 Methods of Communication Research
An analysis of the methods used in communication research. Emphasis 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 Quantitative Research Methods in Communication
Spring. 3 credits. Prerequisite: COMM 682 or equivalent. Lect. M 6:00 p.m.-9:00 p.m. D. McDonald.
Experience in quantitative research techniques. The course provides an introduction to and multi-disciplinary research through examination of the procedures, techniques and assumptions associated with particular techniques of design and measurement, data collection, data preparation, data analysis, and hypothesis testing. Readings include a variety of fields and disciplines in the social and natural sciences.

COMM 684 Qualitative Methods in Communication Research
Spring. 3 credits. M W 8:40-9:55. B. Lewenstein.
This course explores the nature of communication research and the place of qualitative methods in that research. Through readings, discussions, and papers, students will examine the various techniques of qualitative research, gaining both an introduction to those methods and an appreciation of when those methods are appropriate for addressing particular issues in communication.

COMM 685 Training and Development: Theory and Practice (also International Agriculture 685 and EDUC 685)
Spring. 4 credits. S-U grades optional. Charge for materials, $45. F 9:05-12:05; lab to be arranged. Staff.
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. Design for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the U.S. and abroad.

COMM 686 Risk Communication
An examination of theory and research related to the communication of scientific information about environmental, agricultural, food, health, and nutritional risks. Course will concentrate on social theories related to risk perception and behavior. Case studies involving pesticide residues, waste management, water quality, environmental hazards, and personal health behaviors will be examined. Emphasis will be placed on understanding, applying, and developing theories of risk communication. Lectures concurrent with COMM 486; graduate students should enroll in COMM 686.

COMM 691 Seminar: Topics in Communication
Fall and spring. No credit. S-U grades only. Hours to be arranged. Staff.
Some weeks scholars from a wide variety of fields will present varied topics in theory or research as it relates to communication; other weeks graduate students will 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. Hours to be arranged. Staff.
Study of topics in communication not otherwise provided by a department course and determined by the interest of the faculty and students.

COMM 700 MPS Project 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.

Project research for Master of Professional Studies (Communication) students.

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.

EDUC 700 MPS Project 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.

Project research for doctoral candidates.

EDUC 705 Basic Review Mathematics
Fall or spring. 3 credits (this credit is not counted toward the 120 credits required for the degree). Lec, M W F 8:00 or 9:05. S. C. Piliero.

Review of concepts necessary for success in EDUC 115 and basic statistics courses. Topics include problem solving, graphing, basic algebra skills, linear and quadratic functions, polynomial equations, exponents and logarithms, and right-triangle trigonometry. Considerable emphasis is placed on learning mathematics for understanding and on solving word problems.

EDUC 101 Introduction to Education

An introduction to the field of education that is structured around an examination of three contemporary policy issues. The issues are chosen to help students understand important aspects of formal schooling systems (e.g., the public school, colleges, and universities) as well as nonformal educational activities (e.g., adult education, extension education, and community education). The course is taught by two members of the faculty and is designed for students seeking a self-contained introduction to education that can also lead to additional study in the field.

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

Designed for students wishing to fulfill distribution requirements and/or prepare for study in calculus. This course offers a nontraditional approach to college-level precalculus mathematics, stressing conceptual understanding, problem solving, and applications in a technology-enhanced environment. Considerable emphasis is placed on numerical, graphical, and symbolic representations of functions and their transformations. Students will use Function Probe®, a multi-representational software for the Macintosh, in a collaborative, computer-based lab setting.

EDUC 120 Education for Empowerment
Spring. 1–3 credits. T R 1:25-2:40. J. D. Deshler and R. E. Steele.

A modular course; with each module spanning 5 weeks for 1 credit. Common themes running through the modules include human learning, teaching strategies, political/social/economic factors affecting education. The course provides an opportunity to sample different areas of study and to gain knowledge and awareness of one's own educational processes.

EDUC 210 Psychology of Learning and Memory
Fall. 3 credits. Prerequisite: introductory psychology. Not offered 1997–98. J. A. Dunn.

This course deals with contemporary theories of learning, issues in the study of learning, and application of the principles of learning to the management of teaching and learning. Practical applications of research findings will be emphasized. One or more experimental projects and the use of microcomputers will be required.

EDUC 212 Psychological Foundations of Education
Spring. 2–3 credits. S-U option available. Prerequisite: introductory psychology. W 2–4:25 plus times to be arranged. J. A. Dunn.

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 240 The Art of Teaching

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 laboratory situations, 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 247 Instructional/Informational Application of Microcomputers and Related Technologies
Fall and spring. 2–3 credits. Not available to students who have completed ABEN 102 or NR 107. T R 2:30–3:20. lab to be arranged. Staff.

The primary goal of the course is to develop conceptual understandings of instructional/informational applications of microcomputers and teach introductory to intermediate-level skills. Class instruction will relate to microcomputer and networked applications in both formal and informal educational/training settings. Independent study project required for third credit.

EDUC 271 Sociology of Education

An introduction to the sociological study of schooling and education. Topics include the effects of social factors on educational achievement, the norms and values learned as part of the process of schooling, the relations between students and teachers, and the school's relations to the economic and political systems. All levels of education, from elementary school to the university, are considered.

EDUC 311 Educational Psychology

This course applies psychological concepts to educational settings such as schools with a focus on understanding the interaction between people, context and knowledge in schools 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 with a focus on secondary education.

**EDUC 317 Psychology of Adolescence**  
Spring. 3 credits. Prerequisite: introductory psychology. S-U grades optional. M W 11:15-12:05; Friday section to be arranged. D. E. Schrader.  
This course surveys the nature of adolescent cognitive, social, moral, and self-development. Theories of adolescent development are examined in the context of real-life experiences of adolescents using case analysis as a methodological tool. Educational implications will be discussed for both formal and informal settings.

**EDUC 331 Careers in Agriculture, Extension, and Adult Education**  
Fall. 1–3 credits. Letter grade only. M 2:00–4:25. J. D. Deshler, D. E. Foster, and G. J. Applebee.  
This course will offer modules in three areas of teaching: Adult Education, Cooperative Extension, and Agricultural Education. Each module will offer one hour of credit, and students may take one or more of the modules. The course will provide a historical perspective and an introduction to the organization and scope of programs for each module. Students will 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 Formal and Non-formal Education**  
Selection, practice, and evaluation of methods in formal and non-formal education will be stressed. The course will focus on both general teaching strategies and methodology unique to teaching in schools and non-formal settings. Course activities include micro-teaching and field experience during arranged times.)

**EDUC 335 Youth Organizations**  
Spring. 3 credits. T R 10:10–11:00; lab to be arranged. Staff.  
The role of selected youth organizations in providing educational experiences for youth. Factors affecting membership, purposes, design, operation, and administration are surveyed, emphasizing the roles an adult volunteer leader may play. The course is designed to give students an in-depth, learning-by-doing experience of how youth organizations function. Field experience with a recognized youth organization is required.

**EDUC 370 Issues in Educational Policy**  
An examination of selected policy issues in current education. Included are such topics as equality of educational opportunity; student, parent, and teacher rights; and educational politics. Issues are treated from legal, sociological, and economic perspectives. Meets group C, requirements for College of Agriculture and Life Sciences.

**EDUC 378 Political Economy of Education**  
A policy-oriented examination of educational systems with an emphasis on political and economic perspectives. Attention will be paid to both external and internal aspects of educational activities. Specific topics will include the changing contributions of education to earnings, school-community relations, power within educational organizations, the impact of technology in the workplace and in classrooms, and the sources and impact of educational costs. A variety of education settings will be examined including higher education and non-formal education.

**EDUC 380 Independent Honors Research in Social Science**  
Fall or spring. 1–6 credits. Limited to students who have met requirements for the honors program. S-U grades optional. A maximum of 5 credits may be earned in the honors program. Staff.

**EDUC 401 T&P 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 with the assistance of a teacher, environmental educator, and those for whom physical science seems difficult or uninviting.

**EDUC 402 Knowing and Learning in Science, Mathematics, and Agriscience**  
Fall. 4 credits. Prerequisite: enrollment in a Cornell teacher education program or permission of instructor. M W 2:30–4:25. D. J. Trumbull and C. A. Conroy.  
Students examine both current notions in the philosophy and history of science that explain how knowledge within a discipline develops and current theory and research that examines the individual's acquisition of knowledge. This material serves as a basis for students' individual research projects investigating neophytes' knowledge of science and mathematics concepts. All students enrolled must complete fieldwork. Fieldwork will comprise a minimum of three hours a week in an appropriate educational setting.

**EDUC 403 Observing and Teaching Science, Mathematics, and Agriscience**  
Spring. 4 credits. Prerequisites: Enrollment in a Cornell teacher education program or permission of the instructor. W. S. Carlsen and C. A. Conroy.  
Designed for prospective secondary teachers, this course provides a multiple-perspective orientation to the culture of schools and the work of teaching science and mathematics. Students spend 6-8 hours each week observing in area schools. Students also plan and teach innovative lessons in the scheduled teaching laboratory. Readings and discussions planning, delivery and evaluation of instruction, classroom management, and other issues such as equity, tracking, and classroom language.

**EDUC 404 Mathematics of Gender (also Women's Studies 407/807)**  
Fall. 3 credits. Not offered 1997–98. J. Confrey.  
Course will examine the research on women's participation and performance in mathematics, gender differences in fields including psychometric measures of mathematical

**EDUC 411 Introduction to Educational Measurement**  
Fall. 3 credits. Not offered 1997–98. Staff.  
Presents practices and theories of the measurement of human knowledge and performance. Students will be expected to acquire the practical skills of planning and constructing tests for a variety of purposes, interpreting and using test results, evaluating commercially available instruments, and the like. Students will also be expected to discuss intelligently a myriad of social, ethical, legal, and technical issues associated with educational testing. One course in statistics or concurrent registration in Education 352 is recommended but is not required.

**EDUC 413 Psychology of Human Interaction**  
Fall. 3 credits. Enrollment limited. Prerequisite: permission of instructor. Fee, S. T R 10:10–12:05. D. E. Hedlund. Designed to develop an understanding of, effective interpersonal communication and interaction. Appropriate for students in the helping professions, education, and areas involving management of human resources.

**EDUC 414 Counseling Psychology**  
Spring. 4 credits. Prerequisites: Introductory psychology, social or personality psychology. T R 10:10–12:05. D. E. Hedlund. The processes of counseling are examined from various theoretical perspectives. Typical adult counseling issues are examined, and implications are drawn for counseling strategies with an adult population, including psychological assessment, establishing therapeutic goals, intervention strategies, and evaluation of outcomes.

**EDUC 420 Field Experience**  
Fall or spring. 1–4 credits. S-U grades optional. Undergraduate students 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, semiprofessional, or professional practice in an educational enterprise. Each student prepares a plan of action including rationale, purposes, and procedures and arranges with a faculty member to supervise and evaluate the field experience.

**EDUC 430 Special Problems in Agricultural Education**  
Fall, spring, or summer. 1–3 credits. Letter grade only. W 12:20–1:10. C. A. Conroy.  
An opportunity to study individually selected problems in agricultural education.

**EDUC 432 Teaching Agriculture: Methods, Materials, Practice**  
Fall. 9 credits. Prerequisites: EDUC 332 and concurrent registration in EDUC 430 and 497. M T W R F 8:00–3:00. R. E. Steele and C. A. Conroy. Directed participation in teaching agriculture at the secondary school level. Program includes a five-day intensive on-campus
period and periodic seminars addressing selected methods and materials in teaching agriculture, combined with a 14-week period in an off-campus student teaching center. Includes evaluation of area resources, instructional materials and facilities, planning and executing instruction, directing work experience, and advising youth organizations.

EDUC 445 Curriculum Design Workshop
Summer. 3 credits. G. J. Posner.
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 447 Curriculum Design Laboratory: A Technology-Intensive Course
Spring or summer. 3 credits.
W. S. Carlsen.
A project-focused introduction to course design, from needs assessment, through materials development to the evaluation of student outcomes. The course involves the creation and implementation of an actual curriculum, and the nature of the project will vary from year to year. Students are expected to make extensive use of computer software, writing, design, management, and communications. The summer section of 447 will be smaller and we anticipate that, rather than working on a single class project, students will undertake curriculum development projects of their own design.

EDUC 472 Philosophy of Education
Fall. 3 credits. T. R. 3:30-4:45. K. A. Strike.
A study of central issues in the philosophy of education. Questions of ethics, political philosophy, and the theory of knowledge are examined and linked to current educational issues.

EDUC 475 Epistemology and Teaching
This course emphasizes the critical examination of recent debates in philosophy of science concerning the nature of scientific knowledge and scientific inquiry. It applies these inquiries to such questions as the organization of curricular materials, the nature of effective science teaching, and the role of scientific knowledge in the deliberations of a liberal democracy.

EDUC 477 Law and Educational Policy
Fall. 3 credits. M. 2:30-4:25. K. A. Strike.
A study of recent federal court decisions concerning education. Emphasis on examining legal issues against a background of related educational issues and in terms of the consequences of legal decisions for the development and operation of educational institutions.

EDUC 483 Comparative Studies in Adult Education
Spring. 3 credits. S-U grades optional. T R 3:35-5:00. J. D. Deshler.
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 community development are analyzed in relationship to each student's exploration of adult education in two countries. Description of adult education in other countries is shared by international students.

EDUC 494 Special Topics in Education
Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the departmental seminar committee, and the same course will not be offered more than twice under this number.

EDUC 495 Senior Seminar
Spring. 2 credits. Education majors or permission of instructors. S-U only. To be arranged. Undergraduate Coordinator for the department.
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 will be involved in selecting the issues and providing guidance for the seminar, students will be 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). Hours to be arranged. 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 grade-point averages of at least 2.7. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). Hours to be arranged. Staff.
Participating students assist in teaching a course or may undertake tutorial lab time under the general supervision of a faculty member. New topics are available each semester. Students are expected to meet regularly with a discussion or laboratory section to gain teaching experience, and regularly discuss objectives, techniques, and subject matter with the professor in charge.

EDUC 499 Undergraduate Research
Fall or spring. 6 credits maximum during undergraduate career. Open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall). Hours to be arranged. 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 501 Communication Workshop
Summer and intersession. 2-3 credits. S-U grades optional. M. D. Glock.
The course focuses on skills enabling individuals to cope with such concerns as motivation, dealing with difficult persons, criticizing productively, improving comprehension, adjusting to different learning styles, and communicating with the public. Practice is coordinated with theory and research findings. The ongoing dynamics of the course necessitate intense participation over a period of time, not provided by regularly scheduled fifty-minute class periods. Additional auto­tutorial lab time is scheduled. Appropriate for anyone who works with people.

EDUC 507 Science and Environment for Teachers
Summer. 3 credits. S-U option. Prerequi­site: contact instructor for details.
W. S. Carlsen.
This three-week inservice program for secondary and middle school science teachers focuses on biological, chemical, and hydro­logical methods of water monitoring and watershed dynamics. Participants also use remote sensing, work with computers, investigate topics in science, technology and society; learn pedagogical techniques that are consistent with science reform initiatives; and discuss and develop new types of assessment.

EDUC 513 Interpersonal Interaction
Designed to develop skills for an understanding of effective interpersonal communication and interaction. Appropriate for students in the helping professions, education, and areas involving management of human resources. A workshop design is required for the second credit. Participants must bring a tape recorder to class.

EDUC 523 Food and Fiber Across the Curriculum
Summer. 0-3 credits. D. E. Foster and staff.
An intensive five-day course designed to help New York State educators and administrators implement the New York Agriculture in the Classroom program and understand the complexity of New York's leading industry. Participants learn how instructional materials and experiences with our food-fiber system can be used to teach students language arts, mathematics, science, and social studies. One credit is earned by class attendance and participation. Two credits require one additional project. Three credits require two additional projects.

EDUC 547 Instructional Development in Higher Education
Summer. 2 credits. D. G. Way.
For both the beginning and experienced teacher in higher education, this course will focus on four course teaching skills: course design and planning, classroom experience, evaluating student learning and providing effective feedback, and instructional development activities. Students will choose one of these areas to focus on, based on interest and experience, and develop an instructional development plan to accomplish identified goals.
EDUC 548 Effective College Teaching
Spring. 1–3 credits. S-U grade option. T 5:00–7:00. D. J. Trumbull and H. D. Surpin.

This course is designed to help participants become more effective college teachers. It will examine the basic principles of learning, identify different learning styles, and explore a variety of teaching techniques, methods, and technological tools. Participants will also learn how to design a course and improve their effectiveness as teachers.

EDUC 601 Secondary Science and Mathematics Teaching Practicum
Fall or spring. 6 credits. Prerequisite: permission of instructor. Letter grades only. For graduate students enrolled in the Teacher Education in Science and Mathematics program. M 200 R F 8:00–9:00. W. S. Carlsen, J. G. Posner, A. Solomon, M. S. Slack, and D. J. Trumbull.

Supervised student teaching in science or mathematics at the secondary level. Program includes teaching in a local school for ten weeks.

EDUC 602 Teaching Science/ Mathematics: Methods, Materials, Practice
Fall or spring. 9 credits. Prerequisite: concurrent enrollment in EDUC 601 or permission of instructor. M 200 R F 9:00–3:00. W. S. Carlsen and staff.

The course begins with full day sessions of intensive consideration of theoretical frameworks relevant to all aspects of student teaching. Assignments and a weekly seminar during the semester require students to use those theories to develop and evaluate teaching materials and practices. Students will complete an extensive portfolio documenting their work.

EDUC 603 Teaching Mathematics
Fall. 3 credits. Offered alternate years. T 10:10–11:25. J. Confrey.

Current research in mathematics education will be examined in order to develop a picture of the mathematics classroom that integrates subject matter, student conceptions, affective variables, and issues in the social context of learning mathematics. Special topics will include research on problem solving, reasoning, and metacognition, and research on teaching.

EDUC 606 Seminar in Science and Mathematics Education
Fall. 1 credit. S-U grades only. T 4:30–5:30. J. Confrey.

Explores topics in science and mathematics education. The focus of the seminar changes each year.

EDUC 609 Methods for Interpretive Research
Spring. 3 credits. Prerequisite: course in research methods or measurement or permission of instructor. M 2:30–4:00. D. J. Trumbull.

This course examines some of the methods for doing educational interpretive research. An interpretive research perspective attends to the complex interactions between researcher, researched, and contexts and accepts the centrality of interpretation in the conduct of human affairs. This perspective imposes some unique demands on researchers wishing to justify the quality of their projects. In the class, students will practice methods for gathering and interpreting data by conducting a small project using methods as they relate to the aims and assumptions of interpretive research.

EDUC 611 Educational Psychology

A basic survey course for graduate students. Emphasis on psychological factors involved in human learning and the educational process. Set in a broad-based conceptual model of any behavioral setting for learning. A life span developmental approach is used, appropriate for those selecting an introduction to educational psychology or a refresher course in contemporary educational psychology.

EDUC 614 Epistemological Development and Reflective Thought

Insight into how individuals make sense of knowledge is essential to teaching and learning. This course examines theories of intellectual development and their implications for educating students of various age groups, particularly college students. The role of reflection on thinking (metacognition) and its impact on development of thought is explored.

EDUC 615 Self and Interpersonal Development and Education

Interpersonal interactions affect teaching and learning. This course takes a life-span perspective as it explores constructive-developmental theories of self and others, and how such theories explain students' understanding of themselves and others' actions in educational contexts.

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. An opportunity for practical experience in educational professions development.

EDUC 621 Work-Experience Coordinator Certification Course I
Summer. 3 credits. S-U grades optional. 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, and evaluation of work experience programs and articulation with JPTA and VENID. 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 Coordinator Certification Course I. 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 Education
Fall or spring; may also be offered in summer. 1–3 credits. S-U grades optional. Hours to be announced. Staff.

The course provides an opportunity for graduate-level study of individually selected problems and issues in agricultural and occupational education. Designed for experienced teachers.

EDUC 632 Teaching Agricultural, Extension, and Adult Education
Spring. 3 credits. Prerequisite: an introductory course in teaching methods or permission of instructor. M 8:00–9:55. C. A. Conroy.

The focus of the course is on the selection, use, and evaluation of methods and materials for teaching. Methods for group and informal instruction are covered. Opportunity is provided for students to develop teaching competence based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the development of instructional materials is required.

[EDUC 633 Program Planning in Agricultural, Extension, and Adult Education
Fall. 3 credits. Field trip. Lec, T 2:00–4:25; lab, to be announced. Not offered 1997–98. R. E. Steele.

Current social and economic conditions affecting agricultural, extension, and adult education are examined. Principles, objectives, strategies, and processes 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 644 Curriculum Theory and Analysis

An examination of the basic elements involved in making curriculum decisions and an analysis of current approaches to curriculum. The course focuses on the assumptions underlying any curriculum. The major task of each student is to choose and conduct an in-depth analysis of a curriculum. This course is the basic graduate course in curriculum.

EDUC 647 Instructional Technologies: Analysis and Practices
Fall. 2–4 credits. Prerequisite: skills in statistics and research design. Letter grade only. Lec, R 2:30–3:20; lab and seminar to be announced. Not offered 1997–98. D. D. Peasley.

Current research and literature on instructional computing and related technologies in the public and private sectors will be examined. Students complete a group research project on educational technologies and meet for five seminar sessions to earn credits. The research experience includes design, data collection, input, analysis, and synthesis. Concurrent attendance in ED 247 Modules A and B is required (2 credits); or the modules may be taken as a prerequisite.]
EDUC 651 Developing a Research Proposal
Study of procedures for developing and writing a research proposal. Emphasis will be given to identifying a significant topic, recognizing weaknesses in illustrative proposals, and clear and concise writing. Students will be provided with some assistance in constructing a brief proposal of their own.

EDUC 661 Administration of Educational Organizations
Fall. 3 credits. W 3:35–6:00. E. J. Haller. Perspectives on the administration of educational organizations. Consideration of social science, legal and ethical theories, and their application to both public schools and higher education. Intended for students who are considering careers as educational administrators, as well as for those who want to further their understanding of schools as organizations.

EDUC 664 Educational Finance
An analysis of the distribution and utilization of public and private resources for educational purposes. The discussion will revolve around the issues of equity, efficiency, and freedom of choice. Alternative methods of financing schools will be evaluated, and the perplexing legal and moral issues raised by such questions as “Who pays?” and “Who benefits?” will be discussed. Specific attention will be given to budgeting, accountability, and productivity. An opportunity for individuals to focus on their own areas of interest, such as occupational education, the two-year college, or secondary or higher education.

EDUC 665 Administrative Decision Making
An introduction to decision-making theory and its relevance to the field of educational administration. Specific applications will be made to the study and improvement of productivity within educational systems. A wide variety of educational settings will be considered, including higher education and non-formal education.

EDUC 668 Foundations of Extension Adult Education
Fall. 3 credits. Limited to 20 students. S-U grades optional. M 9:05–12:05. J. D. Deshler.
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 relationships of programs to historical, cultural, political, and social settings. Definitions, conceptual controversies, philosophical issues, and current research directions will be examined through a seminar approach.

EDUC 682 Community Education and Development
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 Communication 685, International Agriculture 685)
Spring. 4 credits. S-U grades optional. Charge for materials, $45. F 9:05–12:05; lab to be arranged. R. D. Colle and J. D. Deshler.
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 U.S. and abroad.

EDUC 690 Research Seminar
Fall and/or spring. No credit. G. J. Posner and A. J. Posner.
Presentation of current research in the field of education by graduate students and staff. Opportunities to discuss methodology, findings, and other aspects of research.

EDUC 694 Special Topics in Education
Fall, spring, or summer. 1–3 credits. Prerequisite: permission of instructor. S-U grades optional. Hours to be arranged. Staff.
Topics to be announced.

EDUC 711 Contemporary Issues in Educational Psychology
Fall and spring. 2–3 credits. Fall: M W 11:15. J. Dunn. Spring: T 2:00–4:50. S-U grades optional. This is a graduate-level seminar dealing with key issues in contemporary psychology having implications for educational practice and research. Topics will vary from semester to semester. Students may take the course more than once.

EDUC 714 Moral Development and Education
This seminar focuses on current topics in moral 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 will be placed on development from adolescence through adulthood.

EDUC 715 Seminar in Psychology and Education
Selected topics focusing on the interaction of theoretical and research developments in psychology and education.

EDUC 718 Adult Learning and Development
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. W 2:00–4:25. R. E. Ripple and J. D. Deshler.
Deals with adult learning and teaching 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 720 Seminar in Agricultural, Extension, and Adult Education
Emphasis on current problems and research in agricultural, extension, and adult education. Includes discussion and analysis of student and staff research.

EDUC 745 Seminar in Curriculum Theory and Research
Fall. 3 credits. Prerequisite: EDUC 644, or permission of instructor. T 2:30–5:00. G. J. Posner.
Theoretical issues in curriculum and appropriate areas for curriculum research are discussed. Two current topics of interest are the hidden curriculum and school reform. Both topics serve to uncover the relation between ideology and research.

EDUC 762 Practicum in Quantitative Educational Research
Spring. 3 credits. Prerequisite: one course in elementary statistics or permission of instructor. S-U grades only. E. J. Haller.
For students interested in learning about the process of formulating and carrying out a piece of quantitative empirical research. Studies will focus on an educational problem of the student's choice. Seminar participants will have access to large, nationally representative data sets that will permit them to conduct high-quality, publishable studies of U.S. schools, students, teachers, and parents. In the process they will learn some of the costs and benefits of secondary data analysis and gain some familiarity with analyses using a major statistical package.

EDUC 772 Seminar in Philosophy of Education
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. W 9:00–11:00. K. A. Strike.
Topics to be announced.

EDUC 783 Comparative Extension Education Systems
Summer. 3 credits. S-U option. D. M. Ewert.
Extension education in the developing nations is studied using, as an analytical frame of reference, a hypothetical model comprising such components as community organization, community-based learning, indigenous facilitators and leaders, extension generalists and specialists, training and research-extension linkages. Case materials on alternative extension models and intercountry experiences provide an empirical base.
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 to vertebrates. This presentation is intended for students curious about controlling pests without using synthetic chemicals.)


An introduction to the external and internal anatomy of insects, with emphasis on the comparative and functional aspects. The laboratory is devoted largely to dissection.


An introduction to the behavior of insects, this course will cover both the individual sensory and physiological mechanisms that are the basis of insect behavior, along with aspects of foraging, courtship, and parental care of insects. Insects are the most diverse organisms on earth, with equally diverse behavior. A basic understanding of insect behavior is necessary for all aspects of entomology, both basic and applied.


An introduction to the classification, evolutionary history, and distribution of the insects. Laboratory practice in the identification of orders, families, and representative genera of insects; methods of collection, preservation, and study. Lectures on theory and practice of insect systematics and major features of insect evolution. Insect collections are required.


The ecology of arthropods of medical and veterinary importance in temperate and tropical regions of the world with emphasis on the role they play in causation or transmission of disease. The laboratory involves 2 field trips, techniques of collection and identification, dissections, methods of transmission, means of identification of a blood pathogen and the source of a blood meal.

[ENTOM 370 Pesticides, the Environment, and Human Health (also Toxicology 370)] Fall. 2 credits. Prerequisites: BIO G 101–102 or equivalent. Offered alternate years. Not offered fall 1997 and 1999; next offered fall 1998. Lecs, T R 9:05. J. G. Scott.
A survey of the different types of pesticides, their uses, properties, and effects on the environment. Discussion of the risks, benefits, regulation, politics, and current controversies associated with pesticide use.

**ENTOM 441 Seminar in Insect Pest Management**

Spring. 1 credit. Limited to 15 students. Prerequisite: ENTOM 212 or 444 or permission of instructor. S-U grades only. Offered alternate years. Not offered spring 1999; next offered spring 1998 and 2000. Hour arranged. M. P. Hoffmann and A. M. Shelton. Discussion and analysis of current topics in insect pest management.

**ENTOM 444 Integrated Pest Management (also Plant Pathology 444)**

Fall. 4 credits. Prerequisites: BIOES 261, ENTOM 212 or 441, and PL PA 301 or their equivalents or permission of instructor. Lecs, M W F 9:05; labs M or T 1:25–4:25. P. Arneson. Lectures integrate the principles of pest control, ecology, and economics in the management of pest-crop 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.

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

Spring. 3 credits. Prerequisites: one year of introductory biology; BIOES 261; CHEM 257 or 357/358 and 251 or 301; or permission of instructor. Offered alternate years. Not offered spring 1998 and 2000; next offered spring 1999. Lecs, M W F 11:15. P. P. Feeny. Significance of plant chemistry in mediating interactions between plants and herbivorous animals; mechanisms and strategies of plant finding and exploitation by animals; especially insects, and of defense and escape by plants; evolutionary hypotheses for ecological patterns of resistance and attack; implications for human food and agriculture.

**ENTOM 453 Principles and Practice of Historical Biogeography (also BIOPL 453)**

Fall. 3 credits. Prerequisite: A course in systematics or permission of instructor. S-U grades optional. Offered alternate years. Not offered fall 1998; next offered fall 1999 and 1997. Lecs, T R 10:10; disc, 1 hr/week to be arranged. Staff. A survey of the theories of historical biogeography, and the development of modern biogeographic theory in the context of classical, ecological and phylogenetic analytical methods. Geological and palaeontological aspects of biogeography will be presented, and large-scale biogeographic patterns discussed. Laboratories will focus on computer applications and discussion of controversial issues.

**ENTOM 455 Insect Ecology, Lectures (also BIOES 455)**

Fall. 3 credits. Prerequisites: BIOES 261 or equivalent and ENTOM 212 or equivalent knowledge of another taxon. S-U grades optional. Offered alternate years. Not offered fall 1998; next offered fall 1997 and 1999. Lecs, M W F 11:15. R. B. Root.

Topics include the nature and consequences of biotic diversity, biogeography, coevolution, adaptive syndromes exhibited by various guilds, population regulation, impact of insects on ecosystems, 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 BIOES 456 and NTRES 456)**

Spring. 4 credits. Prerequisites: BIOES 261. S-U grades optional. Offered alternate years. Not offered spring 1998 and 2000; next offered spring 1999. Lecs, T R 9:05; labs, M T W or R 1:25–4:25. B. L. Peckarsky and M. B. Bain. 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: A field project includes descriptive and experimental techniques and hypothesis testing related to environmental assessment.

**ENTOM 463 Invertebrate Pathology**

Spring. 4 credits. Prerequisite: one year of introductory biology. S-U grades optional. Offered alternate years. Not offered spring 1999; next offered spring 1998 and 2000. Lecs, M W F 9:05; lab, W 1:25–4:25. A. E. Hajek. Lecture presents principles of pathology as applied to invertebrates. Topics explored include non-infectious and infectious diseases caused by viruses, bacteria, fungi, protozoa, and nematodes, epizootiology of insect diseases and use of pathogens for control. Laboratory involves a diversity of pathogens and hosts using techniques such as microinjection, electrophoresis, immunoassay, density gradient centrifugation, soil extraction, and computer simulation.

**ENTOM 470 Ecological Genetics (also BIOPL 470)**

Spring. 4 credits. Prerequisites: BIOES 278 or permission of instructor. S-U grades optional. Offered alternate years. Not offered spring 1998 and 2000; next offered spring 1999. Lecs, T R 10:10–11:30; disc, 1 hr/week to be arranged. Staff. A study of the relationships between genetic and ecological processes in populations. Topics include consequences of genetic variation in age-structured populations; demographic concepts of fitness; evaluation of methods for measuring genetic variation and natural selection on ecologically important traits; genetics of competitive ability and predator avoidance; genetic and ecological aspects of phenotype plasticity; character displacement; maintenance of genetic variability; limits to selection. How theory can be used to formulate hypotheses about evolutionary mechanisms in natural populations is considered and experiments designed to test such hypotheses are evaluated.

**ENTOM 471 Freshwater Invertebrate Biology**


**ENTOM 477 Biological Control**

Fall. 3 credits. Prerequisites: ENTOM 212, BIOES 261, and permission of instructor. Offered alternate years. Not offered fall 1998; next offered fall 1997 and 1999. Lecs, T R 9:05; lab T 1:25–4:15. M. J. Tauber. Approach and procedures in biological control of arthropod pests and weeds. Demonstrations focus on living parasitoids and predators. Discussions focus on case histories.

**ENTOM 483 Insect Physiology**

Fall. 5 credits. Prerequisite: ENTOM 212 or permission of instructor. Offered alternate years. Not offered fall 1997 and 1999; next offered fall 1998. Lecs, M W F 9:05; lab, W 1:25–4:25. 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. The student will also be introduced to some common methods used in physiological research and to the critical reading of scientific literature.

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


**ENTOM 494 Special Topics in Entomology**

Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. Staff. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

**ENTOM 497 Individual Study in Entomology**

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

**ENTOM 498 Undergraduate Teaching**

Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Undergraduate teaching assistance in an entomology course by agreement with the instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.
Entomology 631 Systematics of the Coleoptera
Summer. 3 credits. Max enrollment 18 students, 4 week summer session.
Prerequisites: an introductory course in insect taxonomy and permission of instructor.
Labs, M T W R F 9-4; Saturday field trips. Q. D. Wheeler.
A comprehensive review of the comparative morphology, phylogenetic relationships,
classification, natural history, and distribution of the Coleoptera, including adult and
immature stages. Laboratory practice in identification and methods for collection and
study of beetles. A collection is required.

Entomology 632 Advanced Coleopterology
Summer. 1-3 credits. Prerequisite: permission of instructor. S-U grades optional.
Lab, to be arranged. Q. D. Wheeler.
An advanced course on the phylogeny and classification of selected subfamilies of
Coleoptera. Laboratory exercises in identification of beetles, generally to the level of genus or
beyond. Taught by authority on taxon of interest, frequently including a visiting scholar.
Can be repeated for credit.

Entomology 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 bioecology of selected taxa, with accompany­
ing laboratory studies on identification and comparative morphology. Collections sometimes required.

Entomology 640 Applied Ecology and Pest Management
Spring. 3 credits. Prerequisites: ENTOM 441 and a course in statistics. Recom­
Lecs, T R 1:25-2:40. Staff.
Theory and quantitative methods for characterizing anthropod population dynamics for research and pest management purposes. Course evaluates biological and climatic factors influencing population numbers, development, dispersal, and plant response to anthropod pests. Special topics include development of sampling methodology and simulation modeling.

Entomology 662 Insect Behavior Seminar
Spring. 2 credits. Prerequisites: permission of instructor and ENTOM 212 and BIONB 221 or equivalents. S-U grades optional. Offered alternate years. Not offered spring 1998 and 2000; next offered spring 1999. Hours to be arranged. M. J. Tauber.

Entomology 672 Seminar in Aquatic Ecology
Spring. 1 credit. Prerequisites: permission of instructor or either ENTOM 456, 471 or BIOES 261, 462. S-U grades optional. Offered alternate years. Not offered spring 1999, next offered spring 1998 and 2000. Hours to be arranged. B. L. Peckarsky.
Discussion and analysis of current topics in the ecology of streams, lakes and marine
ecosystems, including student-generated synthesis of key papers in the literature.

Entomology 685 Seminar in Insect Physiology
Spring. 1 credit. S-U grades optional. Prerequisite: permission of instructor. Offered alternate years. Not offered spring 1999; next offered spring 1998 and 2000. Hours to be arranged. C. Gilbert.

Entomology 707 Individual Study for Graduate Students
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not for thesis research. Staff.

Entomology 709 Teaching Entomology
Credit to be arranged. Staff. Teaching entomology or for extension training.

Entomology 800 Master's-Level Thesis Research
Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Staff.

Entomology 900 Doctoral-Level Thesis Research
Credit to be arranged. 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
Floriculture and Ornamental Horticulture courses are listed under Horticultural Sciences.

Freehand Drawing and Scientific Illustration
Freehand Drawing and Scientific Illustration courses are offered through the Department of Floriculture and Ornamental Horticulture and are described in the section "Freehand Drawing and Scientific Illustration."

FOOD SCIENCE
This course explores the application of science and technology to foods.
D. P. Brown.
A series of seminars on current technological and regulatory developments in food science.
Field trips to four commercial food manufacturing/processing plants and one food
research organization will be used to illustrate the application of current technologies.
A course project, using the Food Science Alumni Network, will be required.

Food Science
Spring. 1 credit. S-U grades only.

Food Choices and Issues
Spring. 2 credits. S-U grades optional.

Food Science
Fall and spring. 2 credits. Prerequisite: one course each in chemistry and biology. M W
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. Interrela­
tionships between the chemical, physical,
nutritional and quality properties of foods as affected by formulation, processing, and
packaging are stressed.

Food Analysis
Spring. 3 credits. Prerequisite: CHEM 208 or equivalent. Lecs, M W 12:20, lab, F
Introduces tests used by food analysts for fats, proteins, carbohydrates, and selected minor
nutrients. Emphasis is on understanding and use of good analytical techniques, including
gavimetric, volumetric, chromatographic and spectrophotometric methods. A special project
for the total analysis of a complex food provides experience in technique selection,
work scheduling, and execution.

Kosher and Halal Food Regulations
Spring. 2 credits. Sophomore standing and above. M 7:30-9:35 p.m.
J. M. Regenstein.
A comprehensive introduction to kosher and halal foods in the American food industry with
some coverage of home practices. The kosher
food laws, their origin, and their application in modern food processing will be examined. The nature of the kosher supervision industry in America will be described. Halal laws will also be examined and the interactions between the two communities explored. Current food-related issues in both communities will be reviewed, including recent court decisions striking down laws in the state of New Jersey and the City of Baltimore. Some aspects of ethnic foods will also be considered.

FOOD 290 Meat Science (also Animal Science 290)
Fall. 2 or 3 credits. Lecs, T R 11:15-12:05 p.m.; lab, M or R 12:20-3:20. Lab cannot be taken without lecture. D. H. Beermann.

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 cutting, wholesale and retail cut identification, processing, inspection, grading, quality control, and meat merchandising. An all-day field trip to commercial meat plants is taken.

FOOD 311 Milk and Frozen Desserts

Deals with the principles and practices of processing fluid milk products and frozen desserts. The chemical, microbiological, and technological aspects of processing these dairy products are considered. Emphasis will be upon product quality and recognition of factors affecting consumer acceptance.

FOOD 321 Food Engineering Principles
Fall. 3 credits. Prerequisites: FOOD 200 and Introductory Physics. M W F 9:05-9:55. S. S. H. Rizvi.

Introduces the engineering principles underlying food processes and equipment. Topics covered include the fundamentals of heat and mass transport, including fluid mechanics, heat transfer, refrigeration, and psychrometry.

FOOD 322 Food Engineering Laboratory
Spring. 2 credits. Prerequisite: FOOD 321. Lab, T or W 1:25-4:00; lec, T 12:20. S. S. H. Rizvi.

Provides hands-on experience with food engineering processes and measurements. Topics covered include mass and energy balances, rheology, fluid mechanics, heat transfer, refrigeration, and psychrometry.

FOOD 351 Milk Quality
Fall. 1 credit. Prerequisite: AN SCI 250 or equivalent or permission of instructor. F 12:20. D. K. Bandler and D. P. Brown.

Focuses on the important aspects of farm sanitation and milk handling as they affect milk flavor and quality. The course is an overview of quality control tests, basic microbiology, cleaning and sanitizing, and special problems in manufacturing and marketing fresh and storable dairy products.

FOOD 390 Food Microbiology Lectures
Fall. 2 credits. Prerequisites: BIOMI 290 and 291. M W 12:20-1:10. R. A. Lefford.

The major families of microorganisms of importance in foods are studied, with emphasis on the roles of those organisms in food preservation, food fermentations, and public health.

FOOD 395 Food Microbiology Laboratory
Fall. 2 credits. Prerequisite: BIOMI 291. Graduate students must have permission of the instructor. 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 special methods for microbiological testing, and control of food products, and practice in the application of a systematic approach to controlling the safety of foods.

FOOD 396 Food Safety Assurance

This course provides information on procedures to control biological, chemical, and physical hazards and assure the safety of foods. Topics include discussions on Hazard Analysis Critical Control Point (HACCP) programs, total quality management, and the application of current technologies in reducing the incidence of foodborne illness. Case studies and exercises will be used to demonstrate and apply the key principles that are discussed.

FOOD 400 Senior Seminar in Food Science and Technology

Students prepare and present a seminar on a topic of current interest in food science and technology.

FOOD 401 Concepts of Product Development

A discussion of the frequency of events in developing and marketing new food products. Topics include packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.

FOOD 405 Food Waste Management
Spring. 2 credits. Prerequisite: FOOD 200 or its equivalent. Offered alternate years. Lec, M 12:20-2:15; lab, M 2:30-4:25. J. M. Regenstein.

Introduction to the principles and practices related to managing wastes from food plants through reduction, reuse, recycling, and composting. Some broader areas of waste management impacting the food industry will also be discussed. Includes field trips which may take all afternoon.

FOOD 406 Cheese and Other Fermented Dairy Foods

Principles and practices of fermentation and processing techniques as they apply to cheeses, cultured dairy foods, beer, and related products. Labs will feature unit processes and tastings.

FOOD 409 Food Chemistry
Spring. 3 credits. Prerequisite: BIOBM 330 or 331. M W F 9:05-9:55. Staff.

The chemistry of foods and food ingredients. Chemical and physical properties of water, proteins, lipids, carbohydrates, and other food components/additives are discussed in the context of their interactions and functional roles in foods. The effects of chemical changes during processing and storage on quality and nutritional aspects of several food commodity groups (dairy, meat, fruits and vegetables, cereals and legumes) are described.

FOOD 410 Sensory Evaluations of Foods
Fall. 3 credits. Prerequisite: statistics. M W F 10-11:00. H. T. Lawless.

Deals with the sensory techniques used in evaluating the flavor, color, and texture of foods and the evaluation of consumer acceptance. Includes methods for measuring these qualities, underlying psychological principles, statistical methods for analyzing results, and establishing a full-service sensory evaluation program.

FOOD 419 Principles of Food Packaging

The chemical and physical properties and manufacture of the basic materials used to construct packaging and their influence on shelf life are presented. Emphasis is on newer packaging technologies and materials. Economics, design, and regulation of food packaging are briefly presented.

FOOD 499 Senior Seminar in Food Science and Technology

Students prepare and present a seminar on a topic of current interest in food science and technology.

FOOD 431 Concepts of Food Science and Technology
Fall. 2 credits. Prerequisite: FOOD 200 or its equivalent. Offered alternate years. M W 11:15-12:05. J. H. Hotchkiss.

A discussion of the frequency of events in developing and marketing new food products. Topics include packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.

FOOD 405 Food Waste Management
Spring. 2 credits. Prerequisite: FOOD 200 or its equivalent. Offered alternate years. Lec, M 12:20-2:15; lab, M 2:30-4:25. J. M. Regenstein.

Introduction to the principles and practices related to managing wastes from food plants through reduction, reuse, recycling, and composting. Some broader areas of waste management impacting the food industry will also be discussed. Includes field trips which may take all afternoon.

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FOOD 405 Food Waste Management
Spring. 2 credits. Prerequisite: FOOD 200 or its equivalent. Offered alternate years. M W 11:15-12:05. J. H. Hotchkiss.

A discussion of the frequency of events in developing and marketing new food products. Topics include packaging and labeling, food additive and ingredient regulations, taste panels, market testing, market research, and patents.
An introduction to wine appreciation through the study of fermentation biology, wine composition, and sensory perception. Samples of wines will be used to illustrate the sensory properties, microbiological processes, and chemical components that determine wine quality. Students will learn to recognize the major features of wine that determine sensory quality and to understand the processes that produced them. Topics will include the psychology and chemistry of bouquets, taste, and aroma; the microbiology of fermentation and spoilage; and the sensory properties of wines from different grape varieties, viticultural practices, and wine making techniques.

**FOOD 447 International Postharvest Food Systems**
Fall. 2 or 3 credits. Prerequisite: freshman chemistry. S-U grades optional.
T R 10:10-11:00. M. C. Bourne and staff. An interdisciplinary course designed for all undergraduate and graduate students in CALS. 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**
Spring. 2 credits. Offered alternate years. J. M. Regenstein.
Introduction to the complex array of federal and state statutes and regulations that control the processing, packaging, labeling, and distribution of food, including aspects of safety and nutritive value. Emphasis will be on the Food and Drug Administration and an U.S. Department of Agriculture regulations, but the course also will refer to other regulatory agencies. Emphasis will be 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**
H. T. Lawless.
Readings and discussions of primary source materials in sensory evaluation, including historical perspectives, psychophysics, perceptual biochemistry, information processing. Concepts influencing detection of sensory differences, use of rating scales, and characterization of sensory properties will be emphasized.

**FOOD 490 Commercial Meat Processing**
(also Animal Science 490)
A study of the classification, formulation, and production of commercially available processed meat products. Physical and chemical characteristics of meat and nonmeat ingredients; their functional properties; various processing methodologies; microbiology; packaging, handling, and storage; and quality assurance are discussed.

**FOOD 494 Special Topics in Food Science**
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be offered both by the department and by student groups, and the same course will not be offered more than twice under this number.

**FOOD 497 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 Roberts Hall). S-U grades optional. 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. Students may be changed, 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. Students assist in teaching a course appropriate to their previous training. Students will meet with a discussion or laboratory section and will 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). Students conduct original research directed by a food science faculty member.

**FOOD 600 Seminar**
Fall and spring. 1 credit. Required of all food science graduate students. S-U grades only. T 4:30-5:20.

**FOOD 604 Chemistry of Dairy Products**
Fall. 2 credits. Limited to 16 students. Prerequisites: organic chemistry, biochemistry, knowledge of dairy-product manufacturing procedures, and permission of instructor. Offered alternate years. Not offered fall 1997 or 1999; next offered fall 1998. F 1:25-3:30. D. M. Barbano.
A detailed study of milk constituents and their properties. Properties of various milk constituents and related to observed physical and chemical changes that occur in dairy products during and after processing. This course will emphasize current research in dairy chemistry.

**FOOD 605 Physical Chemistry of Food Components**
Fall. 3 credits. Prerequisite: an undergraduate course in physical chemistry. Offered alternate years. Not offered fall 1997 or 1999; next offered fall 1998. M W 10:10. J. W. Brady.
This course will cover the physical properties of food molecules. Emphasis will be placed on the molecular basis of structural characteristics; colloidal properties; molecular interactions; foams, gels; and water binding of foods.

**FOOD 607 Advanced Food Microbiology**
Spring. 2 credits. Prerequisites: food microbiology, genetics (preferred). Offered alternate years. M W 11:15. C. A. Barin.
There have been great advances in applying the modern tools of molecular biology to the detection of microorganisms and their metabolites. The primary emphasis of this course will be to review current developments in the theory and application of nucleic acid and antibody-based detection systems, especially as they concern food safety. In addition, other approaches, including measurement of impedance, ATP, and endotoxins, will be discussed.

**FOOD 612 Electroanalytical Chemistry**
Fall. 2 credits. T R 11:30-12:25. R. A. Durst.
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 will survey 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 Animal Science 490)
Spring. 2 credits. Limited to qualified seniors and graduate students. Prerequisite: BIOBM 330 or equivalent. Offered alternate years. T R 10:10. 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 665 Engineering Properties of Foods**
Spring. 2 credits. Prerequisite: course in transport processes or unit operations as applied to foods; or permission of instructor. Offered alternate years. T R 12:20-1:10. S. S. H. Rizvi and S. J. Mulvaney.
Theories and methods of measurement and prediction of rheological, thermal, and mass transport properties of foods and biomaterial systems. Emphasis is on physical-mathematical basis of measurement as well as the prediction processes. Examples of appropriate use of these properties in engineering design and analysis of food processes will also be provided.
FOOD 694  Special Topics In Food Science
Fall or spring. 4 credits maximum. S-U grades optional. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester, and
will be advertised by the department. Courses offered under the number will be approved
by the department curriculum committee, and the same course will not be offered more than
twice under this number.

FOOD 698  Graduate Teaching Experience
Fall and spring. 1 to 3 credits. S-U grades only. Staff.
A survey of watercolor techniques. Subject matter largely still life, sketchbook, and on-the-spot outdoor painting.

FR DR 211  Freehand drawing and Illustration
Fall. 2 credits. Prerequisite: FR DR 109 or equivalent. Not offered 1997-98. S-U grades optional. 6 studio hours scheduled in 2 or 3 hour units between 9:05 and 12:05. MT W R F. R. J. Lambert.
Progression to the complete illustrations. Subject matter largely from sketchbooks, still life, and imagination.
Composition, perspective, and ways of rendering in different media are considered.

FR DR 214  Watercolor
Spring. 2 credits. Prerequisite: FR DR 109 or equivalent. S-U grades optional. 6 studio hours scheduled in 2 or 3 hour units between 9:05 and 12:05. MT W R F. R. J. Lambert.
A survey of watercolor techniques. Subject matter largely still life, sketchbook, and on-the-spot outdoor painting.

FR DR 316  Advanced Drawing
Fall or spring. 2 credits. Prerequisite: FR DR 109, 211 or permission of instructor. S-U grades optional. 6 hours to be arranged. R. J. Lambert.
For students who want to attain proficiency in a particular type of illustration or technique.

FR DR 417  Scientific Illustration
Fall. 2 credits. Prerequisite: FR DR 211 or 316 or equivalent. S-U grades optional for graduate students only. Not offered 1997-98. R. J. Lambert.
A survey of methods of illustration. Training in techniques of accurate representation in media suitable for reproduction processes, including pen and ink, scratchboard, wash, and mixed media.

FRUIT AND VEGETABLE SCIENCE: HORTICULTURAL SCIENCE
See Horticultural Sciences.

HORTICULTURAL SCIENCES
Horticultural science courses at Cornell are taught by the faculty of the Department of Floriculture and Ornamental Horticulture and the Department of Fruit and Vegetable Science.

Floriculture and Ornamental Horticulture

FRUIT and VEGETABLE Science

Courses by Subject:
General horticulture: 101, 102
Public garden management: 485
Crop production:
Agroforestry: 415
Controller environment agriculture: 410, 411, 412, 413
Fruit: 200, 442, 444, 445, 450
Greenhouse: 410, 411, 412, 413
Nursery: 400, 420
Turfgrass: 330, 475
Vegetable: 225, 456, 460
Extension education: 629
Horticultural physiology: 400, 450, 455, 456, 460, 462, 615, 620
Independent study, research, and teaching: 470, 495, 496, 497, 498, 499, 500, 605, 700, 800, 900
Internships: 496
Landscape horticulture: 435, 440, 485, 491
Plant materials: 230, 243, 300, 301, 335, 430
Plant propagation: 400
Postharvest physiology: 325, 625, 630
Sales and service businesses: 425
Seminar: 495, 602, 630, 636
Special topics: 470, 494, 629, 630, 635, 694
Turfgrass management: 330, 475
Vegetable types and varieties: 220, 465

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.

HORT 101  Introduction to Horticultural Science
Fall. 4 credits. Lect, M W F 10:10; lab W 1:25-4:25. C. F. Gortzig.
An introduction to horticulture in all of its components: floriculture, nursery, landscape horticulture, turfgrass management, fruit and vegetable science, urban horticulture, and related professional and commercial fields. A survey of the component fields of plant science also is provided. Emphasis is on the history, geography, and literature of the field; the structure and organization of the component industries, institutions, and professions; and the role of science and technology in the continuing development of horticultural practice. Field trips, including one three-day field trip (cost approximately $150.00), are taken to horticultural firms, institutions, and historic sites.

HORT 102  General Horticulture
Spring. 4 credits. Each lab limited to 25 students. Lect, M W F 10:10; lab M T or W 2:45-4:25. L. D. Topoleski.
Acquaints the student with applied and basic horticulture. Open to all students who want a general knowledge of the subject or who want to specialize in horticulture but have a limited background in practical experience or training in plant science. Includes flower, fruit, and vegetable growing and gardening techniques.

HORT 200  Introductory Pomology
Fall. 3 credits. S-U grades optional. Lect, T R 10:10; lab, T 1:25-4:25. I. A. Merwin.
A survey of fruit science, emphasizing the natural history, botany, physiology, and production of edible fruits in temperate-climate areas. Topics include varietal breeding and propagation, environmental and sustainability issues, and practical methods of fruit production. Labs and field trips will provide hands-on experience and tours of regional orchards.
A study of the trees, shrubs, ground covers, vegetable and weed seeds, seedlings, nutrient deficiencies, vegetable judging, grading, and grade defects.

**HORT 225 Vegetable Production**

A study of the trees, shrubs, ground covers, and vines used in landscape plantings. Emphasis is on winter identification and values for use as landscape material.

**HORT 230 Woody Plant Materials**

A study of a trees, shrubs, ground covers, and vines used in landscape plantings. Emphasis is on winter identification and values for use as landscape material.

**HORT 243 Taxonomy of Cultivated Plants**
Fall. 3 credits. Prerequisite: One year of introductory biology or written permission of instructor. May not be taken for credit after BIOL 248. Next offered 1998–99. Lec, M W 10:10–11:00; lab, W 1:25–4:25. M. A. Luckow.

A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytic keys. Attention is also given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

**HORT 300 Garden and Interior Plants I**

A study of ornamental plants used in garden and interior situations. The first seven weeks are devoted to a further study of interior plants, with emphasis on specialized groups of interior plants such as orchids, cacti and succulents, gesneriads, ferns, palms, and bromeliads. The second seven weeks are devoted to outdoor herbaceous plants, such as tulips, daffodils, crocuses, and irises, as well as other spring-blooming bulbs and perennial plants. Outdoor laboratories emphasize practical gardening activities appropriate to the spring season.

**HORT 325 Practical Aspects of Postharvest Handling of Horticultural Crops**
Spring. 3 credits. Offered alternate years. Lec, M W 9:05; lab T 1:25–4:25. L. L. Creasy.

A study of changes that occur in horticultural crops between harvest and consumer. Practices that affect the rate of change and the final effect on quality of the commodity are discussed. Maturity/quality indices, preharvest treatments, and harvesting/handling practices and storage/transporation requirements of selected horticulture crops are covered.

**HORT 330 Turfgrass Management**

Study of the scientific principles involved in the management of golf courses, athletic fields, parks and industrial grounds, and commercial sod production. Considerations given to principles of establishment, mowing, irrigation, growth and development, species selection, and nutrition in the management of turfgrass sites.

**HORT 335 Woody Plant Materials for Landscape Use**

A study of the trees, shrubs, vines, and ground covers used in landscape plantings in the northeastern United States. Emphasis is on leaf identification and on characteristics that determine the usefulness of each as landscape subjects.

**HORT 400 Principles of Plant Propagation**
Fall. 3 credits. Prerequisites: BIOL 242 and 244 or another course in plant physiology. Lec, T R 9:05; lab, R 1:25–4:25. K. W. Mudge.

Sexual (seed) propagation and asexual (vegetative) propagation including cutting, graftage, tissue culture, layering and specialized vegetative reproductive structure.

Physiological, environmental, and anatomical principles are stressed in lecture and hands-on experience in laboratories. Examples include both temperate as well as tropical horticultural, agronomic, and forestry crops.

**HORT 410 Principles of Controlled Environment Agriculture (CEA)**
Spring. 3 credits. Prerequisite: permission of instructor. Letter grade only. Corequisite: HORT 410. Lab 3 hours per week as scheduled. R. W. Langhans.

Application of computer software to operations management and environmental management of a CEA facility—including specifications for facilities, optimization of resource inputs (e.g., energy, fertilizer), crop programming, efficient space use, labor efficiency (time and motion), and inventory management.

**HORT 415 Principles and Practices of Agroforestry**
Fall. 3 credits. Prerequisites: senior or graduate standing and permission of instructor. Fee for lecture-laboratory manual: $100. Lec, M W F 9:05; lab, M 2-4:25. K. W. Mudge, J. P. Lassoie.

An introduction to modern and traditional agroforestry systems involving the spatial or temporal integration of multipurpose woody plants (trees and/or shrubs) with annual or perennial crops and/or with livestock. Interactions between woody and non-woody components of agroforestry systems will be considered from the standpoint of above and below ground resource capture. The sustainability of agroforestry systems will be critically examined from both a biophysical and socioeconomic perspective. Laboratory sessions will include field trips, case studies, use of computer-based sources of information, and practical skills involved in woody plant management (identification, propagation, planting, pruning, measurement.).

**HORT 420 Principles of Nursery-Crop Production**
Fall. 4 credits. Prerequisite: HORT 400. Lec, M W F 9:05; lab, M 2-4:25. Field trips. 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 Horticultural Sales and Service Businesses
Spring. 4 credits. Fee for course manual $20. Prerequisites: ARME 240 or a similar course in marketing, or permission of instructor. Weekly laboratory and field trips to commercial operations and one 3–4-day field trip to a metropolitan area (cost approximately $130.00) are taken. Lecs, M W F 10:10; lab, W 1:25–4:25. C. F. Gottzig. A study of the application of horticultural, marketing, and management principles and practices in the operation of horticultural sales and service firms, e.g., garden centers, retail florist and nursery stores, wholesale marketing operations, mail-order businesses, mass markets, interior and outdoor landscape-service and related firms.

HORT 430 Special Topics in Ornamental Plants
Fall or spring. Credit and hours to be arranged. Primarily for upperclass floriculture and ornamental horticulture majors. Prerequisites: HORT 230, 301, 303, 335, or equivalent, and permission of instructor. R. G. Mower. Topical subjects in plant materials. Independent and group study of important groups of woody and herbaceous plant materials not considered in other courses. The topic is given in the supplementary announcement.

HORT 435 Landscape Management
Fall. 4 credits. Prerequisites: HORT 230 or 335, and BIO PL 241 or permission of instructor. Not offered 1997–98. Lecs, M W F 12:20; lab, T 1:25–4:25. A study of the practices involved in the planting and maintenance of woody ornamental plants in the landscape. The major emphases will be on planting and post-planting techniques, water and fertilization management, pruning, and general tree care. The lectures will focus on the physiological bases for essential management principles. Labs have a hands-on focus.

HORT 440 Restoration Ecology
Fall. Offered odd years: 1997, 1999. 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. T. H. Whittaker. An inquiry based approach to 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, one 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. Offered even years. Lecs, M W F 9:05; lab, M 1:25–4:25. Not offered spring 1998. C. M. Petrovic. A study of the evolution, breeding history, and physiology of strawberries, raspberries, blackberries, blueberries, and other minor small fruit crops, and of cultural practices that influence productivity, fruit quality, and pest damage. Marketing and economics will be considered, and alternative production practices for both commercial and home gardeners will be discussed. Frequent field trips enhance classroom activities.

HORT 444 Applied Viticulture
Fall. 3 credits. Not offered fall 1998. Lecs, T R 9:05; lab, R 2:45–4:25. L. L. Cressy. Grape production and post-production practices with emphasis on the Great Lakes and Finger Lakes regions. We will examine grape varieties, site selection, and vine management as affected by geography, meteorology and vine anatomy/physiology. Protection of vines and grapes from injury by cultural, chemical, and natural means will also be explored. Frequent field trips offer hands-on experience in vineyard practices, marketing and processing.

HORT 445 Orchard Management
Spring. 3 credits. Prerequisite: HORT 200. S-U grades offered. Offered every year. Not offered 1999. Lecs, T R 10:10; lab T 1:25–4:25. A. Merwin. The science of tree fruit production in temperate climates, including site evaluation and improvement, fruit variety and rootstock selection, tree propagation, planting, pruning, and training systems, the physiology of flowering and fruit development, dormancy and cold hardiness, tree nutrition and water relations, fruit harvesting and storage, and integrated pest management. Emphasis is on agroecological principles and hands-on practice in orchard lab-sessions and field trips.

HORT 450 Soil Management and Nutrition of Perennial Crops

HORT 455 Fertility Management and Nutrition of Vegetable Crops
Fall. 3 credits. Prerequisite: any college-level chemistry course. Lecs, M W 10:10; lab/disc, M 2–4:25. Not offered fall 1997. The course deals with both major, secondary and minor elements including fertilization programs, interpretation of tissue and soil analyses, nutrient interactions, induced deficiencies, toxicities as well as the effects of organic matter, crop residues, and specific crop sequences. Selected topics are considered with respect to the current literature, experimental techniques, and applied technologies. Topics change from one year to another and reflect the expertise and research interests of the professors who participate. Topics selected for each term will be announced several months before the term begins.

HORT 460 Plant-Plant Interactions
Spring. 3 credits. Prerequisite: any crop production course or permission of instructor. Lecs, T R 9:05; lab/disc, M 2–4:25. Offered alternate years. Offered 1998. The manner in which plants interfere or positively interact is examined for the management of cropping systems. Competitive and chemical interactions are considered between weeds and crops, among crops in polyculture, and between individuals in monoculture. Examples will be taken from both temperate and tropical monoculture and intercropping systems.

HORT 462 Vegetable Crop Physiology
Spring. 3 credits. Prerequisites HORT 225 and BIOLPL 242. Lecs, T R 9:05; lab/disc, M 2–4:25. Offered alternate years. Not offered spring 1998; next offered spring 1999. H. C. Wien. Study of the physiological processes that determine the timing, quantity, and quality of vegetable crop yield. Processes of flower induction, fruit set, fruit growth, and the relationships between vegetative and reproductive growth are covered. Laboratory emphasizes practical hands-on greenhouse experiments and small group discussions.

HORT 465 Vegetable Varieties and Their Evaluation
Fall. 3 credits. Prerequisites: HORT 225 or permission of instructor. S-U grades offered. Lecs, W F 8; lab, F 1:25–4:25. Offered alternate years. Not offered fall 1998. D. W. Wolfe and A. Rangarajan. Principles of vegetable variety evaluation and selection of techniques in relation to program objectives. Morphology, yield, and quality of selected crops will be studied in the field. The seed industry will be briefly discussed.

HORT 470 Special Topics in Pomology
Spring. 3 credits. Open to undergraduates by permission. Hours to be arranged. Staff. Selected topics are considered with respect to the current literature, experimental techniques, or applied technologies. Topics change from one year to another and reflect the expertise and research interests of the professors who participate. Topics selected for each term will be announced several months before the term begins.

HORT 475 Golf Course Management
Fall. 2 credits. Prerequisite: HORT 300 or equivalent. Offered odd years, fall 1997, fall 1999. Lecs to be arranged. A. M. Petrovic. Advanced study in the management of golf course operations including selection of root zone materials, fertilization practices, integrated pest management practices, irrigation systems, environmental based decision making, personnel management, and financial operations. Analysis of a central New York golf courses will provide the basis for discussion.

HORT 485 Public Garden Management
Spring. 3 credits. Prerequisites: HORT 300 or HORT 301; HORT 230 or HORT 335. Offered alternate spring semesters. Lecs, T R 10:10–11:00; lab, T R 11:15–12:05. Two-and-one-half-day field trip to visit other botanical gardens and arboreta. D. A. Bakow. The course will explore the history of public gardens, types of contemporary public gardens, and the operation of botanical gardens and arboreta. Included will be separate units on: collections curation, design of collections, management of landscapes and natural areas, educational programming, interpretive programs, research, financial management, and staffing.

HORT 491 Design and Plant Establishment in the Urban Environment [also LA 491]
Fall. 3 credits. Prerequisites: HORT 230 or 335 or permission of instructor. Lecs, T R 12:20; lab, T 1:25–4:25. N. L. Bassuk and P. J. Trowbridge.
This course will focus on the establishment of woody and herbaceous plants in urban and garden settings. By understanding the environmental constraints placed on plants, we will be able to critically assess and modify potential planting sites, select appropriate trees, shrubs, and ground covers, and learn about the principles and practices of plant establishment both in the ground and in contained environments. Design, followed by specifications and graphic details, will be produced to implement these practices. Field work includes chemical and physical analysis of soils, vegetation, and site assessment.

HORT 494 Special Topics in Horticulture
Fall or spring. 4 credits maximum. S-U grades optional. Prerequisites: permission of instructor(s) for each term. Staff.

HORT 495 Undergraduate Seminar
Undergraduate participation in weekly departmental seminars. May be taken four times for one credit per semester. S-U grades only.

HORT 496 Internship in Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of student's adviser. In advance of participation in internship programs. Students must register with an Independent Study form (available in 140 Robert Hall) signed by the faculty member who will supervise their study and assign their grade. Hours to be arranged. Staff.

HORT 497 Independent Study in Horticultural Sciences
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.) Hours to be arranged. Staff.

HORT 499 Undergraduate Teaching Experience
Fall or spring. Credit variable. S-U grades only. Prerequisite: 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.) Hours to be arranged. Staff.

HORT 499 Undergraduate Research
Fall or spring. Credit variable. S-U grades only. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall.) Hours to be arranged. Staff.

HORT 500 Master of Professional Studies (Agriculture) Project
Fall or spring. 1-6 credits. (6 credits maximum toward MPS (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 Professional Colloquium Series/PHON
Spring. 1 credit. Prerequisite: permission of instructor. 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. Hours to be arranged. Staff.

HORT 602 Seminar in Fruit and Vegetable Science
Fall or spring. 1 credit. S-U grades only. R 4:00. C. B. Watkins. Weekly seminars consist of graduate student research project reports, faculty research topics, as well as guest speakers from other universities and/or industry. Required of graduate students majoring in horticulture and vegetable systems. Undergraduate students must register under HORT 405 Sect. 1.

HORT 615 Quantitative Methods in Horticultural Research

HORT 620 Woody Plant Physiology
Spring. 4 credits. BIOL, BIOLM 331. CHEM 357, or equivalent, or permission of instructor. Letter grades only. Lec, T R 8:40-9:55. Disc, T 1:25-4:25. T. H. Whitlow.

HORT 625 Advanced Postharvest Physiology of Horticultural Crops
Spring. 3 credits. Prerequisite: BIOL 242 and/or HORT 325. Offered alternate years. Not offered spring 1999. Lec, T R 10:10; disc, to be arranged. P. M. Ludford.

HORT 630 Current Topics in Postharvest Horticulture

HORT 635 Tools for Thought
Fall. 1 credit. Prerequisite: permission of instructor. Staff. Offered alternate years. Hours to be arranged. Staff.

HORT 636 Current Topics in Horticulture
1 credit. S-U grades only. Section 01: Fruit and Vegetable Science. Staff. Fall or spring. 1 hour per week, to be arranged. 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 640 Summer Internship
6 credits. Offered alternate years. Staff. Fall or spring. Credit variable. S-U grades only. R 4:00. C. B. Watkins. Summer internships consist of graduate student research project reports, faculty research topics, as well as guest speakers from other universities and/or industry. Required of graduate students majoring in horticulture and vegetable systems. Undergraduate students must register under HORT 405 Sect. 1.
Section 02: Floriculture and Ornamental Horticulture. T. C. Weiler and staff. Fall. 1 hour per week, to be arranged. Graduate students only. Undergraduates should enroll in HORT 495 (Section 02). Each week a staff member will develop a dialogue with students on a topic of current mutual interest. Topics and discussion leaders change by week and semester; topics will encompass planting design, exterior and interior landscape management, turfgrass management, urban horticulture, nursery management, plant materials, stress physiology, weed science, root zone ecology, horticultural sales and service business operation, and controlled environment agriculture. Brief reading assignments may be distributed for completion by the next class.

HORT 694 Special Topics in Horticulture Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. Sec 01, Floriculture. Sec 02, Fruit and Vegetable Science. Staff. The department teaches “trial” courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the same course number will be approved by the department curriculum committees, and the same course will not be 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 to be arranged. 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 to be arranged. S-U grades only.

HORT 900 Thesis Research, Doctor of Philosophy Fall or spring. Credit to be arranged. S-U grades only.

INTERNATIONAL AGRICULTURE
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.

INTAG 300 Perspectives in International Agriculture and Rural Development
Fall. 2 credits. F 1:25-3:20. R. W. Everett. A forum to discuss both contemporary and future world food issues and the need for an integrated, multidisciplinary team approach in helping farmers and rural development planners adjust to the ever-changing food needs of the world.

INTAG 402 Agriculture in Tropical America
Fall. 2 credits. Prerequisite: Upper class or graduate standing. F 1:25-3:20. H. D. Thurston and staff. A preparatory course for participation in International Agriculture 602. Physical resources, vegetation, history, crop and animal production, and various social and economic aspects of agriculture in tropical America will be discussed.

INTAG 403 Traditional Agriculture in Developing Countries

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 millions 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 will examine traditional systems from several disciplinary points of view.

INTAG 599 International Agriculture and Rural Development Project Paper
Fall and spring. 1-6 credits. Limited to M.P.S. candidates in the fields of International Agriculture and Rural Development (IARD) and International Development (ID). S-U grades only. Staff.

INTAG 602 Agriculture in the Developing Nations
Spring. 3 credits. Prerequisites: INTAG 300 or equivalent, INTAG 402, and permission of instructor. Cost of field-study trip includes air fare and approximately $450 for lodging, meals, and personal expenses. T R 2:30-4:25 until mid-year only; R. W. Blake and staff. 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 field-study trip during January to Latin American countries is followed by discussions and assignments dealing with problems in agriculture and livestock production in the context of social and economic conditions.

INTAG 603 Administration of Agricultural and Rural Development (also Government 692)
Spring. 4 credits. M 2:30-5:30. 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 650 Special Topics in International Agricultural and Rural Development
Fall or spring. 1 credit. Staff. A seminar for new themes of agricultural and rural development. Offered occasionally. Specific content varies.

INTAG 665 Training and Development: Theory and Practice (also Communication 685, Education 685 and Industrial and Labor Relations 688)
Spring and summer. 4 credits. S-U grades optional. Charge for materials $45. Lec, F 9:05-12:05; lab, 1 hour per week, to be arranged. At Communication Graduate Center. R. Colle, M. Ewert, D. Deshler.

Analysis, design, and administration of training programs for the development of human resources in small-scale rural, health and nutrition, literacy as nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the U.S. 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 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 703 Seminar for Special Projects in Agricultural and Rural Development
Fall and spring. 1 credit. Required for graduate students enrolled in the M.P.S. (Ag.) degree program and majoring in international agricultural and rural development. Others with permission of the director of graduate field studies in IARD. S-U grades only. M 12:20-2:15. R. W. Blake and staff. The seminar provides students with the opportunity to develop and present their special projects. It also serves as a forum for discussion of current issues in low-income agricultural and rural development, with particular attention to interdisciplinary complexities.

Related Courses in Other Departments
Sociotechnical Aspects of Watershed Development (ABEN 754, ARME 754, and GOVT 644)
Trade Offs in Global Economic Issues (ARME 100)
International Trade Policy (ARME 430)
Economics of Agricultural Development (ARE 464)
The World's Food (ARME 660)
Seminar on Agricultural Trade Policy (ARME 730)
Macro Policy in Developing Countries (ARME 763)
Not offered 1997-98
Tropical Livestock Production (AN SC 400)
Tropical Forages (AN SC 403)
Southeast Asia Seminar: Country Seminar (ASIAN 601)
Food, Agriculture, and Society (B&SOC 469, BIO G 469, S&T 469)
Seminar in International Planning (CRP 671)
Seminar in Project Planning in Developing Countries (CRP 675)
Communication in the Developing Nations (COMM 624)
Comparative Studies in Adult Education (EDUC 483)
Community Education and Development (EDUC 682) Not offered 1997-98
International Postharvest Food Systems (FOOD 447)
International Environmental Issues (NTRES 400)
Religion, Ethics, and the Environment (NTRES 407)
National and International Food Economics (NS 457)
International Nutrition Problems, Policy, and Programs (NS 680)
International Nutrition Seminar (NS 698)
Special Topics in International Nutrition (NS 699)
LANDSCAPE ARCHITECTURE


LA 141 Grounding in Landscape Architecture
Fall. 3 credits. Limited to 15 students. Letter grade only. Completion of drafting supplies, about $200. 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. Completion of basic drafting equipment, fees, and supplies, about $250. Fundamentals of landscape design applied to small-scale site-planning projects. Work in the studio introduces course participant to the design principles, design materials, planting design, and graphics.

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 will focus upon the role of materials in design, design theory, and design vocabulary associated with landscape architectural projects.

LA 261 Urban Archaeology (also CRP 261)
Fall. 3 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 various cultures have altered the urban landscape. Students will participate in a local archaeological excavation.

LA 262 Laboratory in Landscape Archaeology (also CRP 262)
Spring. 3 credits. Prerequisites: LA 261 or CRP 261 or permission of instructor. Various American Indian civilizations and European cultures have all altered the landscape to meet the needs of their cultures. Students will learn how to interpret the American Indian and Euro-American landscapes of specific archaeological sites by identifying and dating artifacts, studying soil samples, and creating site maps.

LA 282 The American Landscape
Spring. 3 credits. An interdisciplinary survey of the environmental and cultural history of the American landscape, including perceptions of landscape as expressed in paintings, photographs, and literature. The history of landscape to culture, landscape use, and the history of regional and national landscapes are general topics, all seen within the context of the history of the environment.

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 will be engaged in the art and science of site-scaled design. This includes gardens, parks, and residential projects, their design and technical solutions.

LA 302 Integrating Theory and Practice II
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. The studio will engage course participants in service-oriented community design projects. Theories of place-making, community and participatory design and planning, and sustainability will be explored through practice-based learning. Students will be expected to do considerable field work in the community-at-large.

LA 315 Site Engineering I
Spring (1st seven weeks of semester). 2 credits. Prerequisite: permission of instructor. Lectures and studio projects focusing on the development of a working knowledge of site grading, site layout, site irrigation, site layout, and road alignment. This course will confront the problems and development of technical drawings leading to construction documentation for a wide variety of projects. Students will construct detail material prototypes and models and have the option of developing computer-generated drawings.

LA 318 Site Construction II
Spring (2nd seven weeks of semester). 2 credits. Prerequisite: LA 317 or permission of instructor. Exploration of construction materials, including specifications, cost estimates, and methods used by landscape architects in project implementation is the focus for this course. The course includes lectures, studio problems, and development of drawings leading to construction documentation for a comprehensive project. Students will develop a site survey and measured drawings as necessary to develop the comprehensive project.

LA 360 Pre-Industrial Cities and Towns of North America (also CRP 360)
Fall. 3 credits. Offered alternate years. Students will examine various transformation processes that occurred in American Indian and Euro-American landscapes. The focus will be on the development and history of the city. The course will provide a historical overview of the development of the American city.

LA 363/547 American Indians, Planners, and Public Policy (also CRP 363/547)
Spring. 3 credits. Students will examine the history of the environment and the role of American Indians in landscape design. This includes gardens, parks, and residential projects, their design and technical solutions.

LA 410 Computer Applications in Landscape Architecture
Fall or spring. 3 credits. Offered to landscape architecture students only. Limited to 15 students. This course will design a working knowledge of various computer software applications (AutoCAD, LandCAD, GIS, etc.) with emphasis on AutoCAD and LandCAD. The course will explore other applications relative to land-use planning and the profession of Landscape Architecture.

LA 412 Professional Practice
Spring. 1 credit. This course provides the student with a comprehensive understanding of the role of the professional landscape architect and the problems and opportunities one may encounter in an office or other professional situations. Topics discussed include practice diversity, marketing, professional services, office and project management, construction management, computers in the profession, and ethics.
LA 480 Principles of Spatial Design and Aesthetics (also City and Regional Planning 481 and 581) Fall. 3 credits. 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 in the contemporary urban context of Europe and North America.

LA 483 Design Criticism Fall. 3 credits. A practicum in writing environmental design criticism. Emphasis on impressionistic writing, on analytical descriptions and interpretations or works, and on the role of criticism in environmental design discourse.

LA 486 Community Design Workshop Spring. 3 credits. Permission of instructor. S-U grades optional. This class will offer the opportunity to learn, hands-on, the design process through the designing and building of service-oriented community projects including parks, greenways, public spaces, playgrounds, gardens and urban design. This course will enable students to both study and experience design and implementation skills at all levels of the design process. Community design and workshop series. Students will learn skills related to community design in a series of workshops and work on a real project with a community.

LA 487 Experiential Community Design Fall. 3 credits. Permission of instructor. S-U grades optional. This class will offer the opportunity to learn, hands-on, the design process through the designing and building of service-oriented community projects including parks, greenways, public spaces, playgrounds, gardens and urban design. This course will enable students to both study and experience design and implementation skills at all levels of the design process. Community design and workshop series. Students will learn skills related to community design in a series of workshops and work on a real project with a community.

LA 491 Design and Plant Establishment in the Urban Environment (also HORT 491) Fall. 3 credits. Prerequisites: HORT 230 or permission of instructor. This course will focus on the establishment of woody and herbaceous plants in urban and garden settings. By understanding the special constraints placed on plants, we will be able to critically assess and modify potential planting sites, select appropriate trees, shrubs, and ground covers and learn about the principles and practices of plant establishment both in the ground and in contained environments. Design, followed by specifications and graphic details, will be produced to implement these practices. Cost of supplies, about $50; expenses for field trips, about $50. Field work includes chemical and physical analysis of soils, vegetation, and site assessment.

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 497 Individual Study in Landscape Architecture Fall or spring. 1–5 credits; may be repeated for credit. 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 grade only. Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty.

LA 501 Composition and Theory Fall. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250. Field trip about $250. Basic principles of natural and cultural processes within contemporary design applied to the practice of landscape architecture. Projects focus on the relationship between measurement, process, experience and form at multiple scales of intervention.

LA 502 Composition and Theory Spring. 5 credits. Limited to graduate students. Cost of drafting supplies and fees, about $250; expenses for field trip, about $250. The studio will focus on the spatial design of project-scale site development. Students will develop their expertise in applying the design theory, vocabulary, and graphic expression introduced in LA 501.

LA 505 Graphic Communication I Fall. 3 credits. Prerequisites: concurrent enrollment in LA 501 or permission of instructor. Basic skills in graphic presentation, including pencil-and-ink drawing and drafting techniques applicable to landscape architecture projects. Basic design in freehand drawing, orthographic projection, axonometric projection, and lettering are covered in the course.

LA 506 Graphic Communication II Spring. 3 credits. Prerequisites: LA 505 and concurrent enrollment in LA 502 or permission of instructor. Course will focus on modes of landscape representation from ideation to presentation. Projects will in many cases correspond with LA 502 design projects. Representation modes include orthographic drawing; concept modelling; composite drawings; 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 Fall. 3 credits. Offered through the College of Architecture, Art, and Planning.

[LA 545 The Parks and Fora of Imperial Rome] Spring. 3 credits. Offered alternate years. Offered spring 1999. Prerequisites: Advanced standing in a design field, classics or history of art, or by permission of the instructor. This advanced seminar is seeking students in classics, art history, archaeology, landscape architecture, 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.

[LA 569 Archaeology in Preservation Planning and Design (also CRP 569)] Fall. 3 credits. Offered alternate years. Next offered 1998-99. In response to federal, state, and local legislation, archaeology now plays an important role in design, planning, and landscape decisions. Students develop the research skills needed to complete environmental review projects and historic landscape plans.

LA 590 Theory Seminar Fall. 3 credits. For graduate students in their last year of study. Seminar in contemporary landscape design theory.

LA 601 Integrating Theory and Practice I Fall. 5 credits. Limited to graduate students. Cost of supplies and fees, about $250; expenses for field trip, about $250. The studio will focus on site-scaled projects that engage cultural and natural systems. Theories of place-making, sustainable design and landscape representation will be critically explored through design projects that derive from and affirm a sense of site and place. The integration of site knowledge and site construction aims to support a deepening level of correspondence 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 will build on the LA601 subject matter with increasing emphasis placed on construction and technology and the expression of design solutions that grow from and affirm a sense of site and place. Social, cultural, physical and environmental factors and their relationship to site design and planning will be critically explored through theory and practice.

LA 615 Site Engineering I Spring. (1st seven weeks of semester). 2 credits. Prerequisite: permission of instructor. Lectures and studio projects focusing on the development of a working knowledge of site
grading, earthwork, storm-water management, site irrigation, site layout, and road alignment.

**LA 616 Site Engineering II**  
Fall. (2nd seven weeks of semester). 2 credits. Prerequisite: LA 615 or permission of instructor. Lectures and studio projects dealing with earthwork estimating, storm-water management, site surveys, site layout, site irrigation and horizontal and vertical road alignment.

**LA 617 Site Construction I**  
Fall (1st seven weeks of semester). 2 credits. Prerequisite: permission of instructor. The detail design and use of landscape materials, used by landscape architects in project implementation is the focus of this course. The course format includes lectures, field trips, studio problems, and development of technical drawings leading to construction documentation for a wide variety of projects. Students will construct detail material prototypes and models and have the option of developing computer-generated drawings.

**LA 618 Site Construction II**  
Spring. (2nd seven weeks of semester). 2 credits. Prerequisite: LA 617 or permission of instructor. Exploration of materials, including specifications, cost estimates, and methods used by landscape architects in project implementation is the focus for this course. The course includes lectures, short studio problems, and the development of drawings leading to construction documentation for a comprehensive project. Students will develop a site survey and measured drawings as necessary to develop the comprehensive project.

**LA 619 Advanced Site Grading**  
Spring (2nd seven weeks of semester). 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. Offered 1997-98; not offered 1999-2000. Various American Indian civilizations as well as diverse European cultures have all exerted their influences on the organization of town and city living. Each culture has altered the landscape in their own unique 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, or technology. Seminar topics and group study not considered in other courses.

**LA 694 Special Topics in Landscape Architecture**  
Fall or spring. 1-3 credits; may be repeated for credit. S-U grades optional. Topical subjects in landscape architectural design, theory, history, or technology. Group study of topics not considered in other courses.

**LA 701 Urban Design and Planning: Design of 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 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. This advanced studio provides the opportunity to explore issues of contemporary landscape architecture and integrate related fields. Topics examined include the influences of culture, history, and criticism, as well as reinterpretations of engineering and representation.

**LA 800 Master's Thesis in Landscape Architecture**  
Fall or spring. 9 credits. Independent research, under faculty guidance leading to the development of a comprehensive and defensible design or study related to the field of landscape architecture. Work is expected to be completed in final semester of residency.

**NATIONAL 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 101 The Environment**  
Fall. 2 or 3 credits. Letter grade only. M W F 9:05; 1 hr disc to be arranged. Staff. The nature of natural resources, how they are managed, and their interactions with individuals and societies are considered. Case histories are used to illustrate both principles and practices. Emphasis will be on management of renewable resources based on ecological and cultural perspectives.

**NTRES 104 Natural History Information Management Concepts**  
Spring. 1 credit. Letter grade only. T 9:05. A. N. Moen. Natural history information management concepts using electronic technology to provide global access to information resources will be introduced. Students will learn how to access and prepare hypertext and multimedia files of natural history information and related information processing techniques for research and education.

**NTRES 105 Natural History Information Management Applications**  
Fall and spring. Credit to be arranged. Letter grade only. 3 hours (TBA) per credit hour. Prerequisite: NTRES 104 (or concurrent registration) and permission of instructor fall term. A. N. Moen. Natural history information will be used to learn computer-based information management skills and to produce information resources for use in other courses in the Department of Natural Resources. Sections will include: (1) Natural History of Plants; (2) Natural History of Animals; and (3) Decision Aids for Laboratory and Field Identification.

**NTRES 201 Environmental Conservation Applications**  
Spring. 3 credits. M W F 12:20; 1 hr disc sec to be arranged. T. J. Fahey. As the end of the 20th century approaches, our lives are increasingly touched by questions about environmental degradation at local, regional, and global scales. Business as usual is being challenged. This course will stimulate you to go beyond the often simplistic portraits of the environmental dilemma offered by the mass media so that you will have a firmer basis for responsible citizenship and action on environmental issues.

**NTRES 204 Natural Resource Modeling Concepts**  
Spring. 1 credit. Letter grade only. R 9:05. Prerequisite. NTRES 104 or permission of instructor. A. N. Moen. Basic concepts underlying resource modeling in natural resources are introduced, and selected models illustrate specific biophysical, population, and simulation models.

**NTRES 205 Natural Resource Modeling Applications**  
Fall and spring. Credit to be arranged. Letter grade only. 3 hours (TBA) per credit hour. Prerequisite: NTRES 204 (or concurrent registration), one course in computer programming and permission of instructor fall term. A. N. Moen. Students may enroll for variable credits in biophysical modeling, population modeling, and simulation modeling sections. Original programs are designed by the students and become part of the information resources in the Cooperative Learning Center. Sections will include: (1) Biophysical Modeling in Natural Resources; (2) Simulation Modeling in Natural Resources; and (3) Population Modeling in Natural Resources.

**NTRES 210 Introductory Field Biology**  
Fall. 4 credits. Limited to 90 students. Open to sophomores and juniors with an adviser in Natural Resources or by permission of instructor. Prerequisites: BIO G 101 and 102 or equivalent. 2 overnight field trips required. Cost of
A course for majors and nonmajors, focusing on the integration of field marks, songs and calls, and habitat cues. Topics covered will include the choice and effective use of field guides, binoculars, and other aids to bird identification; procedures for taking and organizing field notes; the relationships of birds to their habitats and to other birds; and methods and procedures for estimating and surveying songbird populations.

**NTRES 300 International Environmental Issues**

Fall. 3 credits. Junior standing or above. Not offered fall 1997. T R 9:05-9:55; 1 hr disc sec to be arranged. R. J. McNeil. Lectures will survey international environmental issues, with some attention to causes and to solutions. Case studies will include such subjects as whales and whaling, tropical deforestation, endangered species and biodiversity, Law of the Sea, Antarctica, ozone depletion, global warming. Institutions such as treaties, development banks, international law, and trade agreements will be examined. Perspectives will include primarily ecology, secondarily ethics, economics, law.

**NTRES 301 Forest Ecology**

Fall. 3 credits. Prerequisite: Introductory Biology. M W F 11:15. T. J. Fahey. A comprehensive treatment of forest structure, form, and functions that emphasizes forest ecosystems. Topics include paleoecology of forests, eco-physiology of forest trees, disturbance, succession and community analysis, primary productivity, and nutrient cycling.

**NTRES 302 Forest Ecology Laboratory**

Fall. 1 credit. Cost of weekend trip approximately $30. Concurrent enrollment in NTRES 301 required. M 12:20-4:25. 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 White Mountains, New Hampshire. Group research projects in local forests.

**NTRES 303 Woodlot Management and Maple Syrup Production**

Spring. 3 credits. Letter grade only. Lec T R 10:10-11:00; lab R 12:20-4:25. T. J. Fahey. A practical, field-oriented course emphasizing principles and practices of multiple purpose management of small nonindustrial private forest land in the northeastern United States, including the production of maple syrup.

**NTRES 304 Wildlife Ecology Concepts**

Spring. 1 credit. Letter grade only. M W F 11:15. (1st 1/3 of the semester). A. N. Moen. The main concepts underlying wildlife behavior, physiology, nutrition, and energetics are discussed in an ecological context as a basis for further study in the NTRES 305 sections associated with this course.

**NTRES 305 Wildlife Ecology Applications**

Fall and spring. Credit to be arranged. Letter grade only. 3 hours (TBA) per credit hour. Prerequisites: NTRES 304 (or concurrent registration) and permission of instructor fall term. Field research and computer simulations provide in-depth study in wildlife behavior, physiology, nutrition, and energetics sections in cooperative learning environment. All students publish their findings on the information system in the Cooperative Learning Center. Sections will include: (1) Wildlife Behavior; (2) Wildlife Physiology; (3) Wildlife Nutrition; and (4) Wildlife Energetics.

**NTRES 306 Coastal and Oceanic Law and Policy**

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 and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation) $900. Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and efficacy of various legal techniques. A case study at that requires extensive use of the laboratory’s library and personnel is assigned. The week concludes with a mock hearing.

**NTRES 308 Natural Resources Management**

Fall. 3 credits. Prerequisite: junior standing. M W F 10:10. B. A. Kruth. Focus is on fish, wildlife, forest, and water resources. Concepts emphasized include the comprehensive planning process and human dimensions of resource management. Students integrate organismal, environmental, social and institutional dimensions of management through case studies. Grades are based on individual and group performance.

**NTRES 309 Natural Resource Management in American Indian Nations**

Summer. 1 credit. Prerequisite: none; recommended: one course each in Natural Resources and American Indian Program. S. M. Penningroth. This course examines resource management in territories belonging to American Indian nations. Topics include history, sovereignty, religious significance of the environment, and intellectual property. Case examples of traditional Indian management techniques as well as contemporary resource management issues are presented.

**NTRES 321 Introduction to Biogeochemistry (also GEOL 321, SES 321)**

Fall. 4 credits. Prerequisites: college-level chemistry, plus a course in biology and/or geology. Lec. T R 12:20-1:10; lab. F 2:00-4:25. J. B. Yavitt and L. A. Derry. Control and function of the Earth’s global biogeochemical cycles. The course begins with a review of the basic inorganic and organic chemistry of biologically significant elements, and then considers the biogeochemical cycling of carbon, nutrients, and metals that take place in soil, sediments, rivers and the oceans. Topics include weathering, acid-base chemistry, biological redox processes, nutrient cycling, trace gas fluxes, bioactive metals, the use of isotopic tracers, and mathematical models. Interactions between global biogeochemical cycles and other components of the Earth system are discussed.
Required interviews, term paper, oral reports. Several meetings in Ithaca before and after intensive January session in Washington.

**NTER 404 Wildlife Population Applications**

Spring. 1 credit. Letter grade only. Prerequisite: NTRES 402 or permission of instructor. M W F 11:15. (second 1/3 of the semester). A. N. Moen. The main concepts underlying population dynamics of free-ranging species are discussed in an ecological context as a basis for further study in the NTRES 405 sections associated with this course. The emphasis is on analytical population models rather than descriptive population parameters.

**NTRES 410 Wildlife Management Concepts and Applications**

Spring. 3 credits. Prerequisites: broad background in biology, NTRES 304 (Wildlife Species Ecology) or NTRES 404 (Wildlife Populations Ecology). This course is open to seniors and graduate students. M W F 9:05. A. Moen. In-depth analyses of the ecological basis for decision making in wildlife management, computer simulations of management problems and effects of options, management information systems, and preparation of computer-based landscape files. Local field trips are taken.

**NTER 411 Seminar in Environmental Ethics**

Fall. 3 credits. For graduate students, seniors, and juniors. S-U grades optional. W 1:25–3:50. Moral concerns relative to the natural environment and agriculture. In successive years, the seminar will focus on such topics as (1) animal rights vs. ecosystem concerns, (2) natural resource management and the concept of the public interest, (3) doing environmental ethics in a democratic and pluralistic society, and, (4) land use ethics.

**NTRES 415 Principles and Practices of Agroforestry (also Hort 415)**

Spring. 3 credits. Prerequisites: senior or graduate standing. S-U option. Lee, M W 10:10–11:00; lab, W 1:25–4:25. K. Mudge and J. Lassoie. An introduction to modern and traditional agroforestry systems involving the spatial or temporal integration of multipurpose woody plants (trees and/or shrubs) with annual or perennial crops and/or with livestock. Interactions between woody and non-woody components of agroforestry systems will be considered from the standpoint of above and below ground resource capture. The sustainability of agroforestry systems will be critically examined from both a biophysical and socioeconomic standpoint. Laboratory sessions will include field trips, case studies, use of computer-based sources of information, and practical skills involved in woody plant management (identification, propagation, planting, pruning, measurement).

**NTER 417 Wetland Resources**

Summer. 2 credits. Prerequisite: one year of college biology. A special 1-week course offered at Cornell’s Shallows Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $900. An examination of coastal and adjacent freshwater wetlands from historical, disturbance, and preservation perspectives, including fresh- and salt water-marsh ecology and management. Field trips to selected examples of the wetlands under discussion and follow-up laboratories emphasize successional features, plant identification and classification, and role of indigenous species in the dominant insect and vertebrate associations.
NTRES 418 Wetland Ecology and Management—Lecture
Fall. 3 credits. (Students may not receive credit for NTRES 418 and NTRES 417)
Wetland Resources, Shoals Marine Laboratory summer course.) T R 12:20-1:35. B. L. Bedford.
Examination of the structure, function, and dynamics of wetland ecosystems with an emphasis on principles required to understand how human activities affect wetlands. Current regulations, protection programs, and management strategies are considered.

NTRES 419 Wetland Ecology and Management—Laboratory
Fall. 1 credit. Optional. Concurrent enrollment in NTRES 418 is required. W or F 12:20-4:25. One weekend fieldtrip required.
An integrated set of laboratory field exercises designed to expose students to: (a) the diversity of wetland ecosystems; (b) the flora, fauna, soils, and hydrology of wetlands within the region; (c) methods of sampling wetlands vegetation, soils, and water; and (d) methods of wetland identification and delineation. Some exercises will require written reports.

NTRES 420 Ecological Principles for Aquatic Resource Management
Spring. 3 credits. Prerequisites: introductory ecology and introductory chemistry or permission of instructor. M W F 9:05-9:55. R. Schneider.
In-depth analysis of those ecological and biological principles relevant to the management of fresh and marine water resources, with emphasis on the effects of water management on community ecology. Lectures and discussion will integrate scientific literature with current management issues. Topics include linkages between water variability and community composition and organism life histories; influence of water movement on dispersal and migration mechanisms; and the potential role of nutrient transport and water availability to community dynamics.

NTRES 428 Landscape Impact Analysis
Spring. 3 credits. Prerequisites: one introductory course in ecology or equivalent and junior standing; one advanced course in ecology or equivalent. T R 1:25-4:20. B. Bedford.
The course explores environmental impact assessment (EIA) from the perspective of the watershed, landscape, or region rather than the individual development project. It provides an overview of the EIA process as it is implemented within various governmental and development agencies here and abroad; examines diverse conceptual frameworks for landscape impact analysis; and exposes students to modern tools for evaluating landscapes.

NTRES 438 Fishery Management
Introduction to management as an adaptive process that focuses on achievement of goals. Coverage includes sport and commercial fisheries and species restoration. Topics include setting goals and objectives, regulations, habitat management, population control, stocking, and management of trout, reservoirs, the Great Lakes, and Pacific halibut. Ecological, social, political, and economic aspects of those topics are discussed.

NTRES 442 Techniques in Fishery Science
Fall. 3 credits. Limited to 15 upperclass and graduate fishery students. Cost of field trips, no more than $30. Offered alternate odd years. Next offered fall 1999. T R 1:25-4:25; 2 or more weekend field trips and 1 mid-week field trip.
C. G. Smith.
Emphasis is on methods for collecting and analyzing data from fish populations and their habitat. Topics include passive and active fish-capture methods, tagging and marking, and physical and chemical habitat measurements. Assumptions and limitations inherent in data sets, research planning, and scientific report writing are also discussed. Several field trips provide hands-on experience in data collection on streams and lakes.

NTRES 450 Conservation Biology
Fall. 3 credits. Prerequisite: a reasonable biology background. Limited to first 30 seniors, plus graduate students. Lec, T 10:10-12:05, disc, R 10:10 or 11:15. T. A. Gavin.
Emphasis will be on biological topics that are important to the maintenance of biological diversity. Examples include population viability analysis, and the analysis of the demography and genetics of small populations as they are affected by habitat fragmentation and isolation. Students will gain thorough familiarity with these concepts and their potential application through lectures, discussion, and use of computer models. This course is intended primarily for students with a background in college biology. Students with no college biology background should enroll in BIOES 257.

NTRES 456 Stream Ecology (also ENTOM 456, BIOES 456)
Spring. 4 credits. Prerequisites: None; BIOES 261 recommended. Offered alternate years. Next offered spring 1999. Lec, T R 9:00-9:55, Lab, M T W Th or R 1:25-4:25. M. Bain and B. 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: A field project includes descriptive and experimental techniques and hypothesis testing related to environmental assessments.

NTRES 471 Management of Terrestrial Habitats
Spring or summer. 2 credits. Prerequisites: NTRES 210, 304; statistics recommended; junior standing or above. Lec/ Lab: W 1-2-4. C. R. Smith.
A landscape ecological approach will be used to introduce students to habitat concepts and to methods of inventorying, measuring, monitoring, describing, classifying, and restoring terrestrial habitats at a variety of temporal and spatial scales. Field trips will be taken to areas managed by both public and private land management organizations. An introduction to use of the Global Positioning System (GPS) is included.

NTRES 493 Individual Study in Resource Policy, Management, and Human Dimensions
Fall or spring. Credit to be arranged. S-U grades optional. Prerequisite: permission of instructor. R. A. Baer, T. Brown, L. F. Buck, D. J. Decker, J. Gilliet, B. Knuth, J. McNeil, J. Schelhas.
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 will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

NTRES 495 Individual Study in Fish and Wildlife Biology and Management
Fall or spring. Credit to be arranged. S-U grades optional. Prerequisite: permission of instructor. M. Bain, T. Gavin, C. Krueger, R. Malecki, E. Mills, A. Moen, M. Olson, M. Richardson, L. Rudstam, C. Smith.
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 Individual Study in Ecology and Management of Landscapes
Fall or spring. Credit to be arranged. S-U grades optional. Prerequisite: permission of instructor. B. Bedford, T. Fahey, M. Krasny, J. Lassoe, R. Schneider, P. Smallidge, J. Yavitt.
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 will gain insights 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 to be arranged. Limited to graduate students working on professional master's projects. S-U grades only.

NTRES 601 Seminar on Selected Topics in Fishery Biology and Aquatic Science
Fall or spring. 1 credit. S-U grades only. T 3:35-4:25; disc sec, T 4:30-5:00.
Selected readings and discussions of research and/or current problems in fishery and aquatic sciences.
NTRES 604 Seminar on Selected Topics in Resource Policy and Management
Fall. 2 credits. S-U grades optional. M 3:00—4:30. Primarily for graduate students with a major or minor in resource policy and management and upper level undergraduates with a strong interest in resource policy analysis. Topics include the policy process, actors and stakeholders, ethical dimensions, and evaluation. Emphasis is placed on discussion, faculty-student interaction, communication skills, and current resource policy issues.

NTRES 607 Ecotoxicology (Toxicology 607)
Spring. 3 credits. Prerequisites: graduate or senior status and two 300-level courses in chemistry, biological science, or toxicology. Offered alternate even years. Next offered spring 1998. M W F 11:15—12:05. J. W. Gillett. Lectures, readings, and special guest talks 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 610 Introduction to Chemical and Environmental Toxicology (also Toxicology 610)
Fall. 3 credits. Prerequisites: biochemistry and animal physiology. Letter grade only. M W F 11:15—12:05. J. W. Gillett. Introduction to toxicology concepts of toxicity, exposure and biological responses to toxicants, methods of assessing toxicity; factors affecting outcomes, specific sources of toxicants (including air pollution, agriculture, industrial and commercial processes, natural occurring toxicants, and social poisons), risk assessment and regulation of toxic materials.

NTRES 612 Wildlife Science Seminar
Fall and spring. 1 credit. Prerequisite: permission of instructor. S-U grades optional. Check with department for availability. Discussion of individual research or current problems in wildlife science.

NTRES 615 Case Studies and Special Topics in Agroforestry
Fall. 2 credits. Prerequisites: NTRES/HORT 415 or permission of instructor. S-U only. Hours to be arranged. L. E. Buck, J. P. Lassoie. Interdisciplinary groups of students examine case study examples of agroforestry practices in developed and developing countries. Specific topical areas are examined in depth, leading to development of a team-written report and a class presentation. Extensive library research and participation in small group discussions are required.

NTRES 616 Forest Science and Management Seminar
Fall and spring. 1 credit. Permission of instructor. Check with department for availability. Selected readings and discussions of research and/or current problems in forest science and management.

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. J. Schelhas. Establishes a theoretical foundation for analyzing and addressing conservation and development issues from an interdisciplinary perspective. Engages students in the inherent conflicts between natural resource conservation and the development for human needs. Students will work in interdisciplinary groups to analyze issues and cases from both developing and developed countries.

NTRES 619 Field Practicum in Conservation and Sustainable Development
Spring. 3 credits. Prerequisites: NTRES 618; preference given to graduate students with minor in conservation and sustainable development; permission of instructor. Limited to 12 students. Includes two-week field study trip to a Latin American country in January. J. Schelhas. An interdisciplinary study of a conservation and development problem in Latin America. The course will use an interdisciplinary research methodology that includes group problem identification, individual or small group research projects, and synthesis of group work to identify key conservation issues and research priorities for a selected site.

NTRES 629 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 will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

NTRES 698 Current Topics: Environmental Toxicology (Toxicology 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 to be arranged. S-U grades optional. Prerequisite: permission of instructor. NTRES Graduate Faculty. Study of topics in natural resources more advanced than, or different from, other courses. Subject matter depends on interests of students and availability of staff.

NTRES 800 Master's Thesis Research
Fall and spring. Credit to be arranged. Limited to graduate students working on master's thesis research. S-U grades only.

NTRES 900 Graduate-Level Thesis Research
Fall and spring. Credit to be arranged. 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 to be arranged. For students admitted to candidacy after the 'A' exam has been passed. S-U grades only.

Related Courses in Other Departments
See department advisers and curriculum materials for information about other related courses.

Environment and Society (R SOC 324, 440, 495)
Ecology and Biology (ENTOM 456, 470, 471; BIOEC 263, 272, 273, 450, 452, 456, 461, 482, 471, 472, 475, 476, 478)
Environmental Law, Ethics, and Philosophy (S&T 206, CRP 451, PHIL 241, 246, 247, 381)
Human Systems and Communication (COMM 352, 363, 421)
Physical Sciences (ABEN 435, 475, SCAS 260, 371, 483, GEOL 103, 104, CEE 432)
Public Policy and Politics (GOVT 427, 428, BIO & SOC 461; CEE 529)
Resource Economics (ARME 100, 250, 450, 451; ECON 309)
Spatial Data Interpretation (SCAS 420, 461, 620, 660)

PLANT BREEDING


Biometry courses are listed under Department of Statistical Science in "Interdisciplinary Centers, Programs, and Studies" in the front section of this catalog.

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
Spring. 2 credits. Prerequisite: one year of introductory biology or permission of instructor. Lecs, T R 11:15. 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 CALS distribution requirement GROUP B—Biological Sciences.

PL BR 401 Plant Cell and Tissue Culture
Fall. 3 credits. Prerequisites: a course in plant biology, cell biology, or genetics, or permission of instructor. Lecs, 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 these techniques to biological and agricultural studies. Methods for plant improvement via manipulations of cultured cells will be discussed. Six written assignments and a term paper are required.

**PL BR 402 Plant Tissue Culture Laboratory**
Fall. 1 credit. Enrollment limited. Prerequisites: PL BR 401 (may be taken concurrently) and permission of instructor. W 1:25-4:25 (alternate weeks) plus 1 hr to be arranged. E. D. Earle Laboratory exercises complementing Plant Breeding 401. Techniques for establishing, evaluating, and utilizing plant organ, tissue, and cell cultures will be covered. Experiments will use a broad range of plant materials.

**[PL BR 446 Plant Cytogenetics Laboratory]**
Spring. 2 credits. S-U grades optional. Prerequisites: BIOGD 281 or PL BR 225. Will be offered as a one-month module during the spring of 1998. Time to be arranged later. Check with department for further information. K. N. Watanabe. This course provides fundamental knowledge and techniques in plant cytogenetics. Emphasis will be on applications to research on plant genetics and plant breeding. Plant materials involve a wide range of crop species. Specific topics will be covered by invited lecturers.

**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 will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be 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. Student 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 student and another member who will supervise their study and assign their grades and credits. S-U grades only. Staff. On-the-job learning experience under the supervision of professionals in a cooperating organization. A learning contract is written between the faculty supervisor and 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, 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. Undergraduate research projects in plant breeding.

**PL BR 603 Methods of Plant Breeding**
Fall. 3 credits. Prerequisites: BIOGD 281 or PL BR 225 or equivalent and an introductory course in crop production. M W F 9:05. M. E. Smith. A comprehensive examination of plant breeding methods, including inbreeding and population improvement methods. Operational details and practical limitations for each method will be considered, as will suitability for major breeding objectives (agronomic characteristics, quality, and biotic and abiotic stress tolerance). The goal is to familiarize students with tools available to plant breeders, criteria for choosing among them, and options for creatively modifying them for specific situations.

**PL BR 604 Methods of Plant Breeding Laboratory**
Fall. 2 credits. Prerequisite: PL BR 603 or equivalent (may be taken concurrently). T R 1:25-4:15. M. E. Sorrells and R. E. Anderson. Fall fields to plant breeding programs involve discussion of breeding methods used, overall goals, selection techniques, soil 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 605 Advanced Plant Genetics**
Spring. 3 credits. S-U grades optional. Prerequisites: BIOGD 281, PL BR 225, or equivalent. Lecs, M W F 11:15-12:05. M. M. Kyle. This course provides an advanced survey of genetics in higher plants. Topics include genetic analysis of developmental and metabolic processes, cytogenetics, mating behavior and barriers, and aspects of population and quantitative genetics.

**PL BR 622 Seminar**
Fall or spring. 1 credit. S-U grades only. T 12:20. Staff and graduate students.

**PL BR 629 Special Topics in Plant Science Extension**
Spring. 2 credits. F 1:25-4:25. W. D. Pardee. Designed for graduate students and advanced undergraduates to provide a broader knowledge of cooperative extension philosophy and methods. Developed for students interested in extension and research in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.

**PL BR 650 Special Problems in Research and Teaching**
Fall or spring. 1 or more credits. Prerequisite: permission of instructor supervising the research or teaching. Staff.

**PL BR 653.1 Concepts and Techniques in Plant Molecular Biology**
Fall. 1 credit. S-U grades optional. Prerequisites: BIOGD 281 and BIOBM 332 or 330 or their equivalent. Recommended: BIOBM 351. Lecs, M W F 10:10-11:00 (12 lecs). Sept. 3-Sept. 29. D. Stern and J. Steffens.

A review and update on molecular biology concepts relevant to plant sciences including DNA synthesis, RNA transcription and processing, and protein structure and translation. Methods applicable to plant molecular biology are described including isolation of nucleic acids, gel electrophoresis, recombinant DNA techniques, production, DNA-protein interactions, and use of antibodies.

**PL BR 653.2 Plant Biotechnology (also Plant Pathology 663 and BIO PL 653.2)**
Fall. 1 credit. S-U grades optional. Prerequisite: BIO PL 653.1 or permission of instructor. E. D. Earle and M. Zaitlin. This course deals with production and use of transgenic plants for agricultural and industrial purposes. Topics include procedures for gene introduction and control of gene expression, as well as strategies for obtaining transgenic plants that are resistant to insects, diseases, and herbicides, produce useful products, or have improved nutritional and food processing characteristics. Regulatory and social issues relating to plant biotechnology are discussed.

**PL BR 653.3 Plant Genome Organization**
Fall or spring. 1 or more credits. Staff. Emphasis is on 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
PL BR 717 Quantitative Genetics in Plant Breeding
Fall. 3 credits. S-U grades only. Prerequisites: PL BR 603 and BTRY 601. Offered even years. T R 8:30-9:55. Not offered fall 1997; next offered fall 1998.
D. R. Viands.
Discussion of quantitative genetics to help make decisions for more efficient plant breeding. Specific topics include components of variance (estimated from mating designs), gene pool development, linkage, heritability, phenotypic and genotypic correlation coefficients, and theoretical gain from selection. During one period, plants in the greenhouse will be evaluated to provide data for computing quantitative genetic parameters.

PL BR 718 Breeding for Pest Resistance
Spring. 3 credits. Prerequisites: BIOGD 281 or PL BR 225, and PL BR 603 required. An introductory course in Plant Pathology and/or Entomology also highly recommended. Lec, T R 10:10-11:30.
M. A. Mutschler.
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 resistance, approaches to breeding for resistance stability of genetic resistance mechanisms, and the use of biochemical/physiological/molecular tools in breeding for pest resistance.

PL BR 800 Master's-Level Thesis Research
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students working on a master's thesis.

PL BR 900 Graduate-Level Dissertation Research
Fall or spring. Credit to be arranged. 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 to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students admitted to candidacy after the "A" exam has been passed.

PL PA 101 Freshman Writing Seminar: Posts, Pesticides, People, and Politics
Fall. 3 credits. Limited to 17 students. Offered fall 1997. Lec, M W F 8:00-8:50. P. A. Arneson.
This seminar examines the use of pesticides, their impact on human health and the environment, and their regulation. Beginning with Rachel Carson's classic, "Silent Spring," we will examine many facets of the pesticide controversy through readings in current popular literature, technical journals, government documents, industry propaganda, and publications of various so-called "public interest groups." We will emphasize the need for critical thinking as we explore the power of the written word to persuade.

PL PA 102 Freshman Writing Seminar: Environmental Issues and the Changing Global Climate
Spring. 3 credits. Limited to 17 students. Lec, T R 8:30-9:50.
C. A. Laurence.
This seminar provides an opportunity to learn more about the biological, social, and political impact of environmental issues on scales ranging from local to global. Readings, discussions, and some hands-on experience will provide subjects for a seminar designed to teach writing at levels of single sentences to term papers.

PL PA 201 Magical Mushrooms, Mischievous Molds
Spring. 2 credits. S-U optional. Lec, 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
Spring. 4 credits. Prerequisite: one year of biology. Lec, M W F 11:15; lab, T or W 1:25.
P. A. Arneson.
An introduction to plant diseases, their diagnosis, and their 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. It is not an adequate prerequisite for plant pathology courses numbered 600 and above.

PL PA 209 Introductory Mycology
Fall. 3 credits. Prerequisite: one year of biology or equivalent. Concurrent registration in PL PA 319 is recommended.
J. R. Aist.
An introduction to fungi, emphasizing biology, comparative morphology, and taxonomy.

PL PA 319 Field Mycology
Fall. 1 credit. Prerequisite: permission of instructor. R. P. Korf.
Study of mushrooms and other fungi on field excursions followed by 7 evening labs devoted to lectures and identification and study of collected specimens. Emphasis on ecology, biology, and means of identification. Grades are determined on basis of laboratory final.

PL PA 401 Basic Plant Pathology
Fall. 4 credits. Prerequisite: one year of biology and BIO S 241 or equivalent. Recommended: general microbiology, plant physiology. Lecs, T R 11:10; lab, T or W 1:25.
W. A. Sinclair.
Principles and practice of plant pathology. Lectures and labs are coordinated to consider types of plant pathogens and their population dynamics, disease cycles, diagnostic criteria and procedures, and control of disease in crops and ornamental plants. Focus on attack and plant defense, vector relationships, epidemiology, disease forecasting, loss assessment, and disease control. This course prepares students for graduate-level work in plant pathology.

PL PA 407 Nature of Sensing and Response (Also BIO G 407)
Spring. 3 credits. Prerequisites: BIO BM 330 or 333 or 331 and previous or concurrent registration in 332. Recommended: BIO GD 281. Lec, T R 10:10-11:25.
T. P. Delaney.
The responses of organisms and cells to their surroundings are examined to illustrate how biological systems sense their biotic and abiotic environment and communicate sensory information to appropriate responses. A wide variety of response systems will be identified to show their unique features and to illustrate how similar processes are utilized by widely divergent organisms. Examples are drawn from prokaryote, plant and animal systems for environmental sensing, development and responses during disease. Discussion will also examine the role of genetics and biochemistry in understanding signal transduction pathways, as well as the way these systems are perturbed by mutation and disease.

PL PA 411 Plant Disease Diagnosis
Fall. 3 credits. Prerequisite: PL PA 241 or their equivalents. Lecs, M W 11:15; labs, T 1:25-4:25.
G. W. Hudler.
A method for diagnosis of plant disease is presented with emphasis on contemporary laboratory techniques and effective use of the literature.

PL PA 443 Pathology of Trees and Shrubs
Fall. 3 credits. Prerequisites: PL PA 241 or equivalents. Lecs, M W 11:15; labs, T 1:25-4:25. Not offered fall 1997.
G. W. Hudler.
For students preparing for careers in horticulture, urban forestry, and pest management. Deals with the nature, diagnosis, assessment, and treatment of diseases of trees and shrubs. Forest, shade, and ornamental plants are considered.

PL PA 444 Integrated Pest Management
Fall. 4 credits. Prerequisites: BIO ES 261, ENTOM 212 or 241, or PL PA 241 or their equivalents or permission of instructor. P. A. Arneson.
Lectures integrate the principles of pest control, ecology, and economics in the management of pest-crop systems. Laboratories consist of exercises to reinforce concepts presented in lecture and demonstrate pest monitoring techniques and the application of
Theory and concepts in plant disease epidemiology and population biology of plant pathogens. Topics include: population dynamics of pathogens in time and space, interactions of pathogens and plant populations, and population genetics of pathogens. The discussion section is used for examining current plant pathology literature and other exercises complementary to lecture material.

**PL PA 705** Phytovirology
Spring. 2 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: PL PA 401 or equivalent. Not offered 1997–98. M. Zaitlin.

This course considers plant viruses and the diseases they cause. Consideration is given to virus structure and composition, classification, replication, effects on hosts, modes of transmission, and the relationships of these aspects to principles of diagnosis and control.

**PL PA 706** Phytonematology
Fall. 2 credits. For graduate students with a major or minor in plant pathology; others by permission. Prerequisite: PL PA 401 or equivalent; permission of instructor. G. S. Abawi.

Primarily deals with plant-parasitic nematodes, their damage, and management options. Topics covered include morphology, anatomy and taxonomy, methods of extraction and quantification, biology and ecology, assessment of pathogenicity, plant damage and mechanisms involved; interactions with other pests; role in soil health; and control measures.

**PL PA 707** Phytobacteriology
Fall. 2 credits. Prerequisites: general microbiology, lectures and laboratory; introductory plant pathology. Offered alternate years. S. V. Beer.

A consideration of the prokaryotes that cause disease in plants and examples of the diseases they cause. The course emphasizes properties of bacterial pathogens that affect disease, methods for manipulation of the pathogens, and recent developments in phytobacteriology. The current state of knowledge of important phytopathogenic genera, including their genetics and mechanisms of pathogenesis is reviewed. Laboratory practice in isolation, inoculation, identification, genetics, and physiology is included.

**PL PA 709** Phytomycology
Spring. 2 credits. For graduate students with a major or minor in mycology or plant pathology; others by permission. Prerequisites: PL PA 401 and 309 or equivalents, or permission of instructor. Lec: F 1:25–2:30; lab, 2:30–4:30. J. W. Lorbeer.

Provides basic information on the biology of plant pathogenic fungi with emphasis on the structure, ecology, genetics, life cycles, and disease cycles of representative genera and species.

**PL PA 715** Phytovirology Laboratory
Spring. 2 credits. Limited to 12 students. Prerequisite: permission of instructor. S-U grades only. Not offered 1997–98. M. Zaitlin.
PL PA 735 Advanced Plant Virology  
Spring. 3 credits. Prerequisite: permission of instructor. 3 lecs, hours to be arranged. M. Zaitlin.  
Topics in plant virology, with an emphasis placed on student discussion of current literature. Topics included are viral infection process, viral and viroid replication, viral recombination, viral movement, viral genes and their products, cross protection, detection of viruses, molecular approaches to resistance and the use of viruses as vectors for introducing genetic material into plants.

PL PA 738 Genetics and Development of Pathogens Fall. 2 credits. Prerequisite: BIOGD 281 or equivalent. Hours to be arranged. Not offered 1997-98. B. G. Turgeon, O. C. Yoder.  
Classical and molecular approaches to the study of fungal genetics are discussed. Recently developed molecular technology is highlighted, with emphasis on transformation systems, gene disruption and replacement, gene expression, stability of transforming DNA, native transposons and plasmids, karyotyping by chromosome separation, and secretion of heterologous proteins. Application of contemporary methodology to genetic dissection of developmental processes, such as plant pathogenesis (including host and tissue specificity), the mitotic and meiotic cell cycles, and conidium formation is described. Experimental evidence supporting various hypotheses to explain fungal pathogenicity is evaluated. Examples are chosen from investigations of plant pathogenic fungi such as Cochliobolus heterostrophus and Magnaporthe grisea and from well known genetic models such as Aspergillus nidulans and Neurospora crassa.

PL PA 739 Advanced Mycology  
Fall. 4 credits. Prerequisites: PL PA 509 or equivalent, a course in genetics, and permission of instructor. Offered odd-year fall semesters. R. P. Korf.  
A detailed study of the taxonomy, nomenclature, and life cycle biology of four major groups of fungi (rusts, smuts, peronosporales, and fungi imperfecti).

PL PA 788 Research in Molecular Plant Pathology  
Fall and spring. 2, 4, or 6 credits. Prerequisite: permission of instructor. 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 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. Hours to be arranged. Staff. Graduate teaching assistance in a mycology or plant pathology course by mutual agreement with the instructor. This experience may include, but is not limited to, preparing, assisting in, and teaching laboratories, preparing and delivering lectures, leading discussion sessions, and tutoring.

PL PA 800 Master's-Level Thesis Research  
Fall or spring. S-U grades optional. Credit to be arranged. Prerequisite: permission of adviser. Graduate faculty.  
For students working on a master's degree.

PL PA 900 Graduate-Level Thesis Research  
Fall or spring. S-U grades optional. Credit to be arranged. 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. S-U grades optional. Credit to be arranged. Prerequisite: permission of adviser. Graduate faculty.  
For doctoral candidates who have passed the "A" exam.

POMOLOGY (FRUIT SCIENCE)  
See Horticultural Sciences.

RURAL SOCIOLOGY  
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.

R SOC 100 American Indian Studies: An Introduction (also American Indian Studies 100)  
Fall. 3 credits. S-U grades optional. W 7:30-10:30 p.m. R. W. Venables.  
This course provides a foundation for the study of American Indians. Emphasis will be placed on social, cultural, historical, educational, and human development. Guest lecturers from Cornell's staff and the Indian communities and media presentations.

R SOC 101 Introduction to Sociology  
Fall, spring or summer. 3 credits. Lecs. T R 10:10-11:00; sec, various times. C. C. Geisler and staff.  
A survey of concepts and theories in sociology and an examination of social forces and institutions shaping modern societies. The major topics include culture and socialization, social stratification and social class, age, race, ethnic and gender inequality, deviance and social control, religious, education, and occupation organizations, urbanization and demographic change, social change and social movements, bureaucracy, environmentalism, and the uses of sociology.

R SOC 175 Issues in Contemporary American Indian Societies (also American Indian Studies 175)  
Spring. 3 credits. S-U grades optional. W 7:30-10:30 p.m. R. W. Venables.  
Early American Indian history and the postcontact period will be reviewed with an emphasis given to developments since 1789.

Topics such as land claims, treaties, education, mineral and water rights, social problems, militant organizations, and civil rights will be covered, with guest lecturers and media presentations.

R SOC 200 Social Problems  
This course investigates a variety of current social problems from a sociological perspective. The course begins with an overview of sociological theories that may account for social problems and identifies common as well as competing elements of these theories. The theoretical framework is then applied to analyses of a variety of social problems, and these may vary semester to semester. Examples of social problems are homelessness, teenage pregnancy, deindustrialization, and homicide, among others. Emphasis in the course will be given to how social problems are measured, and students will be given an opportunity to test theories with data analysis.

R SOC 201 Population Dynamics  
Spring. 3 credits. S-U grades optional. ALS students must register for this course as R SOC 201. T R 8:40-9:55. J. M. Styczos or L. B. Williams.  
This course provides an introduction to population studies. The primary focus is on the relationships between demographic processes (fertility, mortality, and migration) and social and economic issues. Discussion will cover special topics related to population growth and distribution, including marriage and family formation, labor force participation, urban growth and urbanization resource allocation, and the environment.

R SOC 205 International Development  
Spring. 3 credits. M W F 10:10-11:00. P. D. McMichael.  
New questions concerning development models in the post-Cold War era are examined from a comparative and global perspective on North-South relations. While the focus is the "Third World," the issues confronting it are often global, even when they concern the most basic issue of food security. Using films and various theoretical perspectives, 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. We will also examine the new social movements, such as environmentalism, feminism, and grassroots activism.

R SOC 206 Gender and Society (also Women's Studies 206)  
Spring. 3 credits. Lecs. M W F 11:15-12:05; sec, various times. Staff. Course will familiarize students with origins of gender hierarchies, social and behavioral similarities and differences between females and males, and 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 will be a major focus of the course. Guest lecturers will be met through lectures, readings, films, participant observation and personal experiences.
The relationship between technology and society is among the most pervasive concerns of our time. Ultimately, what makes a technology useful or "appropriate" is a sociological question. Lectures and readings review classical debates regarding technology and society. Herein, students compare high technologies and appropriate technologies, identify problems associated with technology transfer to other societies, and create a list of important criteria by which technologies are judged appropriate or inappropriate using numerous case studies.

**R SOC 208 Technology and Society**
Fall. 3 credits. Offered alternate years. Not offered fall 1997; next offered fall 1998. M W F 10:10–11:00. C. C. Geisler. The relationship between technology and society is among the most pervasive concerns of our time. Ultimately, what makes a technology useful or "appropriate" is a sociological question. Lectures and readings review classical debates regarding technology and society. Herein, students compare high technologies and appropriate technologies, identify problems associated with technology transfer to other societies, and create a list of important criteria by which technologies are judged appropriate or inappropriate using numerous case studies.

**R SOC 213 Social Indicators, Data Management, and Analysis**
Fall. 3 credits. T R 11:40–12:55. P. R. Eberts or L. B. Williams. A survey of definitions of social indicators and general principles of social indicators research will be 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, etc., based on census data, household surveys, and government informants and other low-cost techniques, will be examined using personal computers.

**R SOC 220 Sociology of Health of Latinos and Ethnic Minorities (also Latino Studies Program 220)**
Fall. 3 credits. S-U grades optional. Enrollment is limited to 40. T R 10:10–11:25. P. A. Parra. Discusses the health status of Latinos in the United States. Specifically, it will explore in-group diversity such as migration, economic status and the influence of culture and the environment on health status and access to health care. Although focus is on Latino population, discussion encompasses other minorities who face similar problems.

**R SOC 301 Theories of Society**
Fall. 3 credits. Prerequisites: rural sociology or sociology course. S-U grades optional. M W F 11:15–12:05. P. K. Gellert. An introduction to the "classical" sociological theorists for seniors, juniors, and beginning graduate students. Emphasis on (I) the central concepts of the sociological tradition, (2) major classical theorists (Marx, Durkheim, Weber) and contemporary counterparts. The relevance of these theories of society to current events and social problems will be stressed.

**R SOC 318 Ethnohistory of the Northern Iroquois (also American Indian Studies 318)**
Fall. 3 credits. S-U grades optional. Not offered 1997–98. T 1:25–4:25. R. W. Venables. The development of Iroquois (Haudenosaunee) history and culture is traceable to the present day.

**R SOC 321 Environment and Society (also Sciences and Technology Studies 324)**
Spring or summer. 3 credits. M W F 1:25–2:15. M. J. Pfeffer. The main objective of the course is to develop a critical understanding of the dominant trends in modern U.S. environmental thought like conservationism, ecocentrism, ecological feminism, social ecology, NIMBYism, risk assessment, and environmental equity. Another objective is to familiarize students with some major contemporary substantive environmental problems and policies. These topics include air and water quality, public lands management, biodiversity, deforestation, climate change, and ozone depletion. A sociological framework is applied to evaluate interrelationships between substantive and philosophical/theoretical issues.

**R SOC 331 Demographic Analysis in Business and Government (also Agricultural Economics 416)**
Spring. 3 credits. With permission of instructor. Prerequisite: R SOC 213 or a statistics course. Lee, W F 1:25–2:15, Lab, M 1:25, 2:30, W. Brown. An overview of the way demographic analysis is used in business and government. Through the use of case study and problem solving methods of learning, students come to understand how demographic concepts, methods, and data are used by demographers to solve problems in business and government. The course is designed for upper-level undergraduates from a variety of academic disciplines.

**R SOC 336 Rural Areas in Metropolitan Society**
Fall. 3 credits. S-U grades optional. Prerequisite: a social science course. Offered alternate years. Not offered fall 1997 and 1999; next offered fall 1998. T R 11:40–12:55. D. L. Brown. This course analyzes the changing structure and role of small towns and rural areas in developed nations. The focus is on adaptation of rural communities and populations to major trends including increased societal differentiation and complexity, increased societal interdependence, and rapid social, economic, technological, and ecological change. Alternative policies to ameliorate rural problems and/or enhance rural contributions to national development are considered. Students participate in group projects in rural communities.

**R SOC 340 Food and Agriculture in Modern Society**
Spring. 3 credits. Prerequisite: one course in social science (CALS Group C). S-U optional. T R 8:40–9:55. G. W. Gillespie. Our changing food and agriculture system will be examined from a sociological perspective. What are their major trends as we approach the twenty-first century? What are its social, human health, and environmental issues? What are its potential development strategies and what do these imply for rural communities, urban areas, and the environment?

**R SOC 367 American Indian Tribal Governments (also American Indian Studies 367)**
Fall. 3 credits. S-U option. Lec, T R 2:55–4:10. D. Hinshaw. This course focuses on the structure of contemporary tribal governments and the ways in which these governments approach the issues confronting their constituents. The effects of European contact on traditional political organizations are detailed, as are the present day relationships of tribal governments to federal and state governments.

**R SOC 370 Comparative Issues in Social Stratification**
Fall. 3 credits. Prerequisite: an introductory social science course. T R 1:25–2:40 or T R 8:40–9:55 (depending on professor). T. A. Lyon or S. Feldman. This course reviews both classical and contemporary issues in the comparative social stratification literature. Particular attention is given to the changing configurations of different labor markets, debates on the meaning of new economic constituencies, and the role of gender, race, ethnicity, and sexuality in assessing the patterns, meaning and experiences of inequality. Throughout the course we will give special attention 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 adviser and begin proposal development during the junior year. Students must submit written proposals by the third week of the semester of their senior year to the departmental honors committee representative, M. Pfeffer.

**R SOC 408 Human Fertility in Developing Nations (also Biology and Society 404)**

**R SOC 410 Population and Environment**
Spring. 3 credits. Offered alternate years. T R 10:10–11:25. J. M. Stycos. A voluminous new literature is emerging, attempting to trace the connections between population dynamics and environmental change. The seminars will be devoted to a critical examination of this literature, stressing population change both as cause and consequence of environmental factors. In addition, the social and economic forces that mediate the population-environment relation will be examined.

**R SOC 418 Population Policy (also Biology and Society 414)**
Spring. 3 credits. Prerequisite: R SOC 201 or permission of instructor. Offered alternate years. T R 10:10–11:25. J. M. Stycos. The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to reduce fertility.

**R SOC 425 Gender Relations, Gender Ideologies, and Social Change**
examines how gender ideologies, work-family linkages and the transformation of work and the labor process are based upon as well as to help transform gender relations. The course gives attention to the particularity of place and time as these help to situate gender relations in the different state, regional, and global configurations that contextualize and configure everyday life.

[R SOC 430 Migration and Population Redistribution
Fall. 3 credits. Prerequisite: undergraduates, urban sociology course or permission of instructor. Offered alternate years. Not offered 1997-98. T R 8:40-9:55. D. L. Brown.
This course analyzes the determinants and consequences of internal migration in urban and rural areas of developed and developing nations. Economic and demographic interrelationships are emphasized as are implications of changes in local and regional population structure and composition for labor supply, the demand for goods and services, and infrastructure. Public policy implications of the inter-relations are investigated. Techniques and measurement issues associated with the analysis of migration and population distribution are discussed.

[R SOC 431 Social Demography of Minorities
Ethnic conflict and accommodation is examined in diverse settings (societies and historical periods). Demographic indicators (such as residential segregation, marital patterns, mortality and fertility differentials, and occupational mobility) of underlying social conditions serve as the principal vehicle for evaluating the status of ethnic relations.

[R SOC 436 Successful Aging: Issues and Social Policy in the 1990s
6-week Summer session. 3 credits. M-F 10:00-11:15. P. Taeitz.
This course aims to correct the misconceptions about aging and to free ourselves of the stereotypes that older persons are members of a single, homogeneous category. Successful aging in the 1990s and beyond is the central focus of the course. The response of the public and private sectors to the rapidly growing older population is examined in view of the imbalance between the strengths and capacities of older persons and the lack of role opportunities in society to utilize and reward their talents and abilities. Films and fieldtrips.

[R SOC 437 Aging and Aging Social Policy in the 1990s
Fall. 3 credits. Prerequisite: R SOC 101 or its equivalent. Not offered fall 1997. T R 11:40-12:55. Staff.
An analysis of the "graying" of America and the responses of the public and private sectors to this demographic change. Examines the interplay between basic and applied knowledge in social gerontology. Explores the formal and informal networks of services, in both rural and urban environments, that help maintain independent living arrangements by the elderly.

[R SOC 438 Social Demography
This course surveys the methods, theories, and problems of population studies. Attention is directed to the social, economic, and cultural determinants and consequences of population growth, distribution, and change. The core areas of demography, fertility, mortality, and migration are studied. Comparisons are made between developed and developing areas and between Africa, Asia, and Latin America.

[R SOC 440 The Social Impact of Resource Development
Social impact assessment (SIA) is a method of anticipating unwanted side-effects of projects, policies, and new technologies before they happen and provide a tool for mitigation. The seminar explores SIA applications in different parts of the world and pays particular attention to impacts on native and indigenous peoples. Students learn practical SIA skills and related theoretical/conceptual debates.

[R SOC 442 American Indian Philosophies: Selected Topics (also American Indian Studies 442)
This course provides an opportunity for students to read and discuss a wide range of American Indian philosophies.

[R SOC 490 Society and Survival
Fall. 3 credits. Prerequisite: introductory sociology course or permission of instructor. Not offered 1997-98. T R 2:55-4:10. D. T. Gurak.
Course surveys existing theories, methodological techniques, and research results relating to how social, economic and cultural structures and processes affect survival chances in diverse societies. A comparative framework is presented, and the utility of existing knowledge for policy-related applications in different societies is assessed. Attention is given to the problems associated with interpreting causality in morbidity and mortality data.

[R SOC 492 Contemporary Issues: Seminars: Developments in the Pacific Rim
Pacific Rim dynamics challenge U.S. supremacy, Western conceptions of modernization, and "Third World" unity. We relate these trends to regional political, economic, and cultural forces, including the Japanese model, the "Newly Industrializing Countries" (e.g., South Korea, Taiwan), the "third tier" countries (e.g., Indonesia, the Philippines), and emerging Chinese markets.

[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. Offered on a trial by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

[R SOC 495 Population, Environment, and Development in Sub-Saharan Africa
In the past three decades, countries in sub-Saharan Africa have experienced rapid population growth, weak economic growth, and growing environmental problems. This course examines how these problems are interrelated and looks at possible solutions. After reviewing trends in population environment and development within the region, the course focuses on specific problems, including urbanization, health and survival, population pressure and sustainable agriculture, refugees, and gender/family/community structures.

[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. In some cases students may include reading course, research experience, or public service experience.

[R SOC 560 Managing Local Environmental Systems: Social Perspectives and Research Bases
Fall. 3 credits. S-U optional. Enrollment limited to 15. W 2:55-4:25. Staff.
Course is for students with diverse backgrounds: undergrads, grads, people in professional careers, others with interest in environmental issue identification, resolution and management. Course discussions include ecological, social, economic and local government perspectives. Via lab exercises throughout the semester, student will have opportunities to apply the concepts and principles of these perspectives to analysis of specific local environmental management problems. Readings, lectures, and a course project are mandatory.

[R SOC 601 Theoretical and Methodological Approaches to Community and Rural Development
Fall. 3 credits. Letter grade only. Prerequisite: Graduate student. Lect. R 7:00-10:00 p.m. P. R. Eberts.
A survey of three general approaches for conducting analysis and practice in community and rural development. These approaches include examinations of: 1) planning and structural changes and policymaking; 2) participatory processes for generating community development; and 3) planning and planning strategies as mechanisms for creating community development opportunities.

[R SOC 603 Classical Sociological Theory
Fall. 4 credits. Offered alternate years. S-U grades optional. Prerequisites: open to graduate students and undergraduates with permission of instructor. T R 2:55-4:10. M. J. Pfeffer.
Students will review the main streams of classical sociological thought, focusing on the work of Weber, Durkheim, and Marx. 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 will be to identify the philosophical and conceptual core of the discipline and to critically evaluate the relevance of the classical
This course surveys major twentieth-century theories to contemporary social change and the interaction between political and economic institutions. Major topics covered will include mid-century development. The structure and dynamics of rural communities are examined in a comparative historical framework focusing on continuities and divergences among imperialist and post-colonial settings. Major topics include classical theories of rural social organization and their re-orientation in contemporary peasant studies and agrarian political economy literatures, theorizations of locality, rurality and spatial complexity within the world economy, and critical issues framing the relationship between political and labor market restructuring and petty commodity and household production systems.

[R SOC 604 Theories of Social Change
D. P. McMichael.
This course surveys major twentieth-century social theories, focusing on lineages from classical theory and on theories relevant to understanding the processes of social change. Major topics covered will include mid-century functionalism, conflict theories, neo-Marxism, neo-Weberianism, substantive economic sociology, and world-systems theory. Other topics, such as the "new sociology of culture," critical theory, structuration theory, neofunctionalism, the new methodological individualism, and the macro-micro link, will be covered briefly.]

[R SOC 606 Contemporary Sociological Theories of Development
P. K. Gellert.
Development is now understood to include life expectancy, health and education in addition to material well-being, and it remains a problem everywhere, in both the rich and poor countries, and within them, for regions and communities. Sociological explanations of development have recently crystallized around three competing positions: political economy, rational choice institutionalism, and sociological structuralism. The course will focus on these theories, their antecedents and close cousins, and their research and policy implications.]

[R SOC 618 Research Design I
First of a two-semester sequence (may be taken individually) in introductory graduate methods. Discusses problems of measurement, the design of instruments, and problems of reliability and validity. Common forms of measuring instruments are discussed. Concludes with a discussion of factor analysis. Students apply principles to development of several common types of scales. Computers will be used extensively.]

[R SOC 619 Research Design II
J. D. Francis.
The second part of the two-semester sequence in introductory graduate methods, with emphasis on an intermediate-level treatment of the following topics: regression, analysis of variance, analysis of covariance. Special attention is given to use of categorical variables in regression. Students develop and examine several statistical models using actual data to familiarize themselves with data handling and processing. Extensive use of computers.]

[R SOC 625 State, Economy, and Society
Spring. 3 credits. Offered alternate years. TR 1:25–4:25. P. D. McMichael.
Reviews major issues concerning the relations between political and economic institutions and the role of states, markets, firms, social movements, and cultural institutions in the process of social change. Theoretical perspectives are drawn from classical and modern social theory, including the application of comparative and historical methodologies. Substantive themes concern political-economic restructuring in world regions, and the interaction between national and global processes.

[R SOC 630 Field Research Methods and Strategies
Fall. 3 credits. TR 8:40–9:55. L. B. Williams.
The course will cover a variety of methods: structured surveys, focus groups, in-depth interviews, participant observation, archival record analysis, among others. Frameworks by which research questions can be matched with appropriate field methodologies, choice of sample, data collection, etc., will be discussed. Assessment of strengths and weaknesses of various strategies of field research. Discussion of practical matters such as fieldworker recruitment and training, and data processing issues and ethics of field work.]

[R SOC 640 Community and Changing Property Institutions
The seminar acquaints students with the evolution of property rights, from antiquity to the present, and features a number of property debates (the biological basis of ownership; private versus public ownership; property and value, the so-called "tragedy of the commons"; the "new" property). Readings explore land use regulation and property rights, common property issues, opposing land ethics, and new property forms in the future.]

[R SOC 641 Politics and Economics of Rural and Regional Development
Spring. 3 credits. Limited to upperclass or graduate students. S-U grades optional. Offered alternate years. M 12:20–2:50. T. A. Lyon.
A survey of social, political, and economic factors in local and regional development. Theories of community and regional development and underdevelopment are explored. Neoclassical, Marxist, and civil society theories are examined within local and global contexts.]

[R SOC 643 Land Reform Old and New
Land reform continues to be a major cornerstone of development planning. Between 1980 and 1995 the number of landless and near-landless in the Third World will approach one billion. Though land reform is a principal source of hope for the landless, its meanings are many and its models are controversial. The seminar acquaints students with land reform in antiquity as well as in contemporary settings (among others, Japan, the Philippines, Israel, India, Brazil, Mexico, Russia, and the United States). Perennial issues of equity, efficiency, and sustainability will be discussed in each of these case study areas.]

[R SOC 645 Rural Economy and Society
Fall. 3 credits. Offered alternate years. W 1:25–4:25. S. Feldman.
Employing a sociology of knowledge perspective and comparative approach within the social sciences, this course will review and analyze contemporary themes in feminist epistemological critiques of sociological
methods and knowledge systems. It will begin by identifying what constitutes mainstream explanations within the social sciences, introduce early feminist challenges to androcentric paradigms, move to examine the philosophy and androcentrism, and explore philosophical assumptions. We will examine studies that address issues of class, race, ethnicity, and constructions of otherness. Then questions are explored with a view to assessing various approaches to field, archival, and survey research. Underlying approaches for rationalism to positivism.

[R SOC 675 Global Patterns of International Migration]
Fall. 3 credits. Offered alternate years. Not offered 1997–98. M 7:30–10:30 p.m. Staff.

International migration to the United States and other countries has increased in recent decades. What accounts for this trend in an era when large-scale international migration is supposed to have ended and what are the implications of immigration for receiving countries? Theories and research on these issues are examined in the course from a comparative and interdisciplinary perspective. Several migration systems are examined, including those of North America and the European Community. Policies shaping immigration are also reviewed.

[R SOC 694 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 will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

[R SOC 715 Comparative Research Methods]

This seminar focuses on the comparative method in the social sciences. The logic of comparative inquiry forms the substantive base of the course. Topics include cross-national and cross-regional research design and an analysis of the comparative case study approach. Illustrations of the comparative research approach will cover a range of data types and problems.

[R SOC 718 Multidimensional Measurement and Classification]
Fall. 4 credits. Prerequisite: previous course work in scaling and statistics. Offered alternate years. T R 12:20–2:15. J. D. Francis.

An advanced course in measurement and scaling, building from work by Thurstone, Guttman and Coombs to multidimensional measurements. Topics include philosophy of factor analysis, factor-analysis models, factoring design, factoring techniques, and comparison with factor-analysis models. Cluster analysis and multidimensional scaling are the other major techniques discussed. As matrix algebra is an integral part of these procedures, class time is devoted to this topic. Computers are used to analyze fit to models.

[R SOC 719 Logistic and Log Linear Models]
Spring. 4 credits. Prerequisites: two courses in statistics and one in methods. Offered alternate years. T R 12:20–2:15. J. D. Francis.

The first part of the course considers multiple regression theory and procedures, after which extensions of these models to categorical data are discussed. Consideration is given to violations of assumptions and their effects. Then more advanced regression concepts and estimation techniques are discussed. The main focus of the course is on logit and log linear models. Computerized labs are an integral part of the course.

[R SOC 721 Sociology of Environment and Development]

This course examines society/environment relations in the contemporary environmental discourse and in sociology. Students evaluate such topics as sustainability, science and ethics, and the definition of nature. The central objective is to evaluate sociological theories' treatment of the problems of environmentalism. Subsidiary objectives include the identification of key sociological issues in contemporary environmentalism, and review of environmental themes in sociological theory.

[R SOC 725 The Sociology of "Third World" States]

This course examines how processes of political and economic restructuring have reshaped state capacities and processes of state formation. Particular attention is paid to questions of class formation, corporatist alliances, transnational interests, and alternative development strategies with the emergence of austerity, privatization and trade liberalization and its neoliberalist ideology. Critical to this discussion are the contours of authoritarianism, nationalism, communalism and fundamentalism as these reconfigure national and regional alliances and practices and shape interpretations of current processes of resistance, change, and terms of intervention and exchange.

[R SOC 730 Sociology of Global Change]

Analyses of social change and development are increasingly sensitive to global context. They include the sociology of the world economy as a multi-layered entity anchored in an evolving international division of labor and the system of nation states, and the sociology of transnational political, economic, and cultural processes (e.g., food regimes, commodity chains, diasporas and transnational identities, the new regionalism, and transnational social movements). The seminar examines the substantive and methodological questions generated by research on these global processes, including questions of relevant units of analysis, situating global process in local events and subjectivities and vice versa, and examining the ways in which

[R SOC 741 Community Development and Local Control]

Theories of community growth and decline and the current debate over the place of local control in community development in general are considered. Salient themes include the role of neopopulism in community development, changing institutions of property as community development occurs, and changing definitions of "community."

[R SOC 791 Teaching Experience]
Fall or spring. 1–3 credits. Limited to graduate students. S-U grades only. Participation in the ongoing teaching program of the department.

[R SOC 800 Master's-Level Thesis Research]
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students admitted specifically to a Master's program.

[R SOC 872 Development Sociology]
Limited to master's and doctoral degree candidates with permission of the graduate faculty. S-U grades optional.

[R SOC 900 Graduate-Level Thesis Research]
Fall or spring. Credit to be arranged. 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.

[R SOC 901 Doctoral-Level Thesis Research]
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students admitted to candidacy after the "A" exam has been passed.

Related Courses in Other Departments
(Others may be added)

Introduction to Sociology (SOC 101)
Population Dynamics (SOC 205)
Social Analysis of Ecological Change (S&TS 660 and BASOC 460)
Gender Relations, Gender Ideologies, and Social Change (WMNS 624)

Summer Session Courses
Introduction to Sociology (6-week session)
Environment and Society (3-week session)
Successful Aging: Today and Tomorrow (6-week session)
SOIL, CROP, AND ATMOSPHERIC SCIENCES


Atmospheric Science: 101/102, 131, 250, 331, T. A. LaRue, M. B. McBride, J. Mt. Pleasant, 610, 612, 613, 614, 642, 690, 691, 820, 920, 921
Crop Science: 311, 312, 314, 315, 317, 608, 950, 951
447, 451, 456, 457, 635, 646, 652, 692, 850

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, 608, 610, 612, 613, 614, 642, 690, 691, 820, 920, 921
Environmental Information and Analysis: 398, 420, 461, 620, 660, 675

General Courses

SCAS 190 Sustainable Agriculture
Fall. Credits variable; 2 or 3. Limited to 60 students. S-U grades optional. Lec, R 10:10; labs, M 2:00–4:25, T 10:10–12:35, G. W. Fick.
This course is designed to be an enjoyable introduction to basic food production resources (soils, crops, and climates), and it emphasizes management concepts that conserve or renew those resources for continuing benefit to society. The information is general, yet it is relevant to non-majors 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 World Wide Web. An extra credit can be earned by participation in team preparation and delivery of a lesson in sustainable agriculture.

SCAS 494 Special Topics in Soil, Crop and Atmospheric Sciences (undergraduate level)
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and the same course is not offered more than twice under this number.

SCAS 497 Individual Study in Soil, Crop, and Atmospheric 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 or crop science or atmospheric science are arranged at the beginning of the term for individual study or for group discussions.

SCAS 498 Teaching Experience in Soil Science, Crop Science, and Atmospheric Science
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 atmospheric science is obtained by assisting in the instruction of a departmental course.

SCAS 499 Undergraduate Research
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall). Independent research on current problems selected from any phase of crop science, atmospheric science, or soil science.

SCAS 694 Special Topics in Soil, Crop and Atmospheric Sciences (graduate level)
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and the same course is not offered more than twice under this number.

SCAS 695 Planning and Reporting Research
Spring. 2 credits. Prerequisite: graduate student status or permission of the instructor. Limited to 10 students. Lec to be announced. G. W. Fick.
This course is designed to prepare students in the SCAS Department and closely related fields for planning their research and reporting research results. Emphasis is given to literature reviews, scientific writing and reviewing (either thesis proposals, grant proposals, or manuscripts for publication), and slide and poster presentations. Students are expected to work closely with their major professor as well as the instructor of the course.

Atmospheric Science

SCAS 101/102 Science of Earth Systems Colloquium (also ABEN 120/121, GEOL 123/124)
Fall and spring. 2 credits. Lec, T 1:25–4:10. K. H. Cook, S. J. Riha. Weekly seminars, field trips, and hands-on experiences introducing the student to the scientific study of our planet and human interactions with the environment.

SCAS 131 Basic Principles of Meteorology
Fall. 3 credits. Lecs, T R 11:15; lab, T W or R 1:25–4:25 and M W 7:00–9:30 p.m. 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; and hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

SCAS 250 Meteorological Observations and Instruments
Methods and principles of meteorological measurements and observations, including surface, free-air, and remote systems. Instrument siting, mounting, and protection. Instrument response characteristics, calibration, and standardization. Recorders and data logging systems. Laboratory exercises in observation and data analysis. Intended to serve as preparation for Observers Examination. Lab fee, $50.

SCAS 331 Climate Dynamics (also ASTRO 331)
Fall. 4 credits. Prerequisites: MATH 112 or 192 or equivalent. Lecs, M W F 1:25–2:15; disc, W 2:30. K. H. Cook, P. J. Gierasch.
Processes that determine climate and contribute to its change are discussed, including comparisons with climates of other planets. Applications to problems of climate change and variability include the astronomical theory of ice ages, greenhouse warming, the ozone hole, African drought, and Amazonian deforestation.

SCAS 332 Evolution of the Earth System (also SES 303, GEOL 302)
Spring. 4 credits. Prerequisites: MATH 112 or 192 and CHEM 207 or equivalent. Lecs, to be announced; disc, to be announced. B. Isacks and others.
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.

SCAS 333 Micrometeorology
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.

SCAS 341 Atmospheric Thermodynamics and Hydrostatics
Fall. 3 credits. Prerequisites: one year of calculus and one semester of physics. M W F 9:05–10:55. 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.

SCAS 342 Atmospheric Dynamics
Spring. 3 credits. Prerequisites: one year each of calculus and physics. M W F 10:10. W. W. Knapp.
Introduction to atmospheric dynamics and to the methods of description and quantitative analysis used in meteorology. Topics considered include equations of atmospheric motion, motion in the free atmosphere, vertical variations of wind and pressure fields, mathematical representation and characteristics of fronts, mechanisms of pressure change, concepts of circulation and vorticity, and effects of friction on atmospheric motion.
SCAS 353 Application of FORTRAN in Meteorology
Fall. 3 credits. Prerequisites: SCAS 131 plus one computer programming course. Lec. T R 12:20-1:10; lab, F 1:25-3:20. M. W. Wysocki. An introduction to numerical techniques using FORTRAN to solve meteorological problems. No previous experience with FORTRAN is expected.

SCAS 345 Synoptic Meteorology I
Fall. 3 credits. Prerequisites: SCAS 341 and concurrent enrollment in SCAS 342. Lecs. T R 9:05, lab, M 1:25–3:25. M. W. Wysocki. Weather map analysis and forecasting techniques are studied by applying the principles of fluid and heat flow. This course will strengthen previously introduced meteorological concepts that will be applied to forecasting mid-latitude synoptic scale weather systems, such as cyclones, anticyclones, jet streams, fronts, and waves.

SCAS 350 Application of FORTRAN in Meteorology
Fall. 3 credits. Prerequisites: SCAS 131 plus one computer programming course. Lec. T R 12:20-1:10; lab, F 1:25-3:20. M. W. Wysocki. An introduction to numerical techniques using FORTRAN to solve meteorological problems. No previous experience with FORTRAN is expected.

SCAS 343 Statistical Methods in Meteorology
Fall. 3 credits. Prerequisite: a introductory course in statistics (e.g., BTRY 215 or ARME 310) and calculi. T R 10:10–11:25. D. S. Wilks. Statistical methods used in climatology, operational weather forecasting, and selected meteorological research applications. Some statistical characteristics of meteorological data, including probability distributions, intercorrelations, and persistence. Operational forecasts derived from multiple regression models, including the MOS system. Forecast verification techniques and scoring rules. Time series analysis, EOFs, and other research topics as time permits.

SCAS 344 Tropical Meteorology
Spring. 3 credits. Prerequisites: SCAS 342 or instructor's approval. Offered alternate years. Next offered spring 1998. MWF 11:15–12:05. K. H. Cook. Structure and dynamics of the tropical atmosphere on a wide range of time and space scales, e.g., large-scale convective systems to planetary waves. Topics include hurricanes, monsoon circulation, and El Nino.

SCAS 346 Modeling the Earth System
Spring. 3 credits. Prerequisites: Programming knowledge and instructor's approval. Offered alternate years. Offered spring 1999. T R 12:20–1:35. K. H. Cook. Project-oriented exploration of aspects of the Earth System through computer modeling. Intended primarily for science majors with computing experience, preferably in FORTRAN. Lectures focus on facilitating student projects, discussing basic concepts governing the Earth system dynamics, and evaluating complex models. Students develop a model on a topic of their choice.

SCAS 447 Physical Meteorology
Fall. 3 credits. Prerequisites: a year each of calculus and physics. Offered alternate years. Offered fall 1997. MWF 10:10. W. W. Knapp. 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, solar and terrestrial radiation, and principles of radar probing of the atmosphere.
considered. The impact of tropical cropping systems on the environment are evaluated.

**SCAS 315 Weed Science**

Fall. 3 credits. Prerequisite: introductory course in biology or botany. Lecs, T R 9:05; lab, T W 2–4:25. Staff.

Principles of weed science are examined. Emphasis is on (a) weed ecology, (b) chemistry of herbicides in relation to effects on the environment and plant growth, and (c) control of weeds in crops. Laboratory covers weed identification and ecology, herbicide selectivity, symptomology, and behavior in soil.

**SCAS 317 Seed Science and Technology**

Fall. 3 credits. Prerequisite: BIOL 241 or equivalent. Offered alternate years. Offered fall 1997. Not offered fall 1998. Lecs, T R 11:15; lab, R 1:25–4:25. 2 all-day field trips will be scheduled during the semester. 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.

**SCAS 608 Water Status in Plants and Soils**

Fall. 1 credit. Prerequisite: permission of instructor. S-U grades only. Offered alternate years. Offered fall 1997. Lec, 1 hour to be arranged; lab, R 1:25–4:25 or as arranged. T. L. Setter.

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.

**SCAS 610 Physiology of Environmental Stresses**


A study of the responses of plants to environmental stress, with emphasis on thermal stresses including chilling, freezing, and high temperature injury. Emphasis is on the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.

**SCAS 612 Seed Physiology**

Spring. 3 credits. Prerequisite: plant physiology. T R 8:30–9:55. R. L. Obendorf.

Morphology, physiology, and biochemistry of cereal, legume, and oil-seed formation, composition, storage, and germination. Emphasis is on the deposition of seed reserves during seed formation, stabilization of reserves during storage, and mobilization of reserves during germination. Topics range from on-farm problems to molecular mechanisms.

**SCAS 613 Physiology and Ecology of Yield**

Spring. 3 credits. Prerequisite: plant physiology. MWF 12:20. T. L. Setter.


**SCAS 614 Research Methods in Weed Physiology**

Spring. 2 credits. Prerequisite: SCAS 315 or equivalent. Offered alternate years. Next offered spring 1998. Staff.

Examination of a variety of modern techniques used to study herbicide absorption, translocation, metabolism, mode of action, and mechanism of resistance. Experiments will also be designed to study herbicide behavior and detection in soils. Laboratories will be accompanied by short lectures pertinent to experimental topics.

**SCAS 642 Plant Mineral Nutrition (ALSO BIO PL 642)**


A detailed study of the processes by which plants acquire and utilize mineral nutrients from the soil. Topics will 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 will be emphasized to illustrate the above topics.

**SCAS 690 Root-Soil Interactions**

Fall or spring. 1–2 credits. S-U grades optional. Hours to be arranged. R. W. Zobel.

A topic dealing with root-soil interaction will be selected during the first meeting of the term. Students will prepare one or two seminars based on published work on the topic. Possible topics include root genetics, root morphology, conservation tillage, and soil temperature.

**SCAS 691 Special Topics in Crop Science**

Fall or spring. 1–6 credits. S-U grades optional. Hours to be arranged. T. L. Setter.

Study of topics in crop science that are more specialized or different from other courses. Special topics vary and will depend on staff and student interests.

**SCAS 820 Master’s-Level Thesis**

Fall or spring. 1–6 credits. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students specifically in a master’s program.

**SCAS 860 Remote Sensing Fundamentals (also Civil and Environmental Engineering 610)**

Fall. 3 credits. Prerequisite: permission of instructor. Lecs, T R 9:05–9:55; lab, T W 1:25–4:25. S. D. DeGloria.

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 aircraft imagery to discriminate, measure, inventory, and monitor environmental resources.
SCAS 675 Modeling the Soil-Plant-Atmosphere System
S. J. Riha.
Introduction to the structure and use of soil-plant-atmosphere models. Topics covered will 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 will be discussed.

Soil Science

SCAS 260 Introduction to Soil Science
Spring. 4 credits. Prerequisite: CHEM 103, 207 or 215. S-U grades optional. Lecs, M W F 9:05, lab, M T W or R 1:25. Staff.
A comprehensive introduction to the field of soil science, with emphasis on scientific principles and their application to solving soil management problems. The laboratory exercises stress quantitative measurement of soil properties.

SCAS 321 Soil and Water Management
Spring. 3 credits. Prerequisites: SCAS 190 or 260. S-U grades optional. Lecs, T R 11:15–12:05; lab, R 2:30–4:30.
H. M. van Es.
Course intended to introduce 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, soil erosion and conservation, water management, contaminant movement, tillage, and water quality are examined. Case studies and policy approaches from both the United States and abroad are discussed.

SCAS 362 Soil Morphology
Fall. 1 credit. Undergraduates only. Recommended for sophomores and juniors. R. 1:25–4:25; all day field trip required. R. B. Bryant and J. M. Galbraith.
The principles for field identification of soil properties, profiles, and landscapes are presented. A series of soil pits are examined, described, classified, and interpreted in the field.

SCAS 363 Intermediate Soil Science I: Genesis, Classification, and Survey
Fall, weeks 1–7. 2 credits. Prerequisite: SCAS 260. Lecs, M W F 10:10, lab, W 1:25–4:25. One all day field trip is required. R. B. Bryant and J. M. Galbraith.
Factors and processes of soil formation. Principles of field identification, classification, survey, and interpretation. Laboratory exercises and field trips provide practical training in soil morphology and landscape relations. Course ends at mid-semester and is part of a sequence of three Intermediate Soil Science courses.

SCAS 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 gas exchange surface. The history of environmental contamination and its impact on agricultural soils and ecosystems is described.

SCAS 371 Hydrology and the Environment (also ABEN 371 and GEOL 204)
Spring. 3 credits. Students enrolled in the statutory colleges must enroll in ABEN 371 or SCAS 371. Prerequisite: 1 course in calculus. Lecs, T R 9:05–lab, F 1:25–3:20.
Introduction to the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evapotranspiration, groundwater, surface runoff, river meandering, floods, and droughts. Case studies, short field trips, computer programs, and laboratories are used to foster an understanding of concepts and principles of hydrologic processes.

SCAS 372 Soil Fertility Management
Fall. 3 credits. Prerequisite: SCAS 260 or permission of instructor. S-U grades optional. M W F 9:05. D. R. Boullion.
An integrated discussion of soil crop yield relationships, with emphasis on the soil as a source of mineral nutrients for crops and the role of fertilizers and manure in crop production.

[SCAS 373 Soil, Water, and Aquatic Plants]

SCAS 365 Biogeochemical Cycles, Agriculture, and the Environment
Spring. 2 credits. Prerequisites: CHEM 103 or 207 and SCAS 260 or equivalent. Lecs, T R 11:15; lab, R 1:25–4:25. Not offered 1997–98. Staff.
The success or failure of soil and water management is manifested in streams, wetlands, lakes, and aquifers. Chemical and biological changes downstream are studied and related to agricultural management techniques upstream. Basic chemical and physiological processes are presented and used to suggest appropriate responses to water management problems.

SCAS 471 Properties and Appraisal of Soils of the Tropics
A. VanWambeke.
The course examines the conditions in which soils form, and considers ecological, geological and vegetation factors that produce the diversity that exists among them. The major kinds of soils are recognized, their management properties described, and methods to alleviate the constraints to crop production and the preservation of the environment examined. Topics include the identification of soils, and their functions in sustaining traditional farming systems and advanced technological packages. The course pursues these themes 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 salt-affected soils, paddy, and the characteristics of acid-sulfate soils. Lectures include slides of soils, landscapes, and cropping systems.

SCAS 473 Ecology of Agricultural Systems (also BIOES 473)
Fall. 3 credits. Limited to 45 students. Prerequisite: BIOES 371 or permission of instructor. S-U grades optional. Offered alternate years. Offered fall 1997. Lec and disc, T R 2:30–3:45. During the first 6 weeks of class, the Thursday meetings may run to 5:30 because of field trips.
A. G. Power and staff.
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.

SCAS 483 Environmental Biophysics
Fall. 3 credits. Prerequisite: SCAS 260 or equivalent or permission of instructor. Lecs, M W F 11:15. S. J. Riha.
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 will be covered. Applications to agronomic and environmental problems and instrument design and use are considered through discussion and problems sets.

SCAS 663 Pedology
Spring. 3 credits. Prerequisite: SCAS 361 or permission of instructor. Textbook recommended, not required. Offered odd spring semesters; every other year.
J. M. Duxbury.

SCAS 666 Advanced Soil Microbiology
Fall. 1 credit. Prerequisite: SCAS 365 or permission of instructor. S-U grades only for graduate students. T 12:20.
M. Alexander.
Discussions of current topics in special areas of soil microbiology. Particular attention is given to biodegradation, bioremediation and fate of chemicals.

SCAS 667 Advanced Soil Physics
Spring. 3 credits. Prerequisites: One year of college physics and SCAS 483 or permission of instructor. S-U grades optional. Offered alternate years. Offered spring 1998. Hours to be arranged. 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) standpoints. Mechanical and thermodynamical analysis of the equilibrium status of aqueous solutions in deformable soils. Formal lectures are complemented by tutorial sessions.

**SCAS 669 Organic Matter—Soils, Sediments, and Waters**

Spring. 2 or 3 credits (with discussion) credits. Prerequisites: SCAS 260 and CHEM 357-358 or equivalent. T R 9:05; disc, W 12:55-2:15. 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. Interaction with anthropogenic organics and effects of anthropogenic activities on natural organics are considered.

**SCAS 671 Soil Chemistry**

Fall 3 credits. Prerequisite: one year of physical chemistry or permission of instructor. Offered alternate years. Offered fall 1997. Lecs, M W F 10:10. M. B. McBride. A detailed examination of the structure and surface chemistry of colloidal particles common to soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter will be emphasized. The behavior of environmental contaminants in soils, particularly metals and toxic organics, will be described.

**SCAS 692 Special Topics in Soil Science**

Fall or spring. 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 interest.

**SCAS 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.

**SCAS 890 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.

**SCAS 891 Doctoral-Level Dissertation Research in Soil Science**

Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students admitted to candidacy after the “A” exam has been passed.

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**VEGETABLE CROPS**

See Horticultural Sciences.

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**FACULTY ROSTER**

Abawi, George S., Ph.D., Cornell U. Prof., Plant Pathology (Geneva)

Acree, Terry E., Ph.D., Cornell U. Prof., Food Science, and Technology (Geneva)


Agnello, Arthur M., Ph.D., North Carolina State U. Assoc. Prof., Entomology (Geneva)

Ahner, Beth A., Ph.D., Massachusetts Institute of Technology. Asst. Prof., Agricultural and Biological Engineering

Aist, James R., Ph.D., U. of Wisconsin. Prof., Plant Pathology

Albright, Louis D., Ph.D., Cornell U. Prof., Agricultural and Biological Engineering

Aldwinkle, Herbert S., Ph.D., U. of London (England). Prof., Plant Pathology (Geneva)

Alexander, Martin, Ph.D., U. of Wisconsin. Prof., Soil, Crop, and Atmospheric Sciences

Allee, David J., Ph.D., Cornell U. Prof., Agricultural, Resource, and Managerial Economics

Altman, Naomi S., Ph.D., Stanford U. Assoc. Prof., Plant Breeding and Biometry

Anderson, Robert L., Ph.D., U. of Minnesota. Prof., Horticultural Sciences (Geneva)


Aneshansley, Daniel J., Ph.D., Cornell U. Assoc. Prof., Agricultural and Biological Engineering

Arneson, Phil A., Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology

Austic, Richard E., Ph.D., U. of California at Davis. Prof., Animal Science

Baker, Richard A., Ph.D., Harvard U. Prof., Natural Resources

Bain, Mark B., Ph.D., U. of Massachusetts. Assoc. Prof., Natural Resources

Bander, David K., M.P.S., Cornell U. Prof., Food Science

Barbach, David M., Ph.D., Cornell U. Prof., Food Science

Bartsch, James A., Ph.D., Purdue U. Assoc. Prof., Agricultural and Biological Engineering

Bassuk, Nina L. Ph.D., U. of London (England). Prof., Floriculture and Ornamental Horticulture

Batt, Carl A., Ph.D., Rutgers U. Assoc. Prof., Food Science

Baughner, Sherene, Ph.D., SUNY Stonybrook. Asst. Prof., Landscape Architecture

Bauman, Dale E., Ph.D., U. of Illinois. Prof., Animal Science

Bayecke, Philippe C., Ph.D., U. of California at Riverside. Assoc. Prof., Soil, Crop, and Atmospheric Sciences

Beer, Steven V., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology

Beermann, Donald H., Ph.D., U. of Wisconsin. Prof., Animal Science

Bell, Alan W., Ph.D., U. of Glasgow (Scotland). Prof., Animal Science

Bellinder, Robin R., Ph.D., Virginia Polytechnic Inst. and State U. Assoc. Prof., Fruit and Vegetable Science

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

Boisclair, Yves R., Ph.D., Cornell U. Asst. Prof., Animal Science

Bosworth, Richard N., Ph.D., U. of Minnesota. Prof., Agricultural, Resource, and Managerial Economics

Boor, Kathry J., Ph.D., U. of California at Davis. Asst. Prof., Food Science

Brady, John W., Jr., Ph.D., SUNY at Stonybrook. Assoc. Prof., Food Science

Broadway, Roxanne M., Ph.D., U. of California at Davis. Assoc. Prof., Entomology (Geneva)

Brown, David L., Ph.D., Cornell U. Assoc. Prof., Animal Science

Brown, David L., Ph.D., U. of Wisconsin. Professor, Rural Sociology

Brown, Susan K., Ph.D., U. of California at Davis. Assoc. Prof., Horticultural Sciences (Geneva)

Bryant, Ray B., Ph.D., Purdue U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences

Burr, Thomas J., Ph.D., U. of California at Berkeley. Prof., Plant Pathology (Geneva)

Butler, Walter R., Ph.D., Purdue U. Prof., Animal Science

Calderone, Nicholas W., Ph.D., Ohio State U. Asst. Prof., Entomology

Carlson, William S., Ph.D., Stanford U. Assoc. Prof., Education

Casella, George, Ph.D., Purdue U. Prof., Plant Breeding and Biometry

Castillo-Chavez, Carlos, Ph.D., U. of Wisconsin. Assoc. Prof., Plant Breeding and Biometry

Chapman, Lewis D., Ph.D., U. of California at Berkeley. Prof., Agricultural, Resource, and Managerial Economics

Chase, Larry E., Ph.D., Pennsylvania State U. Assoc. Prof., Animal Science

Cherney, Jerome H., Ph.D., U. of Minnesota. Prof., Soil, Crop, and Atmospheric Sciences

Christy, Ralph D., Ph.D., Michigan State U. Prof., Agricultural, Resource, and Managerial Economics


Coffman, W. Ronnie, Ph.D., Cornell U. Prof., Plant Breeding and Biometry

Coll, Royal D., Ph.D., Cornell U. Prof., Communication

Collner, Alan R., Ph.D., Cornell U. Prof., Plant Pathology

Colucci, Stephen J., Ph.D., SUNY. Assoc. Prof., Soil, Crop, and Atmospheric Sciences

Confrey, Jere, Ph.D., Cornell U. Assoc. Prof., Education

Connemann, George J., Ph.D., Pennsylvania State U. Assoc. Prof., Agricultural, Resource, and Managerial Economics


Conroy, Carol A., Ph.D., Pennsylvania State U. Asst. Prof., Education

Conteras, Martha, Ph.D., U. of California at Riverside. Asst. Prof., Plant Breeding and Biometry

Cook, Kerry H., Ph.D., North Carolina State U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences

Cooke, J. Robert, Ph.D., North Carolina State U. Prof., Agricultural and Biological Engineering

Cox, William J., Ph.D., Oregon State U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences

Creasy, Leroy L., Ph.D., U. of California at Davis. Prof., Fruit and Vegetable Science

Currie, W. Bruce, Ph.D., Macquarie U. (Australia) Prof., Animal Science

Danforth, Bryan N., Ph.D., U. of Kansas. Asst. Prof., Entomology
Gillett, James W., Ph.D., U. of California at Berkeley. Prof., Natural Resources
Gleason, Kathryn L., Ph.D., Oxford U. Asst. Prof., Landscape Architecture
Glynn, Carolyn Ph.D., U. of Wisconsin. Assoc. Prof., Communication
Gonsalves, Dennis, Ph.D., U. of California at Davis. Prof., Plant Pathology (Geneva)
Good, George L., Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Gorewit, Ronald C., Ph.D., Michigan State U. Prof., Animal Science
Gottfried, Herbert W. Ph.D., Ohio U. Prof., Landscape Architecture
Gravani, Robert B., Ph.D., Cornell U. Prof., Food Science
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Guraik, Douglas T., Ph.D., U. of Wisconsin. Prof., Rural Sociology
Hahn, Russell R., Ph.D., Texas A & M. U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Haith, Douglas A., Ph.D., Cornell U. Prof., Agricultural and Biological Sciences
Hajek, Ann E., Ph.D., U. of California at Berkeley. Asst. Prof., Entomology
Haller, Emil J., Ph.D., U. of Chicago. Prof., Education
Halseth, Donald E., Ph.D., Cornell U. Assoc. Prof., Fruit and Vegetable Science
Hang, Yong D., Ph.D., McGill U. (Canada). Prof., Food Science and Technology (Geneva)
Harman, Gary E., Ph.D., Oregon State U. Prof., Horticultural Sciences (Geneva)
Harwood, Edward D., Ph.D., U. of Wisconsin-Madison. Assoc. Prof., Cooperative Extension Administration
Hedlund, Dalva E., Ph.D., Colorado State U. Assoc. Prof., Education
Henick-Kling, Thomas, Ph.D., U. of Adelaide (Australia). Assoc. Prof., Food Science and Technology (Geneva)
Hinth, Harold F., Ph.D., Cornell U. Prof., Animal Science
Hirsch, Thomas A., Ph.D., U. of Wisconsin. Assoc. Prof., Natural Resources
Hoch, Harvey, Ph.D., U. of Wisconsin. Prof., Plant Pathology (Geneva)
Hoffmann, Michael P., Ph.D., U. of California. Prof., Education
Horst, R. Kenneth, Ph.D., Ohio U. Prof., Plant Pathology
Hotchiss, Joseph H., Ph.D., Oregon State U. Prof., Food Science
Hrazdina, Geza, Ph.D., Eidg. Technische Hochschule at Zurich (Switzerland). Prof., Food Science and Technology (Geneva)
Hudler, George W., Ph.D., Colorado State U. Assoc. Prof., Plant Pathology
Hunter, James E., Ph.D., U. of New Hampshire. Prof., Plant Pathology (Geneva)
Hunter, Jean B., D. En.Sc., Columbia U. Assoc. Prof., Agricultural and Biological Engineering
Irwin, Lonne H., Ph.D., Texas A&M U. Assoc. Prof., Agricultural and Biological Engineering
Jewell, William J., Ph.D., Stanford U. Prof., Agricultural and Biological Engineering
Johnson, Patricia A., Ph.D., Cornell U. Assoc. Prof., Animal Science
Kalter, Robert J., Ph.D., U. of Wisconsin. Prof., Agricultural, Resource, and Managerial Economics
Keshavarz, Kavouris, Ph.D., U. of Georgia. Assoc. Prof., Animal Science
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Kruith, Barbara A., Ph.D., Virginia Polytechnic Inst. and State U. Assoc. Prof., Natural Resources
Koehler, Wollram, Ph.D., Philips-University-Marburg (Germany). Assoc. Prof., Plant Pathology (Geneva)
Kroll, Daniel W., M.L.A. Cornell U. Assoc. Prof., Landscape Architecture
Krasny, Marianne E., Ph.D., U. of Washington. Assoc. Prof., Natural Resources
Krueter, Charles C., Ph.D., U. of Minnesota. Prof., Natural Resources
Kyle, Margaret M., Ph.D., Cornell U. Assoc. Prof., Plant Breeding and Biometry
Kyle, Steven C., Ph.D., Harvard U. Assoc. Prof., Agricultural, Resource, and Managerial Economics
Lacy, William B., Ph.D., U. of Michigan. Prof., Cooperative Extension Administration
LaDue, Eddy L., Ph.D., Michigan State U. Prof., Agricultural, Resource, and Managerial Economics
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Langhans, Robert W., Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Lassoie, James P., Ph.D., U. of Washington. Prof., Natural Resources
Lawless, Harry T., Ph.D., Brown U. Assoc. Prof., Food Science
Lee, Chang Y., Ph.D., Utah State U. Prof., Food Science and Technology (Geneva)
Lee, David R., Ph.D., U. of Wisconsin. Prof., Agricultural, Resource, and Managerial Economics
Lee, Xing, Ph.D., Michigan State U. Asst. Prof., Animal Science
Lesser, William H., Ph.D., U. of Wisconsin. Prof., Agricultural, Resource, and Managerial Economics
Lewenstein, Bruce V., Ph.D., U. of Pennsylvania. Assoc. Prof., Communication
Liebert, James R., Ph.D., U. of California at Berkeley. Prof., Entomology
Lorbeer, James W., Ph.D., U. of California at Berkeley. Prof., Plant Pathology
Lora, Rosemary, Ph.D., Michigan State U. Prof., Plant Pathology
Lund, Daryl B., Ph.D., U. of Wisconsin. Prof., Food Science
Lyson, Thomas A., Ph.D., Michigan State U. Assoc. Prof., Rural Sociology
McBrine, Murray B., Ph.D., Michigan State U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
McCouch, Susan, Ph.D., Cornell U. Asst. Prof., Plant Breeding and Biometry
McCulloch, Charles E., Ph.D., Cornell U. Prof., Plant Breeding and Biometry
McDonald, Daniel, Ph.D., U. of Wisconsin. Assoc. Prof., Plant Pathology
Mcferson, James R., Ph.D., U. of Wisconsin. Asst. Prof., Horticultural Sciences (Geneva)
McGrath, Margaret T., Ph.D., Pennsylvania State U. Assoc. Prof., Plant Pathology
McLaughlin, Edward W., Ph.D., Michigan State U. Prof., Agricultural, Resource, and Managerial Economics
McLellan, Mark R., Ph.D., Michigan State U. Prof., Food Science and Technology (Geneva)
McMichael, Philip D., Ph.D., SUNY Binghamton. Prof., Rural Sociology
McNeil, Richard J., Ph.D., U. of Michigan. Prof., Natural Resources
McReynolds, Andrew A., Ph.D., U. of Missouri. Assoc. Prof., Natural Resources
Merwin, Jan A., Ph.D., Cornell U. Assoc. Prof., Fruit and Vegetable Science
Migliorini, Michael G., Ph.D., Cornell U. Assoc. Prof., Plant Pathology
Miller, Dennis D., Ph.D., Cornell U. Prof., Food Science
Milligan, Robert A., Ph.D., U. of California at Davis. Prof., Agricultural, Resource, and Managerial Economics
Millman, Jason, Ph.D., U. of Michigan. Prof., Education
Moen, Aaron N., Ph.D., U. of Minnesota. Prof., Natural Resources
Mok, David H., Ph.D., U. of Chicago. Prof., Education
Montemagno, Carlo D., Ph.D., U. of Notre Dame. Asst. Prof., Agricultural and Biological Engineering
Mount, Timothy D., Ph.D., U. of California at Berkeley. Prof., Agricultural, Resource, and Managerial Economics
Mower, Robert G., Ph.D., Cornell U. Prof., Horticultural Sciences (Geneva)
Nakata, Eiji, Ph.D., U. of California at Riverside. Prof., Horticultural Sciences (Geneva)
Parker, Steve, Ph.D., U. of Wisconsin. Asst. Prof., Horticultural Sciences (Geneva)
Newell, Wendell A., Ph.D., Colorado State U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Novakovic, Andrew M., Ph.D., Purdue U. Prof., Agricultural, Resource, and Managerial Economics
Nyrop, John P., Ph.D., Michigan State U. Assoc. Prof., Entomology (Geneva)
Obendorf, Ralph L., Ph.D., U. of California at Davis. Prof., Soil, Crop, and Atmospheric Sciences
Oltenacu, Elizabeth A., Ph.D., U. of Minnesota. Assoc. Prof., Animal Science
Oltenacu, Pascal A., Ph.D., U. of Minnesota. Prof., Animal Science
Osman, Ruy, Ph.D., U. of Minnesota. Prof., Communication
Pardue, William D., Ph.D., Cornell U. Prof., Plant Breeding and Biometry
Parks, John E., Ph.D., Virginia Polytechnic Inst. Prof., Animal Science
Patlak, E. John, Ph.D., Cornell U. Asst. Prof., Animal Science
Pawlak, John C., Ph.D., U. of Wisconsin. Assoc. Prof., Horticultural Sciences (Geneva)
Peckarsky, Barbara L., Ph.D., U. of Wisconsin. Prof., Entomology
Pell, Alice N., Ph.D., U. of Vermont. Assoc. Prof., Animal Science
Petrovic, A. Martin, Ph.D., Michigan State U. Prof., Floriculture and Ornamental Horticulture
Pfeifer, Max, Ph.D., U. of Wisconsin. Assoc. Prof., Rural Sociology
Pitt, Ronald E., Ph.D., Cornell U. Prof., Agricultural and Biological Engineering
Polanek, Thomas T., Ph.D., Stanford U. Prof., Agricultural, Resource, and Managerial Economics
Pollak, E. John, Ph.D., Iowa State U. Prof., Animal Science
Pool, Robert M., Ph.D., Cornell U. Prof., Horticultural Sciences (Geneva)
Posner, George J., Ed.D., SUNY at Albany. Prof., Education
Price, H. Ray C., Ph.D., Michigan State U. Prof., Horticultural Sciences (Geneva)
Pritts, Marvin P., Ph.D., Michigan State U. Prof., Fruit and Vegetable Science
Quaglia, Richard L., Ph.D., Colorado State U. Prof., Animal Science
Quirk, Susan M., Ph.D., Cornell U. Assoc. Prof., Animal Science
Rakow, Donald A., Ph.D., Cornell U. Assoc. Prof., Floriculture and Ornamental Horticulture
Ranganarjan, Anusuya, Ph.D., Ohio State. Asst. Prof., Plant Breeding and Biometry
Raman, Kandur, Ph.D., U. of Reading. Prof., Plant Breeding and Biometry
Ranney, Christine K., Ph.D., U. of California at Davis. Assoc. Prof., Agricultural, Resource and Managerial Economics
Rao, M. Anandha, Ph.D., Ohio State U. Prof., Food Science and Technology (Geneva)
Reger, Courtenay E., Ph.D., Brandeis U. Prof., Food Science
Reid, W. Shaw, Ph.D., Michigan State U. Prof., Soil, Crop, and Atmospheric Sciences
Reiners, Stephen, Ph.D., Ohio State U. Assoc. Prof., Horticultural Sciences (Geneva)
Reich, Bruce, Ph.D., U. of Wisconsin. Prof., Horticultural Sciences (Geneva)
Reissig, William H., Ph.D., Oregon State U. Assoc. Prof., Entomology (Geneva)
Richmond, Milo E., Ph.D., U. of Missouri. Assoc. Prof., Natural Resources
Riha, Susan, Ph.D., Washington State U. Prof., Soil, Crop, and Atmospheric Sciences
Ripple, Richard E., Ph.D., U. of Wisconsin. Prof., Education
Rizvi, Syed S., Ph.D., Ohio State. Prof., Food Science
Robinson, Richard W., Ph.D., Cornell U. Prof., Horticultural Sciences (Geneva)
Robinson, Townshend L., Ph.D., Washington State U. Assoc. Prof., Horticultural Sciences (Geneva)
Roelofs, W. Ph.D., Indiana U. Prof., Entomology (Geneva)
Roth, David A., Ph.D., Michigan State U. Assoc. Prof., Plant Pathology (Geneva)
Rossi, Frank S., Ph.D., Cornell U. Assst. Prof., Floriculture and Ornamental Horticulture
Ruz, Donald A., Ph.D., North Carolina State U. Prof., Horticultural Sciences (Geneva)
Sanderson, John P., Ph.D., U. of California at Riverside. Prof., Entomology
Sandford, John C., Ph.D., U. of Wisconsin. Assoc. Prof., Horticultural Sciences (Geneva)
Scherer, Clifford W., Ph.D., U. of Wisconsin. Assoc. Prof., Communication
Schneider, Rebecca, Ph.D., Cornell U. Asst. Prof., Natural Resources
Schram, Dawn E., Ph.D., Harvard U. Assoc. Prof., Education
Schiere, William D., Ph.D., U. of California at Riverside. Prof., Agricultural, Resource, and Managerial Economics
Schwager, Steven J., Ph.D., Yale U. Assoc. Prof., Plant Breeding and Biometry
Schwarz, Donald F., Ph.D., Michigan State U. Prof., Communication
Scott, Jeffrey G., Ph.D., U. of California at Berkeley. Assoc. Prof., Entomology
Seem, Robert C., Ph.D., Pennsylvania State U. Assoc. Prof., Plant Pathology (Geneva)
Siedler, Timothy L., Ph.D., U. of Minnesota. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Shanahan, James E., Ph.D., U. of Massachusetts-Amherst. Asst. Prof. Communication
Shapira, Michael, 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. Assoc. Prof., Entomology
Siebert, Karl J., Ph.D., Pennsylvania State U. Prof., Food Science and Technology (Geneva)
Schiek, Joseph B., M.S., Cornell U. Assoc. Prof., Food and Vegetable Science
Scully, Wayne A., Ph.D., Cornell U. Prof., Plant Pathology
Slack, Steven A., Ph.D., U. of California at Davis. Prof., Plant Pathology
Smith, Margaret E., Ph.D., Cornell U. Assoc. Prof., Plant Breeding and Biometry
Smith, S. David, Ph.D., Cornell U. Assoc. Prof., Animal Science
Soderlund, David M., Ph.D., U. of California at Berkeley. Prof., Entomology (Geneva)
Sorrells, Mark E., Ph.D., U. of Wisconsin Prof., Plant Breeding and Biometry
Steele, Roger E., Ph.D., Michigan State U. Asst. Prof., Education
Steenhuis, Tammo S., Ph.D., U. of Wisconsin. Prof., Agricultural and Biological Engineering
Stepp, Pamela L., Ph.D., Cornell U. Asst. Prof., Communication
Stiles, Warren C., Ph.D., Pennsylvania State U. Prof., Fruit and Vegetable Science
Stover, Eddie W., Ph.D., U. of Maryland Asst. Prof., Horticultural Sciences (Geneva)
Straub, Richard W., Ph.D., U. of Missouri. Prof., Entomology (Geneva)
Streeter, Deborah H., Ph.D., U. of Wisconsin. Assoc. Prof., Agricultural, Resource, and Managerial Economics
Strike, Kenneth A., Ph.D., Northwestern U. Prof., Education
Stylos, J. Maryone, Ph.D., Columbia U. Prof., Rural Sociology
Sulon, H. Dean, Ph.D., Ohio State U. Assoc. Prof., Education
Tanksley, Steven D. Ph.D., U. of California at Davis. Prof., Plant Breeding and Biometry
Tauber, Maurice J., Ph.D., U. of California at Berkeley. Prof., Entomology
Tauer, Loren W., Ph.D., Iowa State U. Prof., Agricultural, Resource, and Managerial Economics
Taylor, Alan G., Ph.D., Oklahoma State U. Prof., Horticultural Sciences (Geneva)
Tenneisen, Daniel J., Ph.D., U. of Wisconsin, Asst. Prof., Floriculture and Ornamental Horticulture
Thonney, Michael L., Ph.D., U. of Minnesota. Prof., Animal Science
Timmons, Michael B., Ph.D., Cornell U. Prof., Agricultural and Biological Engineering
Tingey, Ward M., Ph.D., U. of Arizona. Prof., Entomology
Tomek, William G., Ph.D., U. of Minnesota. Prof., Agricultural, Resource, and Managerial Economics
Topoleski, Leonard D., Ph.D., Purdue U. Prof., Fruit and Vegetable Science
Trancik, Roger T., M.L.A., Harvard U. Prof., Landscape Architecture
Trumbull, Deborah J., Ph.D., U. of Illinois. Assoc. Prof., Education
Turgeon, B. Gillian, Ph.D., U. of Dayton. Assoc. Prof., Plant Pathology
VanAmburgh, Michael E., Ph.D., Cornell U. Asst. Prof., Animal Science
VanCampen, Darrell R., Ph.D., North Carolina State U. Assoc. Prof., Animal Science
vanEs, Harold M., Ph.D., North Carolina State U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Via, Sara, Ph.D., Duke U. Assoc. Prof., Entomology
Vliands, Donald R., Ph.D., U. of Minnesota. Prof., Plant Breeding and Biometry
Villani, Michael G., Ph.D., North Carolina State U. Assoc. Prof., Entomology (Geneva)
Wagenet, Robert J., Ph.D., U. of California at Davis. Prof., Soil, Crop, and Atmospheric Sciences
Walker, Larry P., Ph.D., Michigan State U. Prof., Agricultural and Biological Engineering
Walter, Michael F., Ph.D., U. of Wisconsin. Prof., Agricultural and Biological Engineering
Watkins, Christopher B., Rutgers U. Assoc. Prof., Fruit and Vegetable Science
Weeden, Norman F., Ph.D., U. of California at Davis. Assoc. Prof., Horticultural Sciences (Geneva)
Weiler, Thomas C., Ph.D., Cornell U. Prof., Floriculture and Ornamental Horticulture
Welch, Ross M., Ph.D., U. of California at Davis. Prof., Soil, Crop, and Atmospheric Sciences
Wheeler, Quentin D., Ph.D., Ohio State U. Prof., Entomology
White, Gerald B., Ph.D., Pennsylvania State U. Prof., Agricultural, Resource, and Managerial Economics
Whitlow, Thomas H., Ph.D., U. of California at Davis. Asst. Prof., Floriculture and Ornamental Horticulture
Wien, Hans C., Ph.D., Cornell U. Prof., Fruit and Vegetable Science
Wilcox, Wayne F., Ph.D., U. of California at Davis. Assoc. Prof., Plant Pathology (Geneva)
Wilks, Daniel S., Ph.D., Oregon State U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Willett, Lois S., Ph.D., U. of California at Davis. Assoc. Prof., Agricultural, Resource, and Managerial Economics
Williams, Linda, Ph.D., Brown U. Asst. Prof., Rural Sociology
Wolfe, David W., Ph.D., U. of California at Davis. Assoc. Prof., Fruit and Vegetable Science
Yarbrough, J. Paul, Ph.D., Iowa State U. Prof., Communication
Yavitt, Joseph B., Ph.D., U. of Wyoming. Asst. Prof., Natural Resources
Yoder, Olen C., Ph.D., Michigan State U. Prof., Plant Pathology
Zitter, Thomas A., Ph.D., Michigan State U. Prof., Plant Pathology
Zobel, Richard W. Ph.D., U. of California at Davis. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
ADMINISTRATION
Anthony Vidler, dean
John F. Forester, associate dean
Laurie Roberts, director of public affairs
Cynthia K. Prescott, director of administrative operations
Reginald D. Ryder, director of minority educational affairs
Donna L. Kuhar, registrar
Elizabeth A. Cutter, director of admissions
Margaret Webster, curator of visual resources facility
Helen Johnson, director of career office

FACULTY ADVISERS
Architecture students are assigned faculty advisers for their first year. Upperclass students have one assigned adviser but are encouraged to seek assistance and advice from the most appropriate faculty member or college officer.

Students in the fine arts department are assigned faculty advisers for the first year. Students may then choose advisers in their major 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.

Specific inquiries regarding rules, procedures, or deadlines should be addressed to:

Kent L. Hubbell, chair, Department of Architecture
Porus Olpadwala, chair, Department of City and Regional Planning

Roberto Bertoia, chair, Department of Art.

DEGREE PROGRAMS

Graduate-level programs are offered in art, architectural 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 the students and faculty in other disciplines.

Early in its development the college set a limit on the number of students it would enroll and devised a selective method of admission. There are now more than 650 students and a full-time teaching staff of over fifty-five, supplemented by visiting professors and critics, part-time lecturers, and assistants.

Teachers and students mix freely, and much instruction and criticism is on an individual basis.

The college’s courses are integral parts of the professional curricula. Fundamental subjects are taught by faculty members whose experience provides them with professional points of view. The concentration of professional courses within the college is balanced by the breadth of view gained from courses and informal learning in the rest of the university. The college believes that this breadth is an essential element of professional education. This conviction is evident in the form of the 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 Café, a student eatery and lounge, is located in the basement of Sibley Dome.

The college has three darkrooms that are available for general use by students in the college and serve 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.

NOTE: renovations of the college buildings will temporarily relocate some of the aforementioned facilities. More information on the current location of college facilities can be obtained by contacting the individual departments.

Through the generosity of the late William H. Miller, 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 Visual Resources Facility, made possible through gifts from George and Adelaide Knight, in Sibley Hall 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 400,000 slides.

The facilities of the libraries of other schools and departments on campus are also used to house visiting teachers and guests of the college.

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. Art galleries are also maintained in Willard Straight Hall, where loan exhibitions of paintings and graphic work by contemporary artists are held. 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 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. Art galleries are also maintained in Willard Straight Hall, where loan exhibitions of paintings and graphic work by contemporary artists are held. 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 M. Olin Library, designed primarily as a research library for graduate students, are also available.

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 famous Palazzo Lazzaroni in the center of the historical 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 liberal arts, architecture, fine arts, and planning. 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.

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 Hall gallery and the John Hartell Gallery. 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 the college is required to pass all courses in which the student is registered and have a weighted average for the term of not less than C (2.0). The record of each student who falls below the standard will be reviewed by the Student Records Committee for appropriate action, as described below:

1) Warning means that 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 required to take a leave of absence from the college.

2) Final Warning indicates that the student's record is unsatisfactory. Unless considerable improvement is shown in the subsequent term, the student shall be required to take a leave of absence from the college.

3) Required leave of absence: Academic Deficiency. The student is dismissed from the college and may not continue studies in the college. A student who has been placed on final warning or required to take a leave of absence may apply for readmission after an absence of at least two semesters. Application for readmission is made by letter, addressed to the Student Records Committee. The student must submit evidence that the student is employed, must submit a letter from an employer. If a student chooses to register for courses, either extramurally or with another institution, he or she should be advised that credit for these courses will not apply toward the degree but will appear on the student's transcript. The grades received for any courses taken while on a required leave of absence will not be counted into the grade point average. Readmission to the college is at the discretion of the Student Records Committee. Application for spring-term readmission must be made by November 15, and application for fall-term readmission must be made by April 15. Refer to the Architecture, Art & Planning Handbook (Whitebook) for further information regarding required leave of absence.

4) Required withdrawal: May Not Reregister, College of Architecture, Art, and Planning. The student is dismissed from the college and is permanently prohibited from continuing in it. This dismissal does not preclude the possibility of 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 for academic deficiency at the end of the next term if performance during that time is deemed to be grossly deficient.

A cumulative average of at least C- (1.7) is required 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 of courses in design, consisting of studio work augmented by lectures and seminars dealing with theory and method, are the core of the program. Sequences of studies in the history of architecture and cities, culture and society, visual studies, environmental science, structures, and building technology 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 detailed further studies in these areas. Within the professional program a basis for understanding architecture in its contemporary and historical cultural contexts is established.

The structure of the program incorporates considerable flexibility for the individual student to pursue his or her particular interest in the fourth and fifth years. By carefully planning options and electives in the fifth year, it is possible for a qualified student to apply the last year's work for the Bachelor of Architecture degree to one of the graduate programs offered in the department. Some students are then able to complete the requirements for the master's degree in one additional year.

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

Overlap Program
For qualified students the department offers an option that combines the fifth year of the undergraduate program with the first year of the 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 secretary 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>Fall Term</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>101 Design I</td>
<td>6</td>
</tr>
<tr>
<td>181 History of Architecture I</td>
<td>3</td>
</tr>
<tr>
<td>151 Drawing I</td>
<td>2</td>
</tr>
<tr>
<td>Math 111 Calculus or Math 106</td>
<td>3-4</td>
</tr>
<tr>
<td>Out-of-college elective</td>
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<td>17-18</td>
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<table>
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<th>Spring Term</th>
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<td>102 Design II</td>
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<tr>
<td>182 History of Architecture II</td>
<td>3</td>
</tr>
<tr>
<td>152 Drawing II</td>
<td>2</td>
</tr>
<tr>
<td>Math 111 or out-of-college elective</td>
<td>3-4</td>
</tr>
<tr>
<td>Out-of-college elective (freshman writing seminar suggested)</td>
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</tr>
<tr>
<td>17-18</td>
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</table>
### Second Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Fall Term</td>
<td>201 Design III</td>
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<tr>
<td></td>
<td>263 Structural Concepts</td>
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<tr>
<td></td>
<td>231 Architectural Analysis I</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>261 Site Planning</td>
<td>3</td>
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<tr>
<td></td>
<td>Out-of-college elective</td>
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<tr>
<td>Spring Term</td>
<td>202 Design IV</td>
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<tr>
<td></td>
<td>232 Architectural Analysis II</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>262 Building Technology, Materials,</td>
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<tr>
<td></td>
<td>and Methods</td>
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<tr>
<td></td>
<td>264 Structural Elements</td>
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<td>College elective</td>
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</tbody>
</table>

### Third Year

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<th>Term</th>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Fall Term</td>
<td>301 Design V</td>
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<tr>
<td></td>
<td>361 Environmental Controls I—Lighting</td>
<td>3</td>
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<tr>
<td></td>
<td>and Acoustics</td>
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<td>363 Structural Systems</td>
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<td></td>
<td>Departmental elective</td>
<td>3</td>
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<tr>
<td></td>
<td>Out-of-college elective</td>
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<tr>
<td>Spring Term</td>
<td>302 Design VI</td>
<td>6</td>
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<tr>
<td></td>
<td>342 Architecture as a Cultural System</td>
<td>3</td>
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<tr>
<td></td>
<td>362 Environmental Controls II—</td>
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<td></td>
<td>Mechanical and Passive Solar Systems</td>
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<tr>
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<td>Departmental elective</td>
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<tr>
<td></td>
<td>College or out-of-college elective</td>
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</table>

### Fourth Year

<table>
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<tr>
<th>Term</th>
<th>Course</th>
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<tbody>
<tr>
<td>Fall Term</td>
<td>401 Design VII</td>
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</tr>
<tr>
<td></td>
<td>411 Professional Practice</td>
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</tr>
<tr>
<td></td>
<td>Departmental elective</td>
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</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>
<tr>
<td>Spring Term</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>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>
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</table>

### Fifth Year

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<thead>
<tr>
<th>Term</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>Fall Term</td>
<td>501 Design IX or 601 or 603</td>
<td>6</td>
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<tr>
<td></td>
<td>Overlap Program</td>
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<tr>
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<td>Departmental elective</td>
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<td>College or out-of-college elective</td>
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</tr>
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<td>Spring Term</td>
<td>502 Design X or 602 or 604</td>
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<tr>
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<td>College or out-of-college elective</td>
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#### Required Departmental Courses

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<td>62</td>
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<tr>
<td>1</td>
<td>mathematics</td>
<td>Math 111, Math 106, or approved equivalent</td>
<td>3-4</td>
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<tr>
<td>3</td>
<td>structures</td>
<td>263, 264, 363</td>
<td>10</td>
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<td>4</td>
<td>technology</td>
<td>261, 262, 361, 362</td>
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<tr>
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<td>architectural theory</td>
<td>231, 232</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>history of architecture</td>
<td>181, 182</td>
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<td>1</td>
<td>architecture, culture and society</td>
<td>342</td>
<td>3</td>
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<td>1</td>
<td>professional practice or seminar</td>
<td>411</td>
<td>3</td>
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<td>2</td>
<td>drawing</td>
<td>151, 152</td>
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#### Electives

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<tr>
<td></td>
<td>3 history of architecture: 300-level</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>1 visual studies or computer graphics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2 architectural theory or non-sequence design</td>
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</tr>
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<td></td>
<td>1 architectural structures, construction, and technology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2 art: any courses</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>1 computer programming or applications</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1 freshman seminar</td>
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<td></td>
<td>1 mathematics, physics, or biological sciences</td>
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<td>1 humanities</td>
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### 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 back-
grounds, 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.

Students who wish to transfer to the program from outside Cornell must apply to the Department of Architecture by March 15. Applications may be considered after this date but are given lower priority. Applications for both internal and external transfer students are available from Elizabeth Cutter, Admissions Office, College of Architecture, Art, and Planning, Cornell University, 135 East Sibley Hall, Ithaca, New York 14853–6701.

**Curriculum.** A student entering the program is assigned an adviser from the history of architecture faculty in the Department of Architecture. Adviser and student together prepare an appropriate two-year course of study according to the following guidelines:

1) 24 credits of 300-level courses in architectural history: Arch 380 through Arch 399
2) 12 credits in 600-level architectural history seminars: Arch 681 through Arch 699; or 8 credits in a 600-level seminar plus Arch 499, offered for honors candidates only
3) One 300-, 400-, or 600-level course in architectural theory
4) 24 credits in electives selected in consultation with the student's adviser
5) Language requirement, to be met in the manner specified for students enrolled in the College of Arts and Sciences

**Honors program.** Students will 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, 135 East Sibley Hall, and at the Academic Advising Center of the College of Arts and Sciences, 55 Goldwin Smith Hall.

Students may also elect to continue toward a Master of Arts degree in the history of architecture. The M.A. ordinarily requires a minimum of two years of graduate work beyond the bachelor's degree; with this special sequential degree arrangement that time is shortened to one year.

**Summer Term in Architecture**

The summer term offers students the opportunity of a concentrated period of design work. Design is offered at both undergraduate and graduate levels; the term is six to eight weeks in duration.

Undergraduate design sequence courses, including thesis, are offered at first- through fifth-year levels in Ithaca. Normally there is 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.

At the graduate level participation in the summer program cannot be undertaken without the consent of the student's Special Committee.

Furniture design, architectural structures, and computer visualization may be offered as elective courses, contingent upon student interest and faculty availability.

The department offers a Career Discovery Program in Architecture for high school students and undergraduates interested in exploring the possibility of a career in architecture.

**Architectural Design**

Courses in brackets are not offered this year.

A studio fee of $65 is charged each semester for every design course (these fees are subject to change).

**Sequence Courses**

**ARCH 101 Design I**

Fall. 6 credits. Limited to department students.

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**


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 Architecture 231–232 and completion of Architecture 151–152 required. Limited to department students. Prerequisite for Architecture 201 is Architecture 102 and Architecture 152. Prerequisite for Architecture 202 is Architecture 201.

**ARCH 301–302 Design V and VI**

Fall and spring. 6 credits each term. Limited to department students. Prerequisite for Architecture 301 is Architecture 202. Prerequisite for Architecture 302 is Architecture 301.

**ARCH 401–402 Design VII and VIII**

Fall and spring. 6 credits each term. Limited to department students. Prerequisite for Architecture 401 is Architecture 302. Prerequisite for Architecture 402 is Architecture 401.

Programs in architectural design, urban design, or architectural technology and environmental science, etc.

**ARCH 501 Design IX**

Fall or spring. 6 credits. Limited to department students. Prerequisite: Architecture 402.

Programs in architectural design, building typology investigations, and research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis is followed by tutorial work with the student's advisory committee.

**ARCH 502 Design X—Thesis**

Fall or spring. 8 credits. Prerequisite: Architecture 501 or Architecture 500 and Architecture 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.

**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.

**ARCH 603–604 Special Program in Urban Design**

Fall and spring. 9 credits each term. Limited to students who have been accepted into the Overlap Program. Registration by petition only.

**Graduate Courses**

**ARCH 701–702 Problems in Architectural Design**

Fall and spring. 9 credits each term. 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. 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: Architecture 701 and Architecture 702. Required of B.Arch. students whose major concentration is architectural design.

**ARCH 802 Thesis or Research in Urban Design**

Fall or spring. 9 credits. Prerequisite: Architecture 705 and Architecture 704. Second-year design course for graduate students whose major concentration is regional 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 Architecture 103: permission of instructor required. Prerequisite for Architecture 104: Architecture 103 and permission of instructor.

ARCH 303 Special Problems in Architectural Design
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor and approved independent study form. Independent study.

ARCH 200, 300, 400, 500 Elective Design
Fall or spring. 6 credits. Open by permission to transfer students who have not been assigned to a sequence course. Prerequisite: permission of department office. Each student is assigned to a class of appropriate level. Prerequisite for Architecture 500 is Architecture 402.

ARCH 605 Special Problems in Design
Fall and spring. Variable credit (maximum, 3). Prerequisite: permission of instructor. Independent study.

Related Courses and Seminars

ARCH 110 Introduction to Architecture: Design Studio
Summer. 3 credits. S-U option. Open to non-architectural 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. Not offered every year.

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 by periodic reviews of 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 317 Contemporary Italian Culture
Fall or spring. Variable credit (maximum, 3). For students in the Rome program only.

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.

An examination of organizational and management theories and practices for delivering professional design services. Included is a historic overview of the profession and a review of the architect's responsibilities from the precontract phase through construction. Application of computer technology in preparing specifications.

ARCH 510 Thesis Introduction
Foreign summer programs and Rome program only. 3 credits. Must be taken in conjunction with Architecture 500. Prerequisite for Architecture 500 is Architecture 402. Architecture 500 will be considered equivalent to Architecture 501 when taken concurrently with Architecture 510 during a foreign summer program or in Rome.

Lectures, seminars, and independent research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis.

ARCH 610 Graduate Design Seminar
Fall. 3 credits. Intended for but not limited to graduate students in the Architectural Design and Urban Design Program. Required for first-year graduate students in 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 in urban design.

Prerequisite: permission of instructor. Not offered every year.

ARCH 613 Transportation
Fall. 3 credits. Prerequisite: permission of instructor. Not offered every year.

The impact 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.

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.

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 the participants and visitors.

ARCH 335 Theory of Architecture
Fall or spring. 3 credits. Limited to third-year level students and above.

Field and figure (interrelation of parts as dominated by the general character of the whole) is the theme for studying numerous issues relevant to the design of elevations and facades. The first part of the seminar is 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 to the issues addressed.

ARCH 336 Theory of Architecture
Fall or spring. 3 credits. Limited to third-year level students and above.

Theories of modern architecture: De Stijl, cubist and purist painting, industrialized architecture, Le Corbusier's architecture and
with emphasis on the structures of criticism in An inquiry into the fundamental principles of architectural criticism in theory and practice.

ARCH 634 Column, Wall, Elevation, Facades: A Study of the Vertical Surface in Architecture
Fall or spring. 3 credits. Limited to third-year level students and above. For description, see ARCH 334.

ARCH 635 Critical Theory in Architecture
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. 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 636 Special Topics in the Theory of Architecture II
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced before preregistration.

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. 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. Topic to be announced before preregistration.

ARCH 639 Principles of Design Process
Fall or spring. Limited to third-year architecture students and above. Students in other colleges must have permission of instructor. Not offered every year. Analysis of the major theories and techniques of design developed during the past fifteen years, with special emphasis on application to the solution of whole problems in architectural design.

ARCH 641 Theory of Architecture
Fall. 3 credits. Prerequisite: third-year status. Not offered every year. Gardening and architecture: urban parks; villas and country houses; and Italian, French, and English landscape gardens. Site planning.

ARCH 642 Theory of Architecture
Spring. 3 credits. Prerequisite: third-year status. Not offered every year. 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 643 Architecture and Representation
Fall. 3 credits. Limited to degree candidates in architecture. Prerequisite: successful completion of Architecture 231-232. Not offered every year. A study of architecture as it functions as a representational art, referring to its past while inferring its present.

ARCH 644 Architecture and the Mythic Imagination
Fall. 3 credits. Prerequisite: Architecture 342 or permission of instructor. Not offered every year. This course focuses on traditional societies in which beliefs about architectural order are borne out of the mythical 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 645 Architecture and the Mythic System
Spring 445, 446, 447, or 448 can substitute with permission of instructor.

ARCH 441-442 Special Topics in Architecture, Culture, and Society
Fall and spring. Variable credit (maximum 4). Prerequisite: permission of instructor and approved independent study form. Independent study.

ARCH 446 Topics in Architecture, Culture, and Society
Fall or spring. 3 credits. Prerequisite: Architecture 342 or permission of instructor.

ARCH 447 Architectural Design and the Utopian Tradition
Fall. 3 credits. Prerequisite: Architecture 342 or permission of instructor. Not offered every year. 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. Prerequisite: Architecture 342 or permission of instructor. Not offered every year. This course provides a concise chronological summary of the major building traditions of Hindu India and explores the relationship between form and more general beliefs about the power of vision to reveal and transform. Topics include the sculptural program of the Hindu temple as a vehicle for the preservation and transmission of mythic texts, the oculus as an element and the eye as a motif, darshan, the spiritually transforming vision, and the destructive power of vision as revealed in myth and beliefs about "evil eye."

[ARCH 647-648 (667-668) Architecture in Its Cultural Context I and II 647, fall; 648, spring. 4 credits each term. Prerequisite: permission of instructor. Not offered 1997-98. Fall term, theory; spring term, problem solving and method. An examination of the relationship between form and more general beliefs about the power of vision in utopian society. Emphasis on the motivations for particular architectural forms and especially on theories of architecture. Examples from the United States and Asia.]

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. Independent study.

ARCH 152 Drawing II
Spring. 2 credits. Prerequisite: Architecture 151. Freehand drawing as a means of conceiving and expressing spatial form; line weight, shades and shadows, and figure drawing.

Visual Studies
Darkroom fees charged for all photography courses.

ARCH 151 Drawing I
Fall. 2 credits. Freehand drawing with emphasis on line and perspective representation of form and space.

ARCH 152 Drawing II
Spring. 2 credits. Prerequisite: Architecture 151. 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 161)
Fall or spring. 3 credits each term.
For description see Art 161.

ARCH 351 Photography II (also Art 261)
Spring. 4 credits. Prerequisites: Architecture 251 or Art 161, or permission of instructor.
For description see Art 261.

ARCH 450 Architectural Publications
Fall and spring. Variable credit (maximum 3). May be repeated for credit.
Colloquy and practicum on issues related to the production of an architectural journal, as well as other theoretical and practical production related to the exchange of architectural ideas. Exercises will 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.
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.
Independent study.

ARCH 459 Special Topics in Visual Studies I
Fall or spring. 3 credits. Prerequisite: permission of instructor.
Topics to be announced before preregistration.

ARCH 465 Special Topics in Construction
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 262 or permission of instructor. Not offered every year.
Topic to be announced by preregistration.

ARCH 473 Special Investigations in Structures
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form.
Independent study.

ARCH 463 Special Topics in Structures
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 263, 264, and 363 or permission of instructor. Not offered every year.
Topic to be announced by preregistration.

ARCH 474 Special Investigations in Environmental Controls
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form.
Independent study.

Computer Applications

ARCH 372 Imaging and the Electronic Age
Spring. 3 credits. For undergraduate, non-computer scientists. 2 lectures, 1 recitation. D. Greenberg. Not offered every year.
Historical technological advances which created major paradigm shifts for communications as well as advances in computer technology will be presented. Technical fundamentals of computer graphics capabilities will be emphasized. The latter half of the course will cover 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 itself. The course will be heavily supplemented with pictorial content consisting of slides, movies, and live interactive demonstrations.

ARCH 374 Computer Graphics and Visualization (also Computer Science 417)
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 262, and 361, and 362 or permission of instructor. Not offered every year.

ARCH 375 Practicum in Computer Graphics (also Computer Science 418)
Two or three programming assignments dealing with sophisticated interactive vector graphics programs on calligraphic displays and solid-image generation on raster graphics displays.

ARCH 379 Design by Computer
Fall or spring. 3 credits. Limited to third-year students and above. Not offered every year.
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 377 Microcomputer Applications in Design
Fall. 3 credits. Prerequisites: previous knowledge of PC-based CAD or permission of instructor.
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 476 Special Topics in Computer Applications
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 261, 361, and 362 or permission of instructor. Not offered every year.
Topic to be announced by preregistration.
ARCH 477-478 Special Projects in Computer Graphics
Fall, spring. Variable credit (maximum, 4). Limited to third-year students and above. Prerequisites: Architecture 374 plus concurrent registration in Computer Science 314 or equivalent, and permission of instructor. Advanced work in computer graphics input and display techniques, including storage tube, dynamic vector and color raster displays.

Graduate Courses
ARCH 761-762 Architectural Science Laboratory
761, fall; 762, spring. 6 credits each term. Open to architectural science graduate students only. 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. 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 Architecture 181–182 in the first year, and three additional courses from the 380–399 series, preferably in the third and fourth years. Seminars and advanced undergraduate and graduate students do not satisfy undergraduate history requirements. Courses with the same number may only be taken once to satisfy history of architecture or in-college 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. 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 Architecture 181. The history of the built environment as social and cultural expression from more recent times to the present. Themes, theories, and ideas are addressed in greater detail for architecture and urban design leading to the present.

Directed Electives
ARCH 380 History of Theory
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. This course, in which classroom discussion and debate play a central role, explores the history of important theoretical issues involving art and architecture. The readings, which span from the Greeks to today, focus on more than just questions of aesthetics and include theories of ethics, origins, imagination, nature, society, and pedagogy.

ARCH 381 Greek and Roman Architecture and Urbanism
Fall or spring. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. The history of architecture and urban design in ancient Mediterranean civilizations, with emphasis on Greece and Rome. The course considers change and transformation of building types and their elements within the general context of social demands.

ARCH 383 The City
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. This course looks at the development of urban form and urban consciousness from the bronze age to the industrial revolution. It studies conceptions of the city, competing urban paradigms, images of cities both real and fictive, as well as the religious and cultural practices associated with city design.

ARCH 384 The Italian Renaissance: Architecture, Politics, and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. This course focuses on the leading architects and theorists of the Renaissance from within the context of the political and cultural developments in Italy from 1300 to the mid-sixteenth century. The course also investigates specific architectural problems faced by designers and patrons of the time and questions of architectural patronage, practices, and theories.

ARCH 385 Magnificent Utility—Architecture, Politics, and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. This course considers the design and realization of monumental buildings in the context of politics and urbanism from the medieval period to the present. It examines the role of architecture in the creation of power and the construction of identity within complex urban environments.

ARCH 387 The Nineteenth Century—Style, Technology, and Individuality in the West
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. An examination of the nineteenth-century efforts to create appropriate stylistic forms and expressions for emerging building technologies and typologies. The preservation of individual artistic expression against the backdrop of industrialization, urbanization, and professionalization will be emphasized. The course considers the rhetoric of modernist theory and its architectural expression and concludes with considerations of Art Nouveau, Modernism, and Jugendstil.

ARCH 388 Modernism
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. 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 the service of the state during the 1930s.

ARCH 389 Architecture, Revolution and Tradition
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. From early eighteenth to early nineteenth century, European society underwent profound change. Political absolutism—the doctrine of unlimited government controlled—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 and those 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
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. 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 will be emphasized and the contributions of artisans, clients, and users as well as professional architects and builders will be examined. The architectural expressions of Native Americans, African Americans, women, and others will be treated in addition to those of European colonists and settlers.

ARCH 391 American Architecture and Building II
Fall or spring. 3 credits. Prerequisites: Architecture 181–182 or permission of instructor. Not offered every year. 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 will be 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: Architecture 181–182 or permission of instructor. Not offered every year. An exploration of certain themes deemed critical to modern architecture and urbanism through their representation in both commercial and avant-garde films from the medium's birth until the present day. The focus will vary each semester with particular emphases to include the modern house and housing, the modern city, technology and visions of the future, and finally the image of the architect. Representations of these themes in other forms such as painting, photography, theatre, literature, and advertising will also be examined. Selected readings in modern architecture and film, screenings in class, class discussions, presentations, and papers.
ARCH 393 The Cumulative City
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year. Well established cities were transformed by radical and unimagined change in the nineteenth and twentieth centuries. Politics and economics 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: Architecture 181-182 or permission of instructor. Not offered every year. 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 395 Contemporary Issues in the Built Environment
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year. A consideration of how certain social, cultural, political, ethical, and economic issues are manifest in the architectural and built environments of the United States. Overarching issues will be examined through case studies such as the question of monuments and monumentality in a contemporary, multicultural society through the Vietnam Memorial in Washington, D.C., Holocaust museums and memorials, and the preservation of the Audubon Ballroom as a memorial to Malcolm X. Historical concerns and examples will be brought to bear on these contemporary manifestations of preservation, monumentality, gender, class, professional responsibility, and ethics and design as a collaborative art. A course for architects, planners, and preservationists but also clients and users of buildings and landscape.

ARCH 396 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year. Topic to be announced.

ARCH 397 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year. Topic to be announced.

ARCH 398 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year. Topic to be announced.

ARCH 399 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year. Topic to be announced.

Courses In Preservation

ARCH 583 Measured Drawing (also CRP 567)
For description, see CRP 567.

ARCH 584 Problems in Contemporary Preservation Practice (also CRP 563)
For description, see CRP 563.

ARCH 585 Perspectives on Preservation (also CRP 562)
For description, see CRP 562.

ARCH 586 Documentation for Preservation (also CRP 560)
For description, see CRP 560.

ARCH 587 Building Materials Conservation (also CRP 564)
For description, see CRP 564.

ARCH 588 Historic Preservation Planning Workshop: Surveys and Analyses (also CRP 561)
For description, see CRP 561.

Graduate Seminars in the History of Architecture and Urbanism

ARCH 680 Seminar in Historiography
Fall. 4 credits. Prerequisite: permission of instructor. 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. Topic to be announced.

ARCH 683 Seminar in the History of Theory
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced.

ARCH 684 Seminar in the Italian Renaissance: Architecture, Politics, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced.

ARCH 686 Seminar in Seventeenth- and Eighteenth-Century Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced.

ARCH 688 Seminar in the History of the Cities
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced.

ARCH 690 Seminar in American Architecture, Building, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced.

ARCH 692 Seminar in Nineteenth-Century Architecture, Building, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced.

ARCH 696 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced.

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. Topic to be announced.

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. Topic to be announced.

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. Topic to be announced.


ARCH 299 Undergraduate Independent Study in the History of Architecture and Urbanism
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor. May not be taken by students in design to satisfy undergraduate history requirements. 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.

ARCH 799 Graduate Independent Study in the History of Architecture and Urbanism
Fall or spring. Variable credit (maximum, 12). Prerequisite: permission of instructor. Independent study for graduate students.

ARCH 899 M.A. Essay in the History of Architecture and Urbanism
Fall or spring. 4 credits. 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). Independent study for the doctoral degree.
ART

Undergraduate Program
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 in 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 remainder is devoted to a diversified program of academic subjects with a generous provision for electives. The curriculum in art is a program of study within the College of Architecture, Art, and Planning.

The undergraduate curriculum in art is an excellent background for a career in applied art although no specific technical courses are offered in such areas as interior design, fashion, or commercial art. All members of the faculty in the Department of Art are active, practicing 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. 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 will be assigned an adviser in both colleges, of their dual degree program, to provide needed guidance. As a candidate for two degrees you must satisfy all requirements for both degrees. At least 67 of the total credits must come from courses offered in the Department of Art and an additional 6 credits of History of World 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 fifth year.

Bachelor of Fine Arts Degree Requirements

Credits and Distribution
130 credits are required for the BFA degree. A minimum of 67 are taken in the Department of Art and an additional 6 credits of Survey of World Art. A minimum of 49 are taken outside the department.

Curriculum
Students are expected to take an average course load of 16 credits per semester during their four years. No more than three studio courses may be taken in any one semester. Studio courses may be repeated for elective credit. 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 prior to the act.

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, and 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, or photography or printmaking. Declaration of the area of concentration must be made during the second semester of the sophomore year. B.F.A. students must complete a senior thesis in one area of concentration and are required to participate in the Senior Exhibition in the semester the thesis is taken.

Concentration Requirements (27 credits total; 26 in printmaking)
The required courses for each concentration are as follows:

Painting: ART 121, 221, 321, 322, 421, 422 (Thesis)
Sculpture: ART 141, 241, 341, 342, 441, 442 (Thesis)
Printmaking: ART 131/132/133 (2 of 3); 231, 232, 233 (1 of 3); 331, 431, 432 (Thesis)
Photography: ART 161, 261, 263/264/265 (1 of 3), 461, 462
and one of the following: ART 264, and 265

Dual Concentration
If a student is interested in studying in more than one area, he or she 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 must take 23 credits in the first area of concentration. Students must take 15 credits in the second area of concentration. Drawing is only available as a second area of concentration.

The required courses for the dual concentration are:

First Area of Concentration
Total Credits
Painting: ART 121, 221, 321, 421, 422
Sculpture: ART 141, 241, 341, 441, 442
Printmaking: ART 131/132/133 (2 of 3); 231, 232, 233 (1 of 3); 331, 431, 432
Photography: ART 161, 261, 263/264/265 (1 of 3), 461, 462
Second Area of Concentration
Total Credits
Drawing: ART 151, 152, 251, 252, repeat 251
Painting: ART 121, 221, 321, 322

Sculpture: ART 141, 241, 341, 442
Printmaking: ART 131/132/133 (2 of 3); 231, 232, 233 (1 of 3); 331
Photography: ART 161, 261, 263/264/265 (2 of 3)

Note: The total number of out-of-college elective credits required will be adjusted to allow for the additional credits required of the dual concentration.

Combined Media Concentration
The combined media program 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.

The required courses for the concentration in Combined Media (33 credits) are:

100 and 200 level studios
ART 1__, 2__

200 and 300 level studios
ART 2__, 3__, 5__, 3__, 3__, (2 of 4)
Pre-Thesis and Thesis
ART 481, 482

Out-of-college studio electives
(minimum of 2)
OCE Studio, OCE Studio
Total
33 credits

Note: The total number of in/out-of-college elective credits required will be adjusted to allow for the additional credits required of the combined media concentration.

Out-of-College Requirements
A minimum of 49 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 BFA students are required to take 12 credits in the History of Art. One course must be taken in each of the following areas:


Elective: Any art history elective at the 300 level or above or any architectural history elective.

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
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 record. Applications are submitted to the Rome Program coordinator. Students applying to the Rome Program must meet with their faculty adviser, the art department Rome Program 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 also attend the Rome Program. Students wishing to spend two consecutive semesters in Rome are encouraged to do so. In both cases students must petition for special consideration. This petition must include the proposed course schedule for both semesters and must show signatures of approval by the adviser in the student's area of concentration, the department chair, and by the Rome Program adviser.

Rome Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 400</td>
<td>Rome Studio</td>
<td>4</td>
</tr>
<tr>
<td>Art 312*</td>
<td>Modern Art in Italy</td>
<td>3</td>
</tr>
<tr>
<td>Art 317</td>
<td>History of Art in Rome: Early Christian to the Baroque Age</td>
<td>4</td>
</tr>
<tr>
<td>Art 318</td>
<td>History of Art in Rome: Renaissance in Rome and Florence</td>
<td>4</td>
</tr>
<tr>
<td>Itala 111/112</td>
<td>Italian Language</td>
<td>4</td>
</tr>
<tr>
<td>Arch 317</td>
<td>Contemporary Italian Film</td>
<td>1</td>
</tr>
</tbody>
</table>

16 Total

Students may not take more than 16 credits a semester in the Rome Program. Only four studio credits may be taken in any one semester. Students may study in Rome for one or two academic semesters.

*Fulfills 300-level Theory and Criticism requirement.

For those students matriculating in fall of 1997:
Students are required to take ART 111, Introductory Art Seminar; ART 121, Introductory Painting; or ART 141, Introductory Sculpture; ART 112, History of World Art; and a Freshman Writing Seminar during the fall semester of the freshman year. ART 113, History of World Art, 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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Art 310, 312</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art History 367, 370, 470, 494, 570, 574, 595, 596</td>
<td></td>
<td></td>
</tr>
<tr>
<td>German Studies 660</td>
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First Year

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<tr>
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<tr>
<td>Fall Term (Required Curriculum)</td>
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<tr>
<td>111 Introductory Art Seminar</td>
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<td></td>
</tr>
<tr>
<td>112 History of World Art</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>121 Introductory Painting</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>141 Introductory Sculpture</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>151 Drawing I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Freshman Writing Seminar</td>
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<tr>
<td>In/Out College Electives</td>
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16 Total

Second Year

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<tr>
<th>Term</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>Fall Term (Required Curriculum)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>131 Introductory Etching</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>132 Introductory Graphics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>133 Introductory Lithography</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>151 Drawing III</td>
<td>3</td>
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</tr>
<tr>
<td>Out-College Elective (OCE)/Art History</td>
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16 Total

Spring Term

<table>
<thead>
<tr>
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<th>Credits</th>
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<tr>
<td>200 Level Studio</td>
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<tr>
<td>252 Drawing IV</td>
<td>3</td>
</tr>
<tr>
<td>OCE/Art History</td>
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<td>OCE</td>
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18 Total

Third Year

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</thead>
<tbody>
<tr>
<td>Fall Term (Required Curriculum)</td>
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<td></td>
</tr>
<tr>
<td>200 Level Studio</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Art Studio concentration</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>300-level course in Theory and Criticism</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>OCE</td>
<td>3</td>
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</tr>
<tr>
<td>In/OCE</td>
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17 Total

Spring Term (Rome)

<table>
<thead>
<tr>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Art Studio concentration</td>
</tr>
<tr>
<td>OCE/Art History</td>
</tr>
<tr>
<td>In/OCE's</td>
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16

Fourth Year

<table>
<thead>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Fall Term</td>
<td>Pre-Thesis</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>In/OCE's</td>
<td>10</td>
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16

Spring Term

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Thesis</td>
<td>6</td>
</tr>
<tr>
<td>In/OCE's</td>
<td>9</td>
</tr>
</tbody>
</table>

15

The M.F.A. Program

The Master of Fine Arts program requires four terms of full-time study, equal to a minimum of sixty credits. Transfer credit for graduate work done elsewhere or in the summer session is not acceptable. 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 is greater than one-to-one, allowing exceptional opportunity for individual mentoring. Graduate students are provided individual studios and have 24-hour access to specialized studios and labs. Graduate students in art may enroll in introductory or advanced courses in any field of study offered at the university: specialty courses in writing, stagecraft, cinema, and music are available as well as general education courses in the history of art, philosophy, anthropology, and so forth. 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, 613, 614). 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 thesis, offer a thesis exhibition of studio work completed during residency, and give an oral defense of the written 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, the department has developed several summer-only courses.

Guidelines for Independent Study

A student who wants to undertake Independent Study must be a junior in good standing. Fine Arts students must have completed two years of the curriculum, including all first- and second-year studios and four
Courses in Theory and Criticism

ART 111 *Introductory Art Seminar*  
Fall. 1 credit. S-U only. Limited to B.F.A. students. Students meet each week with a different member of the faculty. The varying artistic interests of the faculty are presented and discussed.

ART 112 *History of World Art*  
Fall. 3 credits. This fall-quarter course will survey world art from the Paleolithic era to the present. While primary emphasis will be placed upon the art and architecture of the western tradition, lectures on the visual arts outside that tradition will also be presented. The course will emphasize major monuments, important trends and developments, and critical approaches to the art of the past and present.

ART 113 *History of World Art*  
Spring. 3 credits. Continuation of Art 112.

ART 214 *Art and the Multicultural Experience*  
Fall. 3 credits. 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. They will question the nature of the visual arts as a discipline and survey art created by under-represented American minority cultural groups.

ART 310 *Pictorial Analysis*  
Fall or spring. 3 credits. A lecture course using historical illustrative material which is presented in a comparative, nonchronological order for the purpose of examining how each painting uses principles that are constant throughout art history. The foundations of these principles are studied separately as the elements of abstract order. These elements are to be demonstrated by original compositions that proceed sequentially from relatively simple arrangements to those of maturity.

ART 312 *Modern Art in Italy*  
Fall or spring. 3 credits. Rome Program only. This course is designed to introduce students to contemporary developments in Italian art and to major issues concerning the art world. Significant movements of the twentieth century, including Futurism, Metaphysical painting, and Magic Realism will be discussed, post-war painting and sculpture will be emphasized. Visits with artists in studios, galleries and museums will introduce students to the exchange between artists, dealers and critics. Fulfills 300-level Theory and Criticism requirement for Fine Arts majors.

ART 317 *History of Art in Rome: Early Christian to the Baroque Age*  
Fall. 4 credits. Rome Program only. General survey of the early Christian period to the fantastic vision of Parinisi in the eighteenth century. Special emphasis will be 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*  
Spring. 4 credits. Rome Program only. A direct knowledge of art in its historical context is the aim of this course. Open both to students interested in history and to those concentrating on the visual impact of art. Included are lectures and field trips.

ART 419 *Independent Study/Supervised Readings in Art*  
Fall, spring or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor. 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 be pursued under the supervision of a faculty member.

ART 611 *Professional Skills for the Visual Artist*  
Fall. 3 credits. Limited to MFA students. This seminar will help fine arts graduate students build professional skills that will assist them in their careers as practicing artists and in their work at art-related employment. Students will complete a resource notebook that should be useful to them in the years after they graduate. Topics will include: funding resources, exhibition opportunities, employment options, documentation of work, health, safety, and legal issues.

ART 612 *Recent Practice in the Visual Arts*  
Spring. 3 credits. Limited to MFA students. This seminar is designed to provide graduate students with an overview of recent visual artwork. Students will study work from a wide range of artists who have received significant recognition within the visual arts community. Reviews of major exhibitions such as Documenta, La Biennale di Venezia, and the Whitney Biennial will be discussed. Students will be encouraged to travel to nearby cities to look at contemporary work.

ART 613 *On-Line Publication for the Visual Artist*  
Fall. 3 credits. Limited to MFA students. This course is designed to introduce graduate students to the basic principles of electronic imaging. As a major project, each student will interview a contemporary visual artist. These interviews will be illustrated with digital images of each artist’s work and combined in an on-line magazine. Additionally each student will learn to create a home page on the World Wide Web.

ART 614 *Contemporary Theory in the Visual Arts*  
Spring. 3 credits. Limited to MFA students. This seminar explores selected writings on the current issues represented within the visual arts. It is designed to introduce graduate students to several approaches to critical inquiry and analysis of contemporary visual practice. Topics will vary but may include related criticism in areas such as visual culture, semiotics, identity politics, and institutional frames.

### Studio Courses in Painting

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 121 <em>Introductory Painting</em></td>
<td>Fall, spring, or summer. 3 credits. An introduction to the problems of artistic expression through the study of the pictorial composition; proportion, space, shapes, and color as applied to abstract and representational design.</td>
<td>Art 121 or permission of instructor.</td>
<td>3</td>
<td>$40</td>
</tr>
<tr>
<td>ART 321 <em>Painting III</em></td>
<td>Fall or spring. 4 credits. Prerequisite: Art 321 or permission of instructor.</td>
<td>Continued study of the principles of painting and the selection and expressive use of materials and media. Group discussions and individual criticism.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ART 422 <em>Painting IV</em></td>
<td>Fall or spring. 4 credits. Prerequisite: Art 321 or permission of instructor.</td>
<td>Continued study of the principles of painting and the selection and expressive use of materials and media. Group discussions and individual criticism.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ART 421 <em>Pre-Thesis in Painting</em></td>
<td>Fall or spring. 6 credits. Prerequisite: Art 323. Further study of the art of painting through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.</td>
<td></td>
<td>6</td>
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<tr>
<td>ART 422 <em>Thesis in Painting</em></td>
<td>Fall or spring. 6 credits. Prerequisite: Art 421. Advanced painting project to demonstrate creative ability and technical proficiency.</td>
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<tr>
<td>ART 429 <em>Independent Studio in Painting</em></td>
<td>Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.</td>
<td>Independent studio in painting allows students the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects</td>
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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. 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:

- **Art**: 131, 132, 133: $55
- **Intaglio**: 231, 431.1, 432.2, 439.1: $65
- **Lithography**: 233, 431.2, 432.2, 439.2: $85
- **Screenprinting**: 232, 431.3, 432.3, 439.3: $45

**ART 131 Introductory Intaglio**

Fall and spring. 3 credits.

A basic introduction to etching techniques, with emphasis on engraving, lift ground, relief printing, monotypes, and experimental techniques.

**ART 132 Introductory Graphics**

Fall and spring. 3 credits.

An introduction to the two-dimensional thought process and the language of vision. Students will explore design projects and the use of graphic materials, including collage, pochir, and screen printing.

**ART 133 Introductory Lithography**

Fall and spring. 3 credits.

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.

A studio course in advanced etching techniques. Further study of printmaking. Students will explore design projects and the use of graphic materials, including collage, pochir, and screen printing.

**ART 232 Advanced Screen Printing**

Fall. 4 credits. Prerequisite: Art 132.

An exploration of the screen printing process as it applies to the Fine Arts. Students will develop skills in multicolor printing using transparent inks and additives. Stencils will be made by the handcut and the photo process.

**ART 233 Lithography II**

Spring. 4 credits. Prerequisite: Art 133.

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.

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.

Continuation and expansion of Art 331.

**ART 431 Pre-Thesis in Printmaking**

Fall or spring. 6 credits. Prerequisites: 341 or 342.

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.

Advanced printmaking project to demonstrate creative ability and technical proficiency.

**ART 439 Independent Studio in Printmaking**

Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor. Independent studio in printmaking 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. 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.

A series of studio problems introduce the student to the basic considerations of artistic expression through three-dimensional design, i.e., modeling in Plastiline, building directly in plaster, casting in plaster, and constructing in wood and metal.

**ART 241 Sculpture II**

Fall or spring. 4 credits. Prerequisites: Art 141, or an Arch design studio, or permission of instructor.

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 the bronze casting process. 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.

Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

**ART 342 Sculpture IV**

Fall or spring. 4 credits. Prerequisite: Art 341 or permission of instructor.

Continuation and expansion of Art 341.

**ART 343 Sculpture V**

Fall or spring. 4 credits. Prerequisite: Art 342 or permission of instructor.

Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

**ART 441 Pre-Thesis in Sculpture**

Fall or spring. 6 credits. Prerequisite: Art 343.

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

**ART 442 Thesis in Sculpture**

Fall or spring. 6 credits. Prerequisite: Art 441.

Advanced sculpture project to demonstrate creative ability and technical proficiency.

**ART 449 Independent Studio in Sculpture**

Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor. Independent studio in sculpture 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. 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: $80.00
- Fee for color courses: $160.00
- Fee for an additional B & W course taken the same term: $25.00
- Fee for an additional color course taken the same term: $105.00

**ART 161 Photography I (also Architecture 251)**

Fall, spring, or summer. 3 credits. Prerequisite: Art 31 or permission of instructor. A basic lecture-studio course in black and white photography for beginners. Emphasis is on basic camera skills, darkroom techniques, and understanding of photography imagery.

**ART 168 Black-and-White Photography**

Summer. 3 credits. Three-week session only.

Intended for students at all levels, from introductory to advanced. Emphasis on camera skills, darkroom techniques, and the content of black-and-white photographic imagery.
ART 169 Color Photography
Summer. 3 credits. Three-week session only. Intended for students at all levels, from introductory to advanced. Emphasis on camera skills, darkroom techniques, and the content of color photographic imagery.

ART 261 Photography II (also Architecture 351)
Fall, spring, or summer. 4 credits. Prerequisites: Art 161 or Architecture 251, or permission of instructor. 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 Architecture 251, or permission of instructor. A studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photographic imagery.

ART 264 Photo Processes
Fall, spring, or summer. 4 credits. Prerequisite: Art 161 or Architecture 251, or permission of instructor. A studio course in alternative and nonsilver 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 Architecture 251, or permission of instructor. A course in the use of medium- and large-format cameras that explores technique, highlights the utility of large-format cameras for personal expression both in the studio and outdoors.

ART 481 Pre-Thesis in Photography
Fall or spring. 6 credits. Prerequisite: Art 261, 263. A studio course intended for photography majors and other qualified students.

ART 482 Thesis in Photography
Fall or spring. 6 credits. Prerequisite: Art 481. A studio course intended for photography majors and other qualified students. Advanced photography project to demonstrate creative ability and technical proficiency.

ART 489 Independent Studio in Photography
Fall, spring or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor. Independent studio in photography allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

ART 761-762, 861-862 Graduate Photography
761 Fall, 762 Spring, first-year M.F.A. students. 9 credits. 861 Fall, 862 Spring, second-year M.F.A. students. 9 credits. 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

 Fees for drawing courses:
151, 152, 251, 252, 459: $25

ART 151 Drawing I
Fall, spring, or summer. 3 credits. A course that is general in nature and introduces students to principles and techniques of representation. Emphasis will be on creating the illusion of space and form through line, the rendering of light and shade, and studies in perspective. In addition, the student will have the opportunity to explore various media such as charcoal, chalk, pencil, pen, ink and wash, etc.

ART 152 Drawing II
Spring. 3 credits. Prerequisite: Art 151. A general course in drawing that will emphasize figure study and life drawing. This course will build on the foundation of Art 151 concentrating on the analytical study of the figure. Students will explore a variety of materials, traditional and contemporary.

ART 156 Conceptual Drawing
Summer. 3 credits. Emphasis on drawing from the imagination. The generation of ideas and their development in sketches is stressed. The intent is not to produce finished art but rather to experience a series of problems that require image and design concepts different from those of the artist working directly from nature.

ART 159 Life and Still-Life Drawing
Summer. 3 credits. The human figure and still life are studied both as isolated phenomena and in relation to their environment. Focuses on helping the student observe and discover.

ART 251 Drawing III
Fall. 3 credits. Prerequisites: Art 152. An intermediate drawing course in which students will study composition, the articulation of form, and the illusion of space in a variety of materials. Expressive content, conceptualization, and the exploration of materials will be stressed.

ART 252 Drawing IV
Spring. 3 credits. Prerequisites: Art 251. Advanced drawing with an emphasis on life drawing and figure composition. Individual expression will be encouraged along with creative investigation of materials and processes.

ART 459 Independent Studio in Drawing
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor. Independent studio in drawing allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.

Special Studio Courses

Course fees:
171, 271, 272, 479: $105
481, 482, 489: $70

ART 171 Electronic Imaging in Art
Fall or spring. 3 credits. An introductory studio course using the computer as a tool for making art. Students will explore various approaches to 2-D image creation using software programs for still image generation and processing.

ART 271 Electronic 3-D Modeling and Animation
Fall or spring. 4 credits. Prerequisite: Art 171. A studio course in creating 3-D still and animated visualizations using computers and 3-D software for storyboarding, object modeling, animation, and rendering.

ART 272 Digital Video and Sound
Fall or spring. 4 credits. Prerequisite: Art 171. A studio course that introduces students to digital video including capture stills, animation, video, and sound with an introduction to interactive presentation and CD-ROM production.

ART 372 Special Topics in Art Studio
Fall, spring, or summer. Variable credit. An exploration of a particular theme or project.

ART 379 Independent Studio in Rome for Non-Majors
Fall and spring. 4 credits variable. Prerequisite: student must be a junior in good standing, and have the written permission of the instructor. Rome Program only. Independent studio in Rome 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 400 Rome Studio
Fall or spring. 4 credits. Prerequisite: permission of instructor. Fee: $25. Rome Program only. The content for the Rome studio will be determined by the instructor. Emphasis will be divided between work accomplished in the studio and work executed outdoors in the environs of Rome. Media will consist primarily of painting, drawing, sculpture, and photography, or those assigned by the instructor. Art 400 fulfills four credits of the concentration requirement.

ART 479 Independent Studio in Electronic Imaging
Fall, spring or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor. Independent studio in electronic imaging allows the student the opportunity to pursue special interests not treated in regularly scheduled courses. The student plans study and projects under the supervision of a faculty member selected to guide their progress and evaluate their results.
ART 481 Pre-Thesis in Combined Media
Fall or spring. 6 credits. Prerequisite: written permission of instructor on a combined media thesis form must be received in the art department, prior to enrollment in this course.
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will work.
The projects should reflect experiences gained by exploring and combining various media including those taken in studio courses outside the department. Students select a faculty member from the area of concentration most appropriate to their area of combined media.

ART 482 Thesis in Combined Media
Fall or spring. 6 credits. Prerequisite: 481 and written permission of instructor on a combined media thesis form must be received in the art department, prior to enrollment in this course.
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will work.
The projects should reflect experiences gained by exploring and combining various media including those taken in studio courses outside the department. Students select a faculty member from the area of concentration most appropriate to their area of combined media.

ART 489 Independent Studio in Combined Media
Fall, spring, or summer. 4 credits variable. Prerequisite: student must be a junior in good standing and have the written permission of the instructor.
Independent studio in combined media 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. The university requires students to complete two semesters of physical education.

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 applied to distribution requirements are not acceptable.

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
   - CRP 320: Introduction to Statistical Reasoning for Urban and Regional Analysis (statistics course)
   - Micro Economics course (at least 3 credits, from approved list)
   - Architecture course (at least 3 credits, from approved list)
   - Approved List of Micro Economics and Architecture Courses
   - Micro Economics:
     - CE&H 110: Introductory Micro Economics
   - CE&H 210: Intermediate Micro Economics
   - ECON 101: Introduction to Micro Economics
   - ECON 203: Micro Economics
   - ECON 313: Intermediate Micro Economics

Architecture:
   - ARCH 131: An Introduction to Architecture I
   - ARCH 132: An Introduction to Architecture II
   - ARCH 181: History of Architecture I
   - ARCH 182: History of Architecture II

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
     - Design
       - CRP 415: Gender Issues in Planning and Architecture
     - Economics
       - CRP 400: Introduction to Urban and Regional Theory
       - CRP 401: Seminar in Urban Political Economy
       - CRP 404: Urban Economics
     - CRP 417: Industrial Restructuring: Implications for State and Local Policy

NOTE: This requirement may not be satisfied with the same course taken to complete the micro-economics course requirement under B.
   - c. Environment
     - CRP 380: Environmental Politics
     - CRP 451: Environmental Law
   - d. History
     - CRP 261: Urban Archaeology
     - CRP 360: Pre-Industrial Cities and Towns of North America
     - CRP 361: Seminar in American Urban History
     - CRP 461: Methods of Archival Research
     - CRP 462: The American Planning Tradition
   - e. Politics/Policy
     - CRP 314: Planning, Power, and Decision Making
     - CRP 315: The Progressive City
     - CRP 363: American Indians, Planners, and Public Policy
     - CRP 413: Planning and Political Economy I
     - CRP 448: Social Policy and Social Welfare
Ordinarily the professional M.R.P. degree requires two years of work beyond that for the bachelor's degree. Under this option, a minimum of 30 credits and a master's thesis or project requirement is made for a M.R.P. degree. Interested students apply to the Graduate School, usually in the senior year.

Dual degree option. A student accepted in the Cornell College of Arts and Sciences can earn both a B.A. in a College of Arts and Sciences major and a B.S. in urban and regional studies in a total of five years. Special requirements have been established for this dual degree program. Cornell students interested in pursuing the dual degree program should contact either the director of the Urban and Regional Studies Program or the appropriate dean of the College of Arts and Sciences for further information.

Admissions Requirements and Procedures
Among the most important criteria for admission to the Urban and Regional Studies Program are intellectual potential and commitment—a combination of ability, achievement, motivation, diligence, and use of educational opportunities. Nonacademic qualifications are also 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 attending high school and should have completed no fewer than 12 credits of college or university work at the time of application. High school students who have completed graduation requirements at midyear and are taking college courses for the rest of the academic year should apply as freshmen. Prospective candidates who believe that their circumstances are exceptional should consult with the Director of Admissions in the Cornell division of interest to them before applying for admission.

For transfer application and financial aid, forms are available from the Cornell University Office of Admissions, 410 Thurston Avenue, Ithaca, New York 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 of college-level coursework in English. In addition, students should have taken basic college-level courses distributed across the natural and social sciences, humanities, and mathematics. Applicants whose previous coursework closely parallels the "General Education" requirements of the Urban and Regional Studies curriculum will have relative ease in transfer. 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 John Forester, Program Director, Urban and Regional Studies, Cornell University, 106 West Sibley Hall, Ithaca, New York 14853-6701 (telephone: 607-255-4613).

The Graduate Program in City and Regional Planning

The major concentrations of course work in city and regional planning are in the following areas:

Built environment and urban development planning is concerned with physical facilities: the social, economic, and environmental forces that affect their design; and the process of development, plan making and administration.

History and historic preservation planning is a special program of study preparing students for work in history, analysis, and preservation of buildings, urban environments, and neighborhoods, including downtown business areas.

Regional planning and regional science are concerned with socioeconomic issues and functional planning at the regional level, the forces that generate economic growth and social development, and the ways in which resources can best be used.

Local and regional economic development is concerned with understanding and influencing how economic change may be harnessed to the benefit of communities, countering plant closings and more general regional decline and stimulating more equitable programs of socioeconomic change and development.

International planning offers a broad range of courses in international economic development, development planning, and political economy.

Quantitative methods and policy analysis courses are offered to prepare planners and researchers for a variety of situations and problems.

Complementing these concentrations, planning theory and political economy courses examine the organizational and planning processes and the political and economic conditions in which planning and international development operate.

Several graduate degrees are offered: the Ph.D.; the Master of Regional Planning (M.R.P.), for a two-year program; the Master of Arts (M.A.) in historic preservation planning, for a two-year program; and, in special cases, the Master of Professional Studies (International Development) (M.P.S.I.D.), for the twelve-month international planning program.

Off-Campus Opportunities

Rome Program. Graduate students have the opportunity to spend one or two semesters in Rome, studying at Cornell's center at the Palazzo Massimo. Instruction is given by Cornell professors-in-residence and by other faculty. The program is structured to include work assignments in one of the international development organizations headquartered in Rome.

Course Information

Most courses in the Department of City and Regional Planning are open to students in any college of the university who have fulfilled the prerequisites and have the permission of the instructor.
This seminar examines various bases of world. Their origins, roles, and shortcomings are examined. The urban economy. focus on urban problems and opportunities facing the world political economy is evaluated. Policy prescriptions for their principal problems are discussed.

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.
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 161 Urban Archaeology
For description, see LA 261.

CRP 254 Planning, Power, and Decision Making
Fall. 3 credits.
This seminar examines various bases of political and professional power. We ask, What do professionals who want to serve the public need to know about power and decision-making processes in the institutional settings, which they operate? How and why can professionals make a difference when facing problems characterized by great complexity and severe inequalities among affected groups?

CRP 360 Pre-Industrial Cities and Towns of North America (also LA 360)
Fall. 3 credits. S-U grades optional. For description, see LA 360.

CRP 361 Seminar in Urban History (also CRP 362)
Fall or spring. 3 credits. Prerequisite: permission of instructor. Seminar in the historical evolution of the American city. Emphasis on factors in urban growth, process of urbanization, urban reform movements, and intellectual and social responses to the city.

CRP 363 American Indians, Planners, and Public Policy (also CRP 547, LA 363, and LA 547)
Spring. 3 credits.
For description, see LA 363.

CRP 370 The Regional Question: The Case of Italy
Fall. 3 credits. Rome Program only. Economists, sociologists, and planners have written extensively about severe regional inequalities and regional development planning in Italy. This literature offers a route to understanding why some regions remain less developed than others. We will look at the case of "the third Italy," which includes several highly successful manufacturing regions in the north, and at southern Italy, which is underdeveloped. Introduced by a series of lectures, the course will include field trips to Naples and to the industrial districts of the North.

CRP 380 Environmental Politics
Spring. 4 credits.
Examines the politics of public decisions affecting the environment. Focuses on the role 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 400 Introduction to Urban and Regional Theory
Fall. 4 credits. Open to juniors and seniors.
Introductory review of theories dealing with the spatial distribution of population and economic activity, drawn from various social science disciplines such as geography, economics, and sociology. Review of recent research dealing with such topics as population distribution, migration, location of industry and economic activity, and the spatial organization of urban and regional social systems.

CRP 401 Seminar in Urban Political Economy
Spring. 4 credits. Prerequisites: introductory economics or sociology, for BRS students, CRP 400 also.
The world economy, the global city, and social change. Population, technology, and work in industrial and developing countries. Race, ethnicity, and nationality. Profits, subsistence, and poverty. Students may read and direct discussions on outstanding texts, write book reviews, and prepare brief reports.

CRP 404 Urban Economics (also CRP 604)
Fall or spring. 4 credits. Prerequisite: basic economics. Not offered 1997–98. 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 will be spent in discussing problems of cities in developing countries.

CRP 408 Introduction to Urban Geographic Information Systems (GIS) (also CRP 608)
Spring. 4 credits. Letter grade. Geographic Information Systems (GIS) have revolutionized the way we manage, analyze, and present spatial information. This course will focus on GIS in the social sciences. Many of the exercises and examples will be 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 to be 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 417 Industrial Restructuring: Implications for State and Local Policy (also CRP 517)
Fall. 4 credits. A basic introduction to new issues arising from the way in which international economic shifts are affecting diverse United States localities. The course will focus on intra-industry restructuring, the location of economic activities, and state and local economic policy. Cases will be drawn from a variety of industries and national situations, with specific application to New York and other Northeast locations.

CRP 421 Introduction to Computers in Planning (also CRP 522)
Fall. 4 credits. Not offered 1997–98. Students learn how to use microcomputers and software packages in the planning and problem-solving processes. Included are word processing, spreadsheets, mapping, and other types of packages that are useful for other classes and for professional work in the field. (WordPerfect, Lotus 1-2-3, dBase and MapGIS are examples of packages that have been taught in previous years.)

CRP 442 The Sociology of Science
For description, see S&T 442.

CRP 448 Social Policy and Social Welfare (also CRP 548)
Spring. 4 credits.
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 will introduce principles that guide the development of social policy including fairness and justice. Various conceptions of society will be examined with reference to their influence on the extent and nature of social welfare provision, comparing the U.S. and other industrialized countries. The second part of the course will examine the relationship between economic change and social policy in the United States. A series of current social policy controversies (such as AIDS, homelessness, abortion, and workfare) will illustrate how values and assumptions about state, economy, and society affect the forms of social welfare provisions and how they are administered.
A lecture course that introduces the spatial aspects from those for undergraduates.

CRP 453 Environmental Aspects of International Planning (also CRP 683) Fall. 3 credits.
This seminar will examine the roles of diverse environmental actors-international organizations, national bureaucracies, scientific communities, NGOs, and social movement organizations in shaping environmental debates and designing conservation and remediation policies in the Third World. Open to advanced undergraduate and graduate students in planning, environmental studies, and related social and natural sciences.

CRP 457 Community Service Fieldwork Fall or spring. 4 credits variable. Permission is granted by instructor. Undergraduates work under the direction of a faculty member in the CRP department on a project that assists a public or nonprofit organization. Projects will involve urban and regional issues as defined by a "client" and agreed upon by the faculty member.

CRP 461 Methods of Archival Research Fall. 3 credits.
Examination of methods of using archival materials, including documents in the Cornell archives and regional history collection, for research in the history of architecture, historic preservation, and history of urban development.

CRP 477 Issues in African Development (also CRP 677) Fall and spring. 1 credit. S-U only. This course examines a broad range of critical concerns in contemporary Africa including food production, human resource development, migration, urbanization, environmental resource management, economic growth, and policy guidance. The weekly presentations are made by invited specialists. Students are required to write a term paper.

CRP 481 Principles of Spatial Design and Aesthetics (also CRP 681 and Landscape Architecture 480) Fall. 3 credits. Course enrollment is restricted to planning and landscape architecture students unless special permission is granted by instructor. A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetics principles and theories of design are investigated for different types of urban spaces illustrated by a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.

CRP 490 Student-Faculty Research Fall or spring. 1-6 credits. Limited to undergraduate students in Urban and Regional Studies Program. S-U grades only. Research, reading, and/or writing project in which a student and faculty member choose a topic related to urban and regional studies.

CRP 492 Honors Thesis Research Fall or spring. 4 credits. Limited to Urban and Regional Studies Program majors who have been selected as honor students by the department faculty. Each selected student works with his or her thesis adviser.

CRP 493 Honors Thesis Writing Fall or spring. 4 credits. Prerequisite: Completion of CRP 492. Each selected student works with his or her thesis adviser.

CRP 495 Special Topics Fall, spring, summer. 4 credits. Hours to be arranged.

[CRP 495.27 Cuban Transitions: The Search for Development Alternatives Fall. 3 credits. Open to sophomores, juniors, seniors. No prerequisites. Not offered 1997-98] Cuba is a symbol, it is also a society. This course looks beyond the symbol to Cuban society, environment, and political economy within a Caribbean context. Cuba’s relations with other nations and their impacts on Cuban development will be emphasized. The 1959 Revolution was a defining moment in Cuban history and a central element in Cuban culture. Students will learn about the experiences that shaped the revolution, altered its course in the 1970s and 1980s, and led to profound experimentation and a renewed search for authenticity in the 1990s.

CRP 497 Supervised Readings Fall or spring. Variable 4 credits. Limited to upperclass students. Prerequisite: permission of instructor.

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.

CRP 500 Introductory Workshop Fall. 2 credits. First-year MRP students. A short, intensive workshop course designed to engage entering MRP students and selected faculty in a simulated real world planning problem. Group problem solving, oral and written report presentation, and graphics.

CRP 508 Real Estate Marketing and Management Spring. 3 credits. 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 city and regional planning, and the perspective of the public and nonprofit sectors is the perspective 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 will also cover the economic theory necessary to understand the many applications of economics presented in subsequent courses in city and regional planning.

CRP 513 Planning Practice and Urban Structure Seminar Fall. 4 credits. This introductory graduate seminar has several objectives. It exposes students to the theory and history of (1) planning, administration, and related public intervention in urban affairs, (2) the growth and development of cities, and (3) the built environment. Topics are analyzed from the perspective of political economy. Students improve their understanding of the planning process and of the urban application of the social sciences, get practice in writing short papers, and explore one research topic in depth.

CRP 517 Industrial Restructuring: Implications for Planning and Local Policy (also CRP 617) Fall. 4 credits. For description, see CRP 417.

CRP 520 Statistical and Mathematical Concepts for Planning Fall. 3 or 4 credits. An introduction to statistical and mathematical concepts and methods of importance in planning and policy analysis. Topics will include matrix algebra, probability, sampling, estimation, and regression as well as the use of a microcomputer statistical package.

CRP 521 Mathematical Foundation for Planning Analysis Fall or spring. 4 credits. Limited to undergraduate students in the Urban and Regional Studies Program majors who may enroll in courses numbered 500 and above. Prerequisite: permission of the instructor.

CRP 522 Introduction to Computers in Planning Fall or spring. 4 credits. Examination of various forms of development as well as the role of major participants in the processes. Review issues in residential, retail, industrial, office, and low-income housing projects. Some guest speakers and case studies.

CRP 532 Real Estate Development Process Fall. 3 credits. 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.

CRP 541 The Politics of Technical Decisions I (also Government 628 and Science and Technology Studies 415)  
Spring. 4 credits. For description, see S&T 415.

CRP 545 Introduction to Public Policy Analysis and Management  
For description, see CRP 321.

CRP 546 Conflict Resolution in Community and Environment  
Fall. 3 credits.  
This course will explore the theories and techniques of conflict resolution as they apply to community, environmental, and related public policy disputes. Analysis will complement 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, LA 363, and LA 547)  
Spring. 3 credits. For description, see LA 363.

CRP 548 Social Policy and Social Welfare (also CRP 448)  
Spring. 4 credits. For description, see CRP 448.

CRP 549 Ethics and Practical Judgment in Planning  
Spring. 4 credits variable.  
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 451)  
Fall. 4 credits. For description, see CRP 451.

CRP 552 Urban Land-Use Planning I  
Fall. 3 credits.  
Surveys, analyses, and plan-making techniques for guiding physical development of urban areas, location requirements, space needs, and interrelations of land uses. Emphasis on residential, commercial, and industrial activities and community facilities; housing and neighborhood conditions. Lectures, seminars, and field exercises.

CRP 553 Urban Land-Use Planning II  
Spring. 3 credits. Prerequisite: CRP 552 or permission of instructor.  
In-depth consideration of special issues in urban land-use planning, such as industrial districts, large-scale integrated development, Planned Unit Development, public and institutional facilities, open space, land banking, central business districts, neighborhoods, energy impacts, transportation impacts, and others.

CRP 555 Urban Systems Studio (also Landscape Architecture 701)  
Fall. 5 credits. Prerequisite: permission of instructor. 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 will be introduced as tools for urban design. This is a specially arranged collaborative studio with the Landscape Architecture Program.

CRP 557 City Planning Design Studio  
Spring. 4 credits. Prerequisite: previous design course or permission of instructor. A series of individual and team small area design projects at district, neighborhood, and project scale. The course objective is to develop an understanding of the spatial issues, knowledge, and skills needed to design for the functional, aesthetic, social, and cost needs of urban communities. Studio projects, field trips, and reading.

CRP 558 City and Regional Planning Workshop  
Fall and spring. 4 credits. S-U only.  
Students work on 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 560 Documentation for Preservation (also Architecture 586)  
Fall or spring. 3 credits.  
Methods of identifying, recording, collecting, processing, and analyzing information dealing with historic and architecturally significant structures, sites, and objects.

CRP 561 Historic Preservation Planning Workshop: Surveys and Analyses (also Architecture 588)  
Fall or spring. 4 credits.  
Techniques for the preparation of surveys of historic structures and districts, identification of American architectural styles, focusing on upstate New York; and explorations of local historical resources, funding sources, and organizational structures. Lectures and training sessions. Emphasis on fieldwork with individuals and community organizations.

CRP 562 Perspectives on Preservation (also Architecture 585)  
Fall. 3 credits.  
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 Architecture 584)  
Spring. Variable credit.  
A review and critique of ongoing preservation projects and an appreciation of areas of expertise currently being developed. Presented by staff and guest lecturers.

CRP 564 Building Materials Conservation (also Architecture 587)  
Spring. 3 credits. Open to juniors, seniors, and graduate students. 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. Work on applied problems in history and preservation planning in a field or laboratory setting or both.

CRP 567 Measured Drawing (also Architecture 583)  
Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor. 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 on Preservation Planning and Landscape (also LA 569)  
Fall. 3 credits. Offered alternate years. Not offered 1997–98. For description, see LA 569.

CRP 581 Principles of Spatial Design and Aesthetics (also Landscape Architecture 480)  
For description, see CRP 481.

CRP 604 Urban Economics  
Not offered 1997–98. For description, see CRP 404.

CRP 605 Urban Public Finance  
Fall. 4 credits. Letter grade. Prerequisite: prior exposure to microeconomics. An overview of neoclassical public economics theory, particularly those aspects of the theory that are central to urban public finance. Part two, the unusual three-tiered fiscal system of the United States is described along with the evolving fiscal and economic role of large municipal governments. Part three of the course presents the public finance theory of taxation. Major taxes and other revenue sources utilized by large municipalities are described and analyzed. Part four is the heart of the matter, namely the measurement and analysis of the fiscal condition of cities.

CRP 606 Introduction to Urban Geographic Information Systems (GIS) (also CRP 408)  
Spring. 4 credits. Letter grade. For description, see CRP 406.

CRP 614 Gender and International Development (also Women's Studies 614)  
Spring. 3 credits. Not offered 1997–98. This course has four main objectives. First, to provide an analysis of the location of women in processes of development and to understand the centrality of gender in each case. Second, 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. Third, to reflect upon the linkages between the global economy and the gendered macro and micro processes of development. Fourth to provide a basis for research, practical action, and policy formulation and for evaluating directions and strategies for social change.
The course focuses on what the market can or cannot accomplish in terms of guiding interactions. This includes the analysis of processes through which the current neoliberal model is being built, such as trade liberalization, labor market flexibilization, the erosion of nation states as economic units, and the formation of trade blocs and global institutions.

CRP 620 Planning Analysis
Spring. 4 credits.
A survey of commonly used techniques for analyzing various aspects of subnational socioeconomic systems. Emphasizes planning applications.

CRP 631 Local Economic Policy—Field Workshop
Fall. 4 credits.
A group policy analysis exercise in an upstate New York city. Students do a combination of data analysis, interviews with labor, business, and public leaders; and problem papers addressed to current issues presented by a client group. Individual work is synthesized into a comprehensive report at the end of the semester.

CRP 635 Workshop: State Economic Development Strategies
Spring. 4 credits. S-U grades optional.
The purpose of this course/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 will consist of lecture and discussion meetings. The workshop sessions will 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 639.05 Special Topic: Regional Development, Planning, and the Market, with Emphasis on the Third World-I: Historical and Theoretical Perspective
Fall. 4 credits variable.
Historical and conceptual background, and relevant case material, for dealing with urban and regional development using production analysis with a focus on the Third World. Consequences of the organization of production for urban-rural and regional interactions will be emphasized. This historically oriented theoretical framework will be compared to location, central place, and interregional feedback theories.

CRP 639.06 Special Topic: Regional Development, Planning, and the Market, with Emphasis on the Third World-II: Current Policy Perspective
Spring. 4 credits variable.
The course focuses on what the market can or cannot accomplish in terms of guiding economic industrial, and regional development. Points of view represented range from completely unrestricted market operations to proactive industrial development policies in market contexts. Lessons are drawn for Third World regional development policy drawn from the experience.

CRP 642 Critical Theory and the Micro-politics of Practice
Spring. 4 credits variable.
Trying to "solve problems," planners and policy analysts set agendas, shape participation, negotiate relations of power. This seminar explores theories illuminating the communicative micro-politics of their daily practice. We explore issues of power and discourse, practical judgment and deliberation, productive and reproductive aspects of ordinary speech and action.

CRP 653 Legal Aspects of Land-Use Planning
Spring. 3 credits. Not offered 1997–98
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. Required for MPS in Real Estate. Limited to 20 students. Field trip: $250. Prerequisites: MPS in Real Estate core courses. J. deRoos and M. Schack.
The Real Estate Project Workshop integrates the required elements of the Master of Real Estate Program into a unified whole. The course will focus on the preparation of a development plan for a specific parcel in an urban setting. Working in teams, students will examine project feasibility, project marketing, physical planning and design, the legal and social fabric of the community, and the place of the development in the urban fabric. Professional-quality reports are expected for oral and written presentation.

CRP 657 Real Estate Law
Fall. 3 credits. Letter grade.
Examination of major legal concepts pertaining to acquisition, use, management, and transfer of real estate. Particular focus on important legal considerations pertaining to property rights, contracts, and public controls on the use of land. Consideration of important case law, statutory law, and rules and regulations. Discussion of current legal issues affecting real estate industry.

CRP 661 Historic Preservation Planning Workshop: Plans and Programs
Fall or spring. 1–4 credits. Prerequisite: CRP 561
Preparation of elements of historic preservation plans, designs, legislation, and special studies. Individual or group projects are selected by students. Fieldwork is emphasized.

CRP 662 Seminar in American Urban History (also CRP 361)
Spring. 3 credits. Prerequisite: permission of instructor.
For description, see CRP 361.

CRP 663 Historic Preservation Law
Spring. 3 credits. Offered alternate years. 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
Fall. 3 credits.
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.
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)
Spring. 3 credits. S-U grades optional.
For description, see LA 666.

CRP 670 Regional Planning and Development In Developing Nations
Fall or spring. 4 credits. Prerequisite: second-year graduate standing.
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.
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 675 Seminar in Project Planning in Developing Countries
Spring. 4 credits.
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 seminar-workshop providing both an analysis of the critical elements of effective proposals and an opportunity to use these elements in the preparation of proposals. A multidisciplinary perspective is emphasized.

CRP 677 Issues in African Development (also CRP 477)
Fall or spring. 1 credit. S-U grades only.
For description, see CRP 477.

CRP 683 Environmental Aspects of International Planning (also CRP 483)
Fall. 3 credits.
For description, see CRP 483.

CRP 703 Contemporary Theories of Regional Development
Fall or spring. 4 credits.
An advanced seminar, mainly for doctoral candidates, to review recent contributions to the literature. After a fast-paced review of...
basic material in political economy, students will read and present summaries of works by major contemporary theorists. A final paper is required.

CRP 711 Planning and Organization Theory
Fall or spring. 4 credits.
Advanced seminar on theoretical models of planning, organization, and urban structure. The first part of the course, which may be taken separately for one credit, provides an overview of administrative issues affecting planning. Next, attention is given to theories of organizational structure, growth, and change. Final sessions are devoted to the influence of urban and regional structures as context. Critical reading, short papers, and seminar discussion characterize the course.

CRP 720 Quantitative Techniques for Policy Analysis and Program Management
Spring. 4 credits.
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 730 Methods of Regional Science and Planning I
Fall or spring. 4 credits variable.
An introduction to some of the major methods and models used in regional science and planning. This course is half of a two-semester sequence (see CRP 731). Either course may be taken first. Both courses will cover topics related to the structure and assumptions of the models, model development, and their applications in regional science and planning. Where appropriate, computer implementation will be considered. The spring semester emphasizes statistical and econometric models.

CRP 731 Methods of Regional Science and Planning II
Fall or spring. 4 credits.
See CRP 730. The fall semester will provide an introduction to deterministic methods and models such as input/output models, social accounting models, and optimization models.

CRP 732 Methods of Regional Science and Planning III
Fall or spring. 3 credits. Prerequisites: CRP 730 and CRP 731 or permission of the instructor.
An introduction to the design and implementation of Social Accounting Matrix and Computable General Equilibrium models and their uses, primarily in a regional context, for planning and policy analysis. The use of econometric models and CGE models will be discussed. The GAMS software package will be used in related computer exercises.

CRP 790 Professional Planning Colloquium I
Fall. 1 credit.
Visiting lecturers treat problems and opportunities in the practice of planning. Topics 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.

CRP 792 Master's Thesis, Project, or Research Paper
Fall or spring. 10 credits variable. S-U grades optional.

CRP 794 Planning Internships
Fall, spring, or summer. 1–12 credits.
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. Salared 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.

CRP 796 Colloquium Journal Publication Workshop
Fall or spring. 2 credits. S-U grades only. Individual and group projects culminating in the production of a professional journal.

CRP 797 Supervised Readings
Fall or spring. 4 variable credits. Limited to graduate students. Prerequisites: permission of instructor.

CRP 798 Colloquium in Regional Science, Planning, and Policy Analysis
Fall or spring. 1 credit.
Presentation and discussion of current research by faculty, visitors, and graduate students working on their dissertations. Typically, the colloquium will meet once a week during the semester.

CRP 800 Advanced Seminar in Urban and Regional Theory I
Fall. 3 credits. Prerequisite: CRP 500. The theory of urban spatial organization. Economic, technological, and social factors leading to urbanization and various kinds of spatial organizations are explored. Major theoretical contributions to the understanding of intraregional and intratropical distribution of population and economic activity are reviewed.

CRP 801 Advanced Seminar in Urban and Regional Theory II
Spring. 3 credits. Prerequisite: CRP 800. A continuation of City and Regional Planning 800, concentrating on recent developments.

CRP 810 Advanced Planning Theory
Fall. 3 credits. Prerequisite: CRP 500 or 710.
A survey of the works of scholars who have contributed to current thinking about planning theory. Alternative assumptions concerning models of man and theoretical concepts concerning the nature of planning today are considered.

CRP 830 Seminar in Regional Sciences, Planning, and Policy Analysis
Fall or spring. Variable–4 credits. S-U grades only.
This seminar will provide an opportunity to review some of the literature and current research in regional science, planning, and policy analysis. Specific topics covered will vary each year. Empirical and analytical research will be emphasized. Students will be 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.
Intended for doctoral candidates in city and regional planning; other students welcome. Presentation and discussion of current problem areas and research by advanced graduate students, faculty members, and visitors.

CRP 892 Doctoral Dissertation
Fall or spring. 1–2 credits.

Special Topic Courses
Fall or spring. Variable credit.
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 779 Landscape Architecture
Landscape Architecture at Cornell is jointly sponsored by the College of Agriculture and Life Sciences (in association with the Department of Floriculture and Ornamental Horticulture) and the College of Architecture, Art, and Planning.

The Program
Program faculty: M. I. Adleman, S. Baugher, K. L. Gleason, H. Gottfried, chair; P. Horrigan, D. W. Krall, L. J. Mirin, R. T. Trancik, P. J. Trowbridge, K. A. Wolf. 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 6 resident units, satisfactory completion of the core curriculum courses, and a thesis or a capstone studio.

The department also offers a two-year Master of Landscape Architecture Advanced Degree Program, administered through the Graduate School, for those with accredited degrees in Landscape Architecture or Architecture. The two-year program entails core courses in the discipline and the development of concentrations in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape and art, or urban design.

Both of these degrees are accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects.

Dual Degree Options
Graduate students can earn a Master of Landscape Architecture and a Master of Science (Horticulture) or a Master of City and Regional Planning simultaneously. Students need to be accepted into both fields of study to engage in a dual degree program and must fulfill requirements of both fields of study. Thesis requirements are generally integrated for dual degrees.

Course Information
*LA 141 Grounding In Landscape Architecture
  Fall. 3 credits.
*LA 142 Grounding In Landscape Architecture
  Spring. 4 credits.
*LA 201 Medium of the Landscape
  Fall. 5 credits.
*LA 202 Medium of the Landscape
  Spring. 3 credits.
*LA 281 Urban Archaeology (also CRP 261)
  Fall. 3 credits.
*LA 282 The American Landscape
  Spring. 3 credits.
*LA 292 Creating a Second Nature
  Spring. 3 credits.
*LA 301 Integrating Theory and Practice
  Fall. 5 credits.
*LA 302 Integrating Theory and Practice
  Spring. 5 credits.
*LA 315 Site Engineering I
  Spring. 2 credits. Weeks 1-7.
*LA 316 Site Engineering II
  Fall. 2 credits. Weeks 8-15.
*LA 317 Site Construction I
  Fall. 2 credits. Weeks 1-7.
*LA 318 Site Construction II
  Spring. 2 credits. Weeks 8-15.
*LA 360 Pre-Industrial Cities and Towns of North America (also CRP 360, CRP 666 and LA 666)
  Fall. 3 credits. Offered alternate years 1997-98/1999-00.
*LA 363 American Indians, Planners, and Public Policy (also CRP 363/547 and LA 547)
  Spring. 3 credits.
*LA 402 Urban Design in Virtual Space
  Spring. 5 credits.
*LA 410 Computer Applications in Landscape Architecture
  Fall or spring. 3 credits.
*LA 412 Professional Practice
  Spring. 1 credit.
*LA 480 Principles of Spatial Design and Aesthetics (also CRP 481/501)
  Fall. 3 credits.
*LA 483 Design Criticism
  Spring. 3 credits.
*LA 486 Community Design Workshop
  Spring. 3 credits.
*LA 487 Experiential Community Design
  Fall. 3 credits.
*LA 491 Design and Plant Establishment in the Urban Environment (also HORT 491)
  Fall. 3 credits.
*LA 494 Special Topics in Landscape Architecture
  Fall or spring. 1-3 credits.
LANAR 497 Individual Study in Landscape Architecture
  Spring. 1-5 credits; may be repeated for credit. S-U grades optional. L. J. Mirin.
  Work on special topics by individuals or small groups.
*LA 498 Undergraduate Teaching
  Fall or spring. 1-2 credits.
*LA 501 Composition and Theory
  Fall. 5 credits.
*LA 502 Composition and Theory
  Spring. 5 credits.
*LA 505 Graphic Communication I
  Fall. 3 credits.
*LA 506 Graphic Communication II
  Spring. 3 credits. Not offered 1997-98.
[LANAR 520 Contemporary Issues in Landscape Architecture
  Fall. 2 credits. S-U grades only. Not offered 1997-98. L. Mirin.
  Presentations on topics that are current and significant to the environmental design and planning fields. Issues are discussed from a landscape architecture point of view by practitioners and researchers representing a range of professions.]
LANAR 524 History of European Landscape Architecture
  Spring. 3 credits. L. Mirin.
  A survey from classical times to the present, emphasizing design principles and techniques that have established the landscape architecture tradition in Europe. Particular reference is made to the manner in which environments such as gardens, streets, plazas, parks, and new towns reflect in their built form a range of response to demands of culture, economics, technology, security, the law, and ecology.

[LANAR 525 History of American Landscape Architecture
  Fall. 3 credits. Not offered 1997-98. L. Mirin.
  Landscape architecture in the United States from Jefferson to the present is examined as a unique expression of the American experience. Influences exerted by the physical landscape; the frontier and utopian spirit, and the cultural assumptions of democracy and capitalism are traced as they affect the forms of urban parks, private and corporate estates, public housing, transportation planning, national parks, and other open-space designs.]
*LA 545 The Parks and Fora of Imperial Rome
  Spring. 3 credits.
*LA 559 Archaeology on Preservation Planning and Landscape (also CRP 569)
*LA 590 Thesis Seminar
  Fall. 3 credits.
*LA 601 Integrating Theory and Practice
  Fall. 5 credits. Limited to graduate students.
*LA 602 Integrating Theory and Practice
  Spring. 5 credits.
*LA 615 Site Engineering I
  Spring. 2 credits. Weeks 1-7.
*LA 616 Site Engineering II
  Fall. 2 credits. Weeks 8-15.
*LA 617 Site Construction I
  Fall. 2 credits. Weeks 1-7.
*LA 618 Site Construction II
  Spring. 2 credits. Weeks 8-15.
*LA 619 Advanced Site Grading
  Spring. 2 credits. Weeks 8-15.
*LA 666 Pre-Industrial Cities and Towns of North America (also CRP 666)
  Fall. 3 credits. Offered alternate years 1997-98/1999-00.
*LA 680 Graduate Seminar in Landscape Architecture
  Fall or spring. 1-3 credits.
*LA 694 Special Topics in Landscape Architecture
  Fall or spring. 1-3 credits.
*LA 698 Undergraduate Teaching
  Fall or spring. 1-2 credits.
*LA 701 Urban Design and Planning: Designing Cities in the Electronic Age (also CRP 555)
  Fall. 5 credits.
*LA 702 Advanced Design Studio
  Spring. 5 credits.
*LA 800 Master's Thesis in Landscape Architecture
  Fall or spring. 9 credits.
  *Offered through the College of Agriculture and Life Sciences.
## FACULTY ROSTER

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>University</th>
<th>Position</th>
</tr>
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<tbody>
<tr>
<td>Baugh, Sherene, Ph.D.</td>
<td>SUNY at Stony Brook Visiting Prof.</td>
<td>City and Regional Planning</td>
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<tr>
<td>Beneria, Lourdes, Ph.D.</td>
<td>Columbia U. Prof.</td>
<td>City and Regional Planning</td>
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<tr>
<td>Blum, Zevi, B.Arch.</td>
<td>Cornell U. Assoc. Prof., Art</td>
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<tr>
<td>Blount, Richard S., J.D.</td>
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<td>City and Regional Planning</td>
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<tr>
<td>Bowman, Stanley J., M.F.A.</td>
<td>U. of New Mexico Prof., Art</td>
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<td>Bertoia, Roberto, M.F.A.</td>
<td>Southern Illinois U.</td>
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The Division of Biological Sciences provides a unified curriculum for undergraduate majors 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

The Division of Biological Sciences is composed of seven sections: Biochemistry, Molecular and Cell Biology, Ecology and Systematics, Genetics and Development, Microbiology, Neurobiology and Behavior, Physiology, Plant Biology; and, in addition, the L. H. Bailey Hortorium and the Shoals Marine Laboratory.

Student services are provided by the division’s Office for Academic Affairs and the Behrman Biology Center, both located in Stimson Hall, where academic advice, information on biological sciences course offerings, other important information, and counseling are available for undergraduates. The Office for Academic Affairs also follows the progress of biology majors and works closely with faculty advisors. Additional services and resources of the Biology Center include academic program planning, tutoring, lecture tapes, examination files, and information on undergraduate research opportunities. The center has comfortable areas for studying and relaxing.

The Shoals Marine Laboratory, a cooperative venture with the University of New Hampshire, is located on Appledore Island in the Gulf of Maine. Its base office in Stimson Hall provides academic advising and career counseling 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 Westward.

FACULTY


Other Teaching Personnel


DISTRIBUTION REQUIREMENT

In the College of Agriculture and Life Sciences, the biological sciences distribution requirement (Group B) is for a minimum of 9 credits, including at least 6 credits of introductory biology satisfied by Biological Sciences 109-110, 105-106, or 101 and 103 plus 102 and 104, or 107-108, or any combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) may be applied to the Group 1 distribution area in accordance with regulations stipulated by the Arts College.

In the College of Human Ecology, the natural sciences distribution requirement is for at least 6 credits selected from Biological Sciences 109-110, 101 and 103 plus 102 and 104, 105-106 or 107-108 or from specified courses in chemistry or physics. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) also satisfies the distribution requirement in the natural sciences.

Note: Biological Sciences 101-102-103-104 should be taken as a unit by students of any college except those with advanced placement credit.

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 or inconsecutive order is strongly discouraged.
USE OF ANIMALS IN THE BIOLOGICAL SCIENCES CURRICULUM: CORNELL UNIVERSITY

Students wishing to enroll in courses offered through the Division of Biological Sciences should know and understand the following criteria relative to the use of animals in the teaching program, as passed by the faculty 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. The Division of Biological Sciences conforms 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, 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. Fred Quimby, at 253-3516. 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.

THE MAJOR

The Division of Biological Sciences offers a major in biological sciences 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 through the division's Office for Academic Affairs, where students submit their applications to the major and obtain biology faculty advisers.

During the second semester of the sophomore year, all students who intend to major in biological sciences must apply for acceptance into the major with the associate director for academic affairs, in 200 S Rush Hall.

Students in the College of Agriculture and Life Sciences who were admitted directly to the major complete the application process to declare a program of study area and to assure satisfactory progress toward completion of the major. Acceptance requires completion of the course sequences in introductory biology, chemistry, and mathematics (see requirements 1-3 below), plus one semester of organic chemistry lectures. In addition, a 2.75 Cornell cumulative grade-point average is required, and final acceptance into the major except for those students admitted directly to the major as freshmen (College of Agriculture and Life Sciences students only) or as transfers. Students in the process of completing these prerequisites for admission to the major may be accepted on a provisional basis. Final acceptance into the major is required for graduation with a biological sciences major. It is the student's responsibility to assure that final acceptance has been granted.

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. Students are not encouraged to continue with the major in biological sciences unless performance in these four subjects gives evidence of capacity to perform satisfactorily at a more advanced level.

The requirements for the biological sciences major are listed below. These courses, with the exception of the language requirement, should be taken for a letter grade, unless the course is offered for S/U grades only.

1) Introductory biology for majors (one year):
   - Biological Sciences 101 and 103 plus 102 and 104, or 105-106.
   - Biological Sciences 107-108, offered during the eight-week Cornell Summer Session for 8 credits, also satisfies the introductory biology requirement for majors. Students may choose to accept advanced placement if they have received a score of 5 on the Advanced Placement Examination of the College Entrance Examination Board (CEEB). Students with a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 101-102, 101 and 103, 102 and 104, or 103-104. These students should consult information available in the course office (1140 Comstock Hall) and in the Biology Center (216 Stimson Hall) to determine which semester to take to complete the introductory biology requirement.

2) General chemistry (one year):
   - Chemistry 207-208, or 103-208, or 215-216.

3) College mathematics (one year): two semesters of calculus (Mathematics 111-112, 191-192, or their equivalents) or one semester of calculus (Mathematics 106, 111, 191, or equivalents) plus either Mathematics 110 or Statistics and Biometry 101. Education 115 may not be used to fulfill any part of this requirement.

4) Organic chemistry:
   - Chemistry 257 and 251, or 357-358 and 251, or 357-358 and 301, or 559-360 and 251, or 359-360 and 301.

5) Physics:
   - Physics 207-208, 112-213, or 101-102.

6) Genetics:
   - Biological Sciences 281.

7) Biochemistry:
   - Biological Sciences 330, 331 and 332, or 333.

8) Evolutionary Biology:
   - Biological Sciences 278.

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 of the Division of Biological Sciences by (a) presenting evidence of successful completion of three or more years of study of a foreign language in high school or (b) obtaining a score of 560 or more on the reading portion of the College Entrance Examination Board achievement test or (c) achieving "qualification" status in a language as defined by the College of Arts and Sciences or (d) successfully completing at least 6 college credits in a foreign language. Students registered in the College of Arts and Sciences must satisfy the language requirement as stated by that college.

*Since modern biology has an important physical and quantitative orientation, students are advised to undertake basic science courses that emphasize this approach. Asterisks in the above list indicate 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.

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. The program of study requirements are designed to help students achieve depth in one area of biology while ensuring that the selected advanced courses form a coherent and meaningful unit. Because of the flexibility allowed in satisfying these requirements, students should consult their faculty advisers. The possible programs of study are listed below.

1) Animal Physiology: BIOAP 311, Introductory Animal Physiology, Lectures; BIOAP 313, Histology. The Biology of Tissues, BIOAP 316, Cellular Physiology, and BIOAP 319, Animal Physiology Experimentation. The Program of Study in Animal Physiology emphasizes whole-animal, tissue, and cell physiology, and
provides considerable opportunity for studies using live animals. It is intended especially for students contemplating careers in biomedical sciences or other fields involving new approaches to research in Graded independently. The specific sections offered in any semester may vary. The labs are organized as half-semester sections that are prerequisites have not changed. This course (4 credits) BIOBM 430 was formerly listed as Quantitative Chemistry. BIOBM 430 is strongly recommended: 4 credits of biochemistry laboratory courses (BIOBM 430 below) and Physical Chemistry (Chemistry 389–390 or 287–288 or 287–390 or 389–288). Note that Chemistry 288 is designed for biologists. It is recommended that students interested in graduate work in biochemistry take the more rigorous organic chemistry and physics sequences (Chemistry 357–358 or 359–360 and Physics 207–208), six credits of organic chemistry laboratory, and a third semester in preparation for the more rigorous physical chemistry sequence (Chemistry 389–390). Students interested in biochemistry should complete a year of introductory chemistry other than Chemistry 103–104 before the start of their sophomore year. Students are also urged to complete introductory biology in their freshman year.

Note: BIOBM 430 was formerly listed as BIOBM 630. The course content and prerequisites have not changed. This course is organized as half-semester sections that are graded independently. The specific sections offered in any semester may vary. The labs emphasize qualitative and quantitative aspects of modern approaches to research in biochemistry, molecular and cell biology.

3) Molecular and Cell Biology: BIOBM 432, Survey of Cell Biology; 4 credits of BIOBM 430 (formerly BIOBM 630). Laboratories in Biochemistry, Molecular and Cell Biology, and at least 7 additional credits of courses that have a cellular biological or molecular biological orientation. The 7 additional hours should include at least two courses from the following list (underlined courses are recommended as providing breadth in molecular and cell biology): BIOAP 619, Lipids; BIOAP 658, Molecular Mechanisms of Hormone Action; BIOBM 434, Applications of Molecular Biology; BIOBM 439, Laboratory Research in Biochemistry, Molecular and Cell Biology; BIOBM 437, Oncogenes and Cancer Viruses; BIOBM 651, Protein Structure and Function; BIOBM 652, Membranes and Bioenergetics; BIOBM 653, Biosynthesis of Macromolecules; BIOBM 655, Mechanisms of Metabolic Regulation and Mammalian Gene Expression; BIOBM 656, Cell Biology; BIOBM 659, The Nucleus; BIOG 406, Sensing and Responding in Biological Systems; BIOG 385, Developmental Biology; BIOG 483, Molecular Aspects of Development; BIOG 484, Molecular Evolution; BIOG 486, Advanced Eukaryotic Genetics; BIOG 488, Molecular Genetic Analysis; BIOG 682, Fertilization and the Early Embryo. BIOI 343, Molecular Biology and Genetic Biotechnology; BIOI 347, Laboratory in Molecular Biology and Genetic Engineering of Plants; BIOI 444, Plant Cell Biology; BIOI 641, Laboratory in Plant Molecular Biology; BIOI 652, Plant Molecular Biology II; BIOI 290, General Microbiology; Lectures: BIOI 291, General Microbiology. Laboratory: BIOI 408, Viruses and Disease; BIOI 485, Bacterial Genetics; BIOI 692, Protein and Nucleic Acid Interactions; BIOIN 222, Neurobiology and Behavior II: Introduction to Neurobiology; BIOIN 325, Neurodegenerative Diseases; Molecular Aspects, BIOMN 425, Natural History of Ion Channels; BIOMN 495, Molecular and Genetic Approaches to Neurosciences; BIOMN 497, Neurochemistry and Molecular Neurobiology. Students interested in cell biology should complete a year of introductory chemistry other than Chemistry 103–104 before the start of their sophomore year. Students are strongly encouraged to take one of the 5-credit options of Biochemistry (331 and 332 or 330 and 334).

4) Ecology and Evolutionary Biology: BIOES 261, Ecology and the Environment, and 10 credits from the following course list, including at least one course from each group:

(a) BIOMI 241, Introductory Botany; BIOMI 274, The Vertebrates: Structure, Function, and Evolution; BIOMI 373, Biology of the Marine Invertebrates; BIOMI 466 and 468, Physiological Plant Ecology, Lectures and Laboratory; BIOMI 471, Mammalogy; BIOMI 472, Herpetology; BIOMI 475, Ornithology; BIOMI 476, Biology of Fishes; ENTOM 212, Insect Biology.


Note: One 400-level, 4-credit course (including 4 credits from BIOI 346) offered at Shools Marine Laboratory may be applied toward the 10 credits. Students are encouraged to gain experience in some aspect of field biology through course work at a biological field station or work experience.

Note: The Ecology and Evolutionary Biology program of study offers an undergraduate specialization in Marine Biology and Oceanography. A description of this specialization can be found in the section entitled COURSES IN MARINE SCIENCE.

5) General Biology: The Program of Study in General Biology requires a minimum of 13 credit hours from courses offered by the Division of Biological Sciences in addition to other courses toward requirements 1–8 above. These 13 credits must include:

1) one course each from those required for at least three of the eight other programs of study (see pages 152–154),
2) a course with a laboratory, and
3) a minimum of two upper-level (300 and above) courses of two or more credits each.

100-level courses are not acceptable for meeting any of these requirements. BIOI 341 may not count as the lab course. BIOG 498 may not be used to fulfill the requirements of this program of study. BIOG 499 (minimum of 2 credits, but no more than 3 credits) may count as one of the upper-level courses, and may count as the laboratory course with approval of the adviser, but it cannot count as a course representing a program of study.

6) Genetics and Development: A minimum of 13 credits, usually chosen from the following courses: BIOG 385, Developmental Biology; BIOG 387, Developmental Aspects of Evolution; BIOG 389, Embryology; BIOG 480, Seminar in Developmental Biology; BIOG 481, Population Genetics; BIOG 482, Human Genes and Society; BIOG 483, Molecular Aspects of Development; BIOG 484, Molecular Evolution; BIOG 486, Advanced Eukaryotic Genetics; BIOG 488, Molecular Genetic Analysis (up to 3 credits); BIOI 485, Bacterial Genetics; BIOIN 493, Developmental Neurobiology; BIOI 343, Molecular Biology and Genetic Engineering of Plants.

Students may also choose from the following courses to complete the 13-credit requirement: BIOG 682, Fertilization and Early Development. BIOG 684, Advanced Topics in Population Genetics; BIOG 687, Developmental Genetics; BIOG 683, Biosynthesis of Macromolecules; BIOG 639, The Nucleus; BIOE 663, Theoretical Population Genetics; BIOI 694, Genetics of Diverse Bacteria; BIOI 641, Laboratory in Plant Molecular Biology; BIOI 644, Plant Growth and Development; BIOI 652, Plant Molecular Biology II; BIOI 655, Plant Molecular Biology I; PL BR 606, Advanced Plant Genetics.

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 of the faculty adviser.

7) Microbiology: BIOI 290, General Microbiology, Lectures; BIOI 291, General Microbiology, Laboratory; BIOI 300, Seminar in Microbiology; and at least three courses chosen from the following: BIOI 391, Advanced
Microbiology Laboratory; BIOMI 415, Bacterial Diversity; BIOMI 416, Bacterial Physiology; and BIOMI 485, Bacterial Genetics.

8) Neurobiology and Behavior: The two-semester introductory course sequence, Neurobiology and Behavior I and II (BION 221 and 222) with discussion section (4 credits per term), and 7 additional credits, among which must be a course from the neurobiology and behavior offerings—BION 420, BIO G 499, and BION 720 may not be used as this neurobiology and behavior course. However, these readings and independent research courses may form the majority of credits (beyond those provided by the advanced neurobiology and behavior course) required to complete the Program of Study in Neurobiology and Behavior. Option (a) may not be used to fulfill the requirements of this program of study.

Note: Students who declare the Program of Study in Neurobiology and Behavior after taking BION 221 or 222 for only 3 credits must complete additional course work in neurobiology and behavior. These students should consult the chair of the Section of Neurobiology and Behavior (W365 Seeley G. Mudd Hall) to determine what course(s) to use to make up the deficiency.

9) Plant Biology: Students choose one area of study from the following two options:

Option (a) Botany: Students are required to take Introductory Botany (BIOP 242 and 244). Students should then choose, with the aid of their faculty adviser, a minimum of three of the following courses, for a total of at least 10 additional credits, to round out their botanical training—BIOP 242 and 244, Plant Physiology, Lectures and Laboratory; BIOP 247, Ethnobotany; BIOP 248, Taxonomy of Vascular Plants; BIOP 342 and 344, Plant Physiology, Lectures and Laboratory; BIOP 343 and 347, Molecular Biology and Genetic Engineering of Plants, Lectures and Laboratory; BIOP 345, Plant Anatomy; BIOP 444, Plant Cell Biology; BIOP 445, Photosynthesis; BIOP 447, Molecular Systematics; BIOP 448, Plant Evolution and the Fossil Record; BIOS 463 and 465, Plant Ecology and Population Biology, Lectures and Laboratory; or BIOS 466 and 468, Physiological Plant Ecology, Lectures and Laboratory.

Option (b) Plant Biotechnology: Students are required to take BIOP 343 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: BIOP 241, Introductory Botany; BIOP 242 and 244, Plant Ecology, Lectures and Laboratory; BIOP 342 and 344, Plant Physiology, Lectures and Laboratory; BIOP 346, Algal Physiology; BIOP 444, Plant Cell Biology; BIOP 468, Plant Molecular Biology; PL BR 401, Plant Cell and Tissue Culture; or PL BR 402, Plant Tissue Culture Laboratory.

10) Independent Option: A special program for students interested in nutrition is available under this option. Students interested in courses in biochemistry should contact the Office for Academic Affairs (200 Stimson Hall) for further information. In addition, students who want to undertake a course of study not covered by the nine existing programs of study or the special program may petition the Division of Biological Sciences Curriculum Committee. Information on independent options and Curriculum Committee procedures will be available in the Office for Academic Affairs, 200 Stimson Hall.

Independent Research and Honors Program

Individual research projects under the direction of a faculty member are encouraged as an aspect of study within a program of study. Applicants for research projects are accepted by the individual faculty members, who take into account students' previous academic accomplishments, interests, and goals and the resources and equipment suitable for the proposed project. Students accepted for independent research enroll for credit in Biological Sciences (BIO G) 499 (Undergraduate Research in Biology) with the written permission of the faculty supervisor. Students register for this course in 200 Stimson Hall. Any faculty member in the Division of Biological Sciences may act as a supervisor. Supervisor supervisors outside the division are acceptable only if a faculty member of the Division agrees to take full responsibility for the quality of the work. Students may not earn credit for research conducted outside of Cornell. Information on research activities and undergraduate research opportunities is available in the Behrman Biology Center, 216 Stimson Hall.

Research credits may not be used in completion of the following program of study areas: animal physiology; biochemistry; cell biology; ecology and evolutionary biology; microbiology; plant biology. Up to 3 credits of research may be used to complete the Program of Study in general biology and genetics and development, and 4 credits of research in neurobiology and behavior.

The honors program in biological sciences is designed to offer advanced training in laboratory or field research through the performance of an original research project under the direct guidance of a member of the Cornell faculty. Applications for the honors program are available in the Office for Academic Affairs, 200 Stimson Hall, and must be submitted to the Honors Program Committee by the deadline announced early in the senior year. Application forms for the honors program are separate from the enrollment forms for Biological Sciences (BIO G) 499 (Undergraduate Research in Biology). 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 an overall Cornell cumulative grade-point average of at least 3.00. In addition, students must have at least a 3.00 Cornell cumulative grade-point average in all biology, chemistry, mathematics, and physics courses. Grades earned in courses in other departments that are used to fulfill major requirements are included in this computation. In addition, candidates must have a Cornell faculty member to supervise their research. Any faculty member in the Division of Biological Sciences may act as a supervisor. Students may also work with Cornell faculty supervisors outside the division. Students who select supervisors outside the division must arrange for a faculty member of the division to serve as cosigner of the research. The division cosigner must agree to meet with the student on a regular basis, to report to the Honors Program Committee on the progress of the work approximately two months before the thesis is due, and to serve as a reviewer of the thesis. An honors candidate usually enrolls for credit in Biological Sciences (BIO G) 499 (Undergraduate Research in Biology) under the direction of the faculty member acting as honors supervisor, although it is not necessary to do so. Students choosing to earn credit for honors research must enroll in Biological Sciences (BIO G) 499 (Undergraduate Research in Biology) separate from the honors program. Requirements of the honors program include participation in honors research seminars during the two semesters prior to submission of an acceptable honors thesis, completion of all major requirements, and maintenance of the 3.00 Cornell cumulative 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 should consult their faculty advisers early during their junior year. Students are strongly encouraged to begin their research projects in their junior year, although they are not formally admitted to the honors program until the beginning of the senior year. Students who are considering study abroad during their junior year should consult with a member of the Honors Program Committee during their sophomore year to plan a reasonable schedule for research honors. The Honors Program requires that student participants attend honors seminars in which they give oral presentations during the first and second semesters of their senior year. Students who are conducting research away from campus during the senior year should consult with a member of the Honors Committee no later than the beginning of the first semester of their junior year. Details pertaining to theses due dates, seminars, and other requirements may be obtained from the chair of the Honors Program Committee or from the Office for Academic Affairs, 200 Stimson Hall. Information on research activities is available in the Behrman Biology Center, 216 Stimson Hall. Deviation from any of the requirements of the Honors Program requires a petition in the form of a letter to the Honors Program Committee, c/o 200 Stimson Hall.

CURRICULUM COMMITTEE

Many decisions pertaining to the curriculum, to division-wide requirements, and to the programs of study are made by the Curriculum Committee of the division. The committee consists of faculty and elected student members and welcomes advice and suggestions from all interested persons.
### 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 Systematics, BIOES; Genetics and Development, BIOGD; Microbiology, BIOMI; Neurobiology and Behavior, BIOMB; Plant Biology, BIOPL; Shoals Marine Laboratory, BIOSM.

Note: Biological sciences 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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### GENERAL COURSES (BIO G)

The Division of Biological Sciences teaches three introductory biology course sequences during the academic year: Bio G 101–104, Bio G 105–106, and Bio G 109–110; and one during the eight-week summer session: Bio G 107–108. Bio G 101–104, 105–106, and 107–108 are intended for biological sciences majors and other students needing 8 credits from an introductory sequence for majors (for example, students in a premedical curriculum). Any of these sequences meets 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 non-majors, and meets the prerequisite for many, but not all, upper-level courses listing "one year of introductory biology" as a prerequisite. Students can earn a maximum of 8 credits in introductory biology (including advanced placement credits).

#### BIO G 101–102 Biological Sciences, Lectures

- **Fall:** 101, 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. Lecs, M W F 9:05 or 10:10.
- **Spring:** 102, 2 credits each term.
  - **Lectures:** 102, 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. 11; spring, Feb. 19 and Apr. 2. K. K. Adler.

- **Fall:** 101, 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 the light of modern evolutionary theory and discussions of plant and animal systems are integrated.
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. In case of ucn Concept of 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 F 1:25-4:25, M or W 7:30-10:30 p.m., or F 8:00-11:00. One 3-hour lab each week and a weekly rec for dissections, special lecture, 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 instruction in the major areas of biology. First-semester topics include biochemistry, physiology, plant biology, and behavior. In the second semester, laboratory experience is provided in the areas of genetics, biotechnology, immunology, invertebrate diversity, population plant growth and development, and ecology. During the first semester, dissection of a doubly-pithed frog is included. Pithing is done by the instructor. Dissection of several invertebrates occurs during the second semester. For those students who object to animal dissection, alternative materials are available for study. However, testing will involve identification of important structures in real organisms.

BIO G 105-106 Introductory Biology
105, fall; 106, spring. 4 credits each term (or 2 credits, with permission of instructor). Enrollment limited to 200 students. Prerequisite: 105 is prerequisite to 106, unless written permission is obtained from instructor. May not be taken for credit after BIO G 101-104 or 109-110. No admittance after first week of classes. Estimated cost for dissection kit $11. S-U grades optional, with permission of instructor. Lect, T 9:05 (1st lec of term, R 28 9:05); additional study and lab hours to be arranged. C. H. McFadden and staff. Designed primarily for biology majors, preprofessional arts, and other students who desire a challenging, broad introduction to fundamental concepts of biology. Cell biology, physiology, anatomy (accompanied by preserved vertebrate dissection), and biochemistry are strongly emphasized in the fall semester. Subjects of study in the spring semester include population biology, ecology, evolution, behavior, and the diversity of organisms (accompanied by preserved and live invertebrate dissection). Students who plan to concentrate in anatomy and physiology should take this course. Because of the strong emphasis on organismal biology, there are dissections. Students who object to dissections should plan to take Bio G 101-104. The course uses an autotutorial format and is designed to meet upper-division credit requirements in scheduling. Completion of the course requires mastery of a group of core units. Testing on these units is primarily by oral examination. Students who take the course must respect deadlines. Four formal laboratory sessions are offered each semester; additional laboratory work is included in the core units. Evaluation is based on written reports on experimental work, practical exams, and a comprehensive final exam.

BIO G 107-108 General Biology
Summer (8-week session): 107, weeks 1-4; 108, weeks 5-8. 4 credits each. Prerequisite: one year of college or permission of instructor. BIO G 101-103, 105, or 107 is a prerequisite for 108. Fee. $25 for weeks 1-4; $15 for weeks 5-8. Lect, M-R 9-12, labs, M T W R 1:30-4:30, F 9-12. Staff. Designed for students who plan further study in biology and for students who want a broad course in biology as part of their general education. BIO G 107 covers biological metabolism, first at the molecular level and then progressively to the organism system level. The laboratory work is a continuation of the material covered in BIO G 107 and involves more techniques, a survey of animal organization, and the design and performance of a study. BIO G 107-108 fulfills the introductory biology requirement for majors and forms a suitable introductory biology course sequence for students intending to go to medical school.

BIO G 109-110 Biological Principles
109, fall; 110, spring. 3 credits each term. Limited to 600 students. A passing grade in 109 or 105 is prerequisite to 110 unless written permission is obtained from the instructor; and the student has at least 3 credits of college biology. Since 109-110 together constitute an integrated survey, 109 cannot be used to satisfy the College of Arts and Sciences or College of Agriculture and Life Sciences distribution requirement unless it is followed by 110 or an exemption is obtained from the instructor. May not be taken for credit after BIO G 101-104 or 105-106. This course sequence may be used to fulfill the distribution requirement in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology, but may not be used as an introductory course for the major in biological sciences. Note that this course satisfies the prerequisite for many, but not all second- and third-level courses in biology. Letter grade only. Lect, M W F 9:05 or 10:10; lab, M T W R F 2-4:25 or T 10:10-12:35. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Each student must attend lab on alternate weeks. Evening prelims: fall, Sept. 25 and Nov. 11; spring, Feb. 19 and Apr. 2. R. Turgeon, M. Taylor, C. Eberhard, and staff. Students who do not plan to major in biology may take this broad introductory course in modern biology. It is not a course in social biology but addresses itself to biological principles with academic rigor. The content is designed to appeal to anyone who seeks a comprehensive knowledge of biology as part of a general education. Laboratory sections enable small groups of students to meet with the course staff and are used for problem-solving experiments, demonstrations, and discussions. No live dissections are involved; there are dissections of vertebrate, invertebrate and plant material (observation required).

BIO G 152 Special Topics in Biology
Spring, 1 credit. Limited to 30 students. Prerequisites: superior performance in BIO G 100 or equivalent and concurrent enrollment in BIO G 102, 106, or 110, or written permission of instructor. S-U grades only. This course may not be used in fulfillment of college distribution requirements. Lect, T 3:35; occasional field trips to be arranged. Guest lecturers discuss topics in their field of research interest. R. Turgeon, C. C. Eberhard, staff, and guest lecturers.

This course is designed to complement introductory biology by providing an opportunity for deeper exploration of selected topics of interest. Class involvement and discussion are encouraged.

BIO G 170 Evolution of the Earth and Life (also Geological Sciences 102)

BIO G 200 Special Studies in Biology
Fall, spring, or summer. 1-3 credits. Prerequisites: transfer- or special-student status and written permission of instructor and of the associate director of the Division of Biological Sciences. Students must register using a special form available in Stimson 200. S-U grades optional, with permission of instructor. Hours to be arranged. Staff. A registration device for students who want to take only a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Only students who have already had training equivalent to the portion of the regular course that is to be omitted may register in this manner. This course may not be used in fulfillment of college distribution requirements except by permission of the associate director of the division.

BIO G 202 The Diversity of Life
Fall. 3 credits. S-U grades optional. Lect, M W F to be arranged. J. J. Davis, J. J. Doyle, E. Rodriguez. The course focuses on three primary themes: 1) the range of biotic diversity; 2) the principles of systematics that underlie the description; 3) the relationship of the human species to biotic diversity.

BIO G 207 Evolution (also History 287 and Science and Technology Studies 287)
Fall or summer. 3 credits. Intended for students with no background in college biology. May not be taken for credit after BIOES 278. Does not meet the evolutionary biology requirement for the biological sciences major. S-U grades only. This course may not be used in fulfillment of college distribution requirements. Lect, T 10:10 or disc, 1 hour each week to be arranged. W. B. Provine, Summer.
(also Science and Technology Studies 287): Lecs/disc, M-F 8:30-9:45.
A. S. Kondrashov.

Evaluating the central concept in biology. This course examines evolution in historical and cultural contexts. Aims of the course include understanding the major issues in the history and current status of evolutionary biology, and exploring the implications of evolution for culture. Issues range from controversies over mechanisms of evolution in natural populations to the conflict between creationists and evolutionists.

BIO G 208 Drawing the Human Figure
Summer (6-week session). 3 credits. Labs, M T W 3:00-5:15. K. Kucharski. Human anatomy. Emphasis on learning specific anatomical relations to the skeletal and muscular systems as approached through observation and drawing practices.

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, scratchboard, 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 Veterinary Microbiology 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. Sem to be arranged. Staff. From time to time specialized seminars on topics of interest to undergraduates are offered by visiting faculty or faculty from the Sections of Ecology and Systematics, Genetics and Development, or Plant Biology. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester. For students interested in Biochemistry, Physiology, or Neurobiology, please see descriptions under appropriate section.

BIO G 401 Introduction to Scanning Electron Microscopy
Fall or spring, weeks 1-8. 1 credit. Limited to 8 students (fall). 12 students (spring). Prerequisite: permission of instructor. S-U grades optional. Lec, M 10:10; lab, T R or F 9:05-12:15 or T W or R 1:25-4:25. Fee may be charged. M. V. Parthasarathy.

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, the 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. 1.5 credits if student takes both sections). Limited to 12 students. Prerequisites: BIOAP 313, BIOPH 345 or 443, or written permission of instructor. S-U grades optional. Lec, T 11:15; labs, M W or T R 1:25-4:25. Two sections: Section 01, 1 credit, weeks 1-4; Section 02, 3 credits, weeks 5-12. Students may register for one or both sections. Fee may be charged. M. V. Parthasarathy. Section 01, 1 credit, weeks 1-4, covers the principles and techniques of preparing biological material for transmission electron microscopy. Using animal, plant, and microbe materials this section features 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 405 Neotropics: Introduction to Their Biology
Fall. 2 credits. Limited to 18 students. Prerequisites: BIOES 261 or equivalent, and permission of instructor. Sem, W 7:30-9:30 p.m. P. H. Wrege, A. S. Flecker. This seminar is a cherry-picked survey of the biology of selected biomes of the New World tropics, with primary focus on moist lowland forests. The objectives are to learn the basic characteristics and phenomena important to an understanding of neotropical biology, to gain firsthand knowledge of the resources available at Cornell for the pursuit of this knowledge, and to learn how to organize and execute a meaningful seminar presentation.

BIO G 407 Nature of Sensing and Response (also PLPA 407) (formerly Bio Sci 268)
Spring. 3 credits. Prerequisite: BIOBM 330 or 333 or 331 and previous or concurrent registration in 332. Recommended: BIOGD 281. S-U grades optional. Lec, T R 10:10-11:25. T. P. Delaney.

An examination of the responses of organisms and cells to their surroundings illustrates how biological systems sense their biotic and abiotic environment and communicate sensing into appropriate responses. This course explores a variety of responses to identify their unique features and to illustrate how similar processes are utilized by widely divergent organisms. Examples are drawn from prokaryotic and animal systems for environmental sensing, control of development and responses during disease. Discussions examine the role of genetics and biochemistry in understanding signal transduction pathways, as well as the way these systems are perturbed in certain diseases.

BIO G 431 Frontiers in Biophysics
Fall. 1/2 credits. S-U grades only. Lec to be arranged. D. Shalloway and staff. 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 1:25-2:30; lab, R 2:30-4:30. A. O. Wayne.

A theoretical and practical review 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 plant cells.

BIO G 467 Seminar in the History of Biology (also History, Biology and Society 447, and Science and Technology Studies 447)
Summer (6-week session). 4 credits. Limited to 18 students. S-U grades optional. W. B. Provine. Specific topic changes each year.

BIO G 469 Food, Agriculture, and Society (also Biology and Society 469 and Science and Technology Studies 469)
Spring. 3 credits. Limited to 20 students. Prerequisite: an introductory ecology course or permission of instructor. S-U grades optional. Lecs, T R 1:25-2:40. A. G. Power.

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.

BIO G 498 Teaching Experience
Fall or spring. 3-4 credits. Enrollment limited. Prerequisites: previous experience in teaching and enrollment in the course to be taught or equivalent, and written permission of instructor. Students in the College of Arts and Sciences may count credits from this course toward the 120 credits required for graduation. S-U grades optional, with permission of instructor. Hours to be arranged. Staff.

Designed to give qualified undergraduate students teaching experience through actual involvement in planning and assisting in biology courses. This experience may include supervised participation in a discussion group, assisting in a biology laboratory, assisting in field biology, or tutoring. Biological sciences courses currently offering such experience include BIO G 105-106; BIOAP 311, 313, 319; BIOBM 330, 331; BIOES 274, 475; 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. Prerequisite: written permission of staff member who supervises the work and assigns the grade. Students must register in the Office for Academic Affairs in 200 Stimson Hall. Each student must submit an independent study proposal and get approval of proposed research project during course registration. (Special forms for this purpose are available in the college offices and in 200 Stimson Hall.) Any faculty member in the Division of Biological Sciences may act as a supervisor. Cornell faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to serve as co-sponsor, taking full responsibility for the quality of the work. Supervisors outside of Cornell must be acceptable. S-U grades optional. Hours to be arranged. Staff.

Practice in planning, conducting, and reporting independent laboratory and library research programs. Research credit may not be used in completion of the following programs of study: animal physiology; microbiology; plant physiology; and evolution. Students may not be used to fulfill the requirements of any Program of Study in the biological sciences major.

BIO G 606 Freeze-Fracture Technique
Spring, weeks 9-14. 1 credit. Prerequisites: BIO G 403 or equivalent, and permission of instructor. S-U grades optional. Hours to be arranged. Staff.

Principles of freeze-fracturing and freeze-substitution technique, freezing artifacts, and interpretation of images.

BIO G 705 Advanced Immunology Lectures (also Veterinary Microbiology 705)
Fall. 3 credits. Prerequisite: BIO G 305 or permission of instructor. Offered alternate years. Lecs. MWF 9:05. Coordinator: R. G. Bell. Coverage at an advanced level of molecular and cellular immunology.

BIO G 706 Immunology of Infectious Diseases and Tumors (also Veterinary Microbiology 719)
Spring. 3 credits. Prerequisite: BIO G 305 or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1997-98. Lec. R 11:15-12:15. Coordinator: R. G. Bell. Coverage at an advanced level of the immunology of diseases caused by selected bacteria, viruses, protozoa, and helminths, and tumor immunology.

Related Courses in Other Departments
The Sea: An Introduction to Oceanography (Biological Sciences [BIOS] 154)
Medicine and Civilization (Biology and Society 322)
Pathogenic Bacteriology and Mycology (Biological Sciences [BIOM] 404 and Veterinary Microbiology 318)
Viruses and Disease (Biological Sciences [BIOM] 408 and Veterinary Microbiology 408)

ANIMAL PHYSIOLOGY (BIOAP)

BIOAP 212 Human Physiology for Non-Biology Majors
Spring, 3 credits. May not be taken for credit after BIOAP 311. Limited to 130 students. This course may be used toward the science distribution requirement of the College of Arts and Sciences and the Group B distribution requirement of the College of Agriculture and Life Sciences. This course may not be used to fulfill the requirements of any Program of Study in the biological sciences major.


Introduction to the physiology of all major organ systems and the relation of that physiology to human health and disease. Emphasis on understanding of major body functions and control mechanisms regulating each organ system. Students develop a fundamental understanding of how their bodies work that will be the basis of making informed decisions about their own health and medical needs as members of their families. Taught by staff of research physiologists and cooperating physicians.

BIOAP 214 Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214)
Fall. 3 credits. Limited to non-biology majors and human, sophomore, and junior biology majors; senior biology majors may register with permission of instructor. Prerequisite: one year of introductory biology. S-U grades optional. Offered alternate years. Not offered 1997-98.

J. E. Fortune.
The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction, where possible, special attention is given to studies of humans. Current evidence on the effects of gender on nonreproductive aspects of life (behavior, mental, and physical capabilities) is discussed. The course is intended to provide students with a basic knowledge of reproductive endocrinology and with a basis for objective evaluation of sex differences in relation to contemporary life.

BIOAP 311 Introductory Animal Physiology, Lectures (also Veterinary Physiology 346)
Fall. 3 credits. Prerequisites: one year of college biology, chemistry, and mathematics. Recommended: previous or concurrent courses in physics. S-U grades optional, with permission of instructor. Lecs. M, W F 11:15. Evening prelims: Sept. 23 and Oct. 30. E. R. Loew and staff.

A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure/function relationships are stressed along with underlying physico-chemical mechanisms.

BIOAP 312 Farm Animal Behavior (also Animal Science 306)
The behavior of production species (avian and mammalian) influences the success of any management program. Students study behaviors relating to communications, learning, social interactions, reproduction, and feeding of domestic animals, and their physiological basis. Management systems for commercial livestock production and their implications for animal behavior and welfare are stressed.

BIOAP 313 Histology: The Biology of the Tissues
Fall. 4 credits. Prerequisite: one year of introductory biology. Recommended: BIOBM 330 or 331, or their equivalents; and previous or concurrent enrollment in BIOAP 311. S-U grades optional, with permission of instructor. Lecs. M, W, F 12:30-2:15; labs, T R 1:25-2:30. Evening prelims: Oct. 2 and Nov. 6. C. Wahl.

Provides students with a basis for understanding the microscopic, fine-structural, and functional organization of vertebrates, as well as methods of analytic morphology at the cell and tissue levels. Dynamic interrelations of structure, composition, and function in cells and tissues are emphasized. The course may include work with vertebrate animals.

BIOAP 316 Cellular Physiology
Spring. 4 credits. Limited to 72 students, with preference given to students studying in animal physiology. Each lab limited to 36 students. Prerequisite: concurrent or previous enrollment in BIOBM 330 or 331 and 352 or 333. Lecs. M, W F 9:05; lab, M or T 1:25-5:00. Evening prelims: Feb. 24, Apr. 2, and April 28. A. Quaroni and staff.

Lectures introduce students to the most current information on the way cells function and regulate themselves and neighboring cells and on what molecules are involved in these regulatory processes. Laboratories provide an introduction to cell and organ culture and to immunological techniques used to study cell structure and function in vivo and in vitro. Experiments performed in the laboratory are closely related to, and provide practical experience with, subjects covered in the lectures. Vertebrate animals are used in this course. No experimentation is performed on live animals.

BIOAP 319 Animal Physiology Experimentation
Fall. 4 credits. Designed for upper-level undergraduate and graduate students studying in physiology, and other students interested in biomedically related professions. Graduate students in the Field of Physiology and related fields without equivalent background are strongly encouraged to enroll. Each of 2 afternoon laboratory sections is limited to 40 students. Prerequisite: concurrent or previous enrollment in BIOAP 311 or permission of instructor. Lecs. R 12:20; lab, M or W 12:20-5:00 (includes disc section). R. A. Corradino.

A series of student-conducted in vitro and in vitro experiments designed to illustrate basic physiological processes 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, vivisection under anesthesia, and real-time computer recording and analysis of data. Experiments with living tissues and live animals examine properties of blood, muscle, and nerves; cardiovascular, respiratory, and renal function and their control; and endocrine regulation of renal, cardiovascular, and reproductive functions. Experimental resources include live animals, frogs, rats, and rabbits, which are euthanized after the laboratory exercises. Written reports of laboratory activities are required. Grading is based on evaluation of these reports, take-home case studies, laboratory performance, and weekly quizzes.

**BIOAP 419 Advanced Animal Physiology Experimentation**

Spring. 3 credits. Prerequisite: BIOAP 319 previous semester or permission of instructor. Limited to 12 students selected on the basis of project proposals. Lab to be arranged. Coordinator and advisor: R. A. Corradino. Advanced research on selected aspects of laboratories conducted in BIOAP 319, Animal Physiology Experimentation. Close supervision is provided.

**BIOAP 486 Mammalian Physiology**

Spring. 3 credits. Enrollment limited. Graduate student auditors allowed. Prerequisite: BIOAP 311 or equivalent. Students not meeting this prerequisite must obtain written permission of instructor in T9 026 Vet Research Tower before the first class. Lecs, T R 10:10. R. A. Corradino. The course offers an in-depth treatment of selected topics in mammalian and human physiology. Emphasis is on concepts and a working knowledge of physiology. Selected topics include: basic functional elements of biological systems; recurrent themes in physiology; design of multicellular animals; mammalian fluid compartments; homeostasis, membrane and epithelial transport; electrophysiology; cardiovascular physiology, gastrointestinal physiology; renal physiology; and acid/base. The lectures incorporate clinical correlations whenever appropriate. Occasional guest lecturers talk about work and careers in basic research and/or clinical medicine. Recommended for biological sciences majors, pre-med and pre-vet students, and beginning graduate students in physiology, nutrition, and animal science.

**BIOAP 619 Lipids (also Nutritional Sciences 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, molecular structure, and catalolysis; molecular biology, function and regulation of lipoprotein receptors; mechanism of hormonal regulation of lipolysis and fatty acid synthesis; and cholesterol metabolism and atherosclerosis.

**BIOAP 658 Molecular Mechanisms of Hormone Action**

Spring. 2 credits. Prerequisite: permission of instructor. Minimum enrollment of 6 required. Offered alternate years. Lecs, T R 10:10. R. A. Corradino. An advanced course developed from the current literature on general endocrine mechanisms. Primarily a lecture course with student discussion.

**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. One topic offered fall 1997: topics to be offered announced for spring 1998.

**BIOAP 711 Readings in Applied Animal Behavior**

Fall. 1 credit. Prerequisite: BIOAP 311 or equivalent. Offered alternate years. Lec, 1 hour each week to be arranged. K. A. Houpt.

**BIOAP 719 Graduate Research in Animal Physiology (also Veterinary Physiology 620)**

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. Students must register in Vet Research Tower 825. S-U grades optional. Hours to be arranged. Staff. Similar to BIO G 499 but intended for graduate students who are working with faculty members on an individual basis.

**BIOAP 757 Current Concepts in Reproductive Biology**

Fall. 3 credits. Limited to 20 students. Prerequisites: undergraduate degree in biology and a strong interest in reproductive biology. S-U grades optional. Offered alternate years. Lec/disc, T R 10:10-12:05. J. E. Fortune, W. R. Butler, and staff. A team-taught survey course in reproductive physiology/endocrinology. Lectures by a number of reproductive biologists on various aspects of male reproductive function (endocrine regulation, testis function, spermatogenesis, and sperm physiology/function); female reproductive function (endocrinology, ovarian development and functions, oocyte physiology/function); fertilization and early embryo development; pregnancy; parturition; puberty; and reproductive technology. Student participation in the form of discussions and/or presentations.

**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 to be arranged. Coordinator: P. W. Nathanielisz. 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 graduate students with the latest techniques/methods in physiological 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. Coordinator: P. W. Nathanielisz. 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 graduate students with the latest techniques/methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

**Related Courses in Other Departments**

Adaptations of Marine Organisms (Biological Sciences [BIOG] 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 [BIOD] 385)

Embryology (Biological Sciences [BIOD] 389)

Fundamentals of Endocrinology (Animal Science 427)

Insect Morphology (Entomology 322)

Integration and Coordination of Energy Metabolism (Biological Sciences [BIOM] 637 and Nutritional Sciences 636)

Neuroanatomy (Veterinary Anatomy 504)

Sensory Function (Biological Sciences [BION] 492)

Teaching Experience (Biological Sciences [BIO G] 498)

Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

**BIOCHEMISTRY, MOLECULAR AND CELL BIOLOGY**

**BIOBM 132 Orientation Lectures in Biochemistry**

Spring, weeks 1-5. No credit. Primarily for freshmen, sophomores, and transfer students. S-U grades only (registered students receive an unsatisfactory grade for nonattendance). Lecs, S 10:10-11:00, for first three S of semester. Section chair and staff. Discussions by six professors about their research and promising areas for research in the future.

**BIOBM 233 Introduction to Biomolecular Structure**

Fall. 2 credits. Limited to 30 students. Prerequisites: CHEM 207-208 or equivalents. Lecs, T R 2:30-3:30. S. E. Ealick. This course is intended for students with a basic understanding of chemistry who are considering a program of study in biochemistry. The interaction between the structure and function of biologically important molecules are explored. Emphasis is placed on understanding the way in which the three-dimensional arrangements of atoms...
determine the biological properties of both small molecules and macromolecules such as proteins and enzymes. The study of molecular structure is aided by interactive computer graphics for visualizing three-dimensional structures of molecules.

[BIOBM 320 Physics of Life (also Applied and Engincers 320)]

[BIOBM 330-332 Principles of Biochemistry]
Introductory biochemistry is offered in three formats: individualized instruction (330) and lectures (331 and 332) during the academic year and lecture (333) during the summer. Individualized instruction is offered to a maximum of approximately 250 students each semester. Lectures given full semester (331) and spring semester (332).

[BIOBM 330 Principles of Biochemistry, Individualized Instruction]
Fall or spring. 4 credits. Prerequisites: one year of introductory biology for majors and one year of general chemistry and CHEM 253 or 257 or 357-358 or equivalent, or permission of instructor. Concurrent registration in BIOBM 330 is encouraged. May not be taken for credit after BIOBM 331, 332, or 333. S-U grade optional for graduate students only. Hours to be arranged. Evening prelims: fall, Oct. 7 and Nov. 6; spring, Feb. 26 and Apr. 2. J. F. Blankenship, G. S. Albrecht, P. C. Hinkle, P. A. Karplus, and staff. Fourteen units that cover protein structure and function, enzymes, basic metabolic pathways, DNA, RNA, and protein synthesis. An introduction to gene cloning. No formal lectures; autotutorial format; discussion sessions on three research papers on protein structure and function.

[BIOBM 331 Principles of Biochemistry: Proteins and Metabolism]
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and one year of general chemistry and CHEM 253 or 257 or 357-358 or equivalent, or permission of instructor. May not be taken for credit after BIOBM 330 or 333. S-U grades with permission of instructor. Lecs. M W 10:10. Evening prelim. Oct. 21. G. W. Feigena.
The chemical reactions important to biology, and the enzymes that catalyze these reactions, are discussed in an integrated format. Topics include methods for studying proteins, protein folding, enzyme catalysis, bioenergetics, and key reactions of synthesis and catabolism.

[BIOBM 332 Principles of Biochemistry: Molecular Biology]
Spring. 2 credits. Prerequisites: one year of introductory biology for majors and previous or concurrent registration in organic chemistry, or permission of instructor. May not be taken for credit after BIOBM 330 or 333. S-U grades optional, with permission of instructor. Lecs. T R 12:20. J. M. Calvo. A comprehensive course in molecular biology that covers the structure and properties of DNA, DNA replication and recombination, synthesis and processing of RNA and proteins, the regulation of gene expression, and the principles and uses of recombinant DNA technologies.

Section 02 Experimental Proteins and Enzymology
Experiments include purification of enzymes by ion exchange chromatography and affinity chromatography, determination of kinetic parameters for an enzyme, analysis of proteins by rate zonal sedimentation, SDS-polyacrylamide gel electrophoresis, and immunoblotting.

Section 03 Experimental Cell Biology
Spring only. 2 credits. T. T. Huffman.
Experiments include culture of animal cells, transfection, immunofluorescence microscopy, and evaluation of cellular stress responses using radioisotope labeling methods.

[BIOBM 432 Survey of Cell Biology]
Spring. 3 credits. Prerequisite: BIOBM 330, 331, or 332, and previous or concurrent registration in 332, or equivalent. S-U grades optional for graduate students only. Lect. M W 8:40-9:50. W. J. Brown and staff. A survey of a wide array of topics focusing on the general properties of eucaryotic 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, BIOBM 632, 636, and 639.

[BIOBM 433 Biotechnology: Molecular Basis (formerly BIOBM 434)]
Summer (5-week session). 3 credits. Prerequisite: BIOBM 330 or 331 and 332 or 333 or equivalent. Lec to be arranged. S. Ely. This course provides a detailed account of the biochemistry and molecular biology behind recent biotechnological advances and commercial introductions. Topics include the use of transgenic bacteria in bioremediation and for insect control, of transgenic plants to produce novel biopesticide delivery and protection systems, and the engineering of plants and animals for production of pharmaceutical and other valuable materials.

[BIOBM 434 Applications of Molecular Biology to Medicine, Agriculture, and Industry (formerly BIOBM 430)]
Spring. 3 credits. Enrollment limited to 36 students with preference given to seniors and students concentrating in biochemistry or molecular and cell biology. Prerequisites: BIOBM 330 or 333 or 332 or equivalent. Lec to be arranged. S. Ely. This is a capstone course designed to help students integrate information from disciplines such as biochemistry, molecular biology, cell biology, genetics, immunology, virology, microbiology, and plant biology. Students in groups of three investigate some practical applications of molecular biology, with an emphasis on underlying basic principles. Examples of topics include introducing genes into bacteria, plants, and animals; importance of model organisms in producing useful substances such as vaccines, enzymes, hormones, and drugs; transgenic animals; engineering plants resistant to insects; mapping and cloning disease genes; DNA-based diagnosis of genetic diseases; gene therapy; and genome projects. By the
end of the term, students have consulted a variety of texts and reference works and explored databases, web sites, personal interviews, and the telephone as ways of getting information. In addition, students present oral presentations and create a Web site.

BIOBM 435-436 Undergraduate Biochemistry Seminar

435; Fall; 436; spring. 1 credit each term. May be repeated for credit. Limited to upper-grade undergraduate preregistration only.

BIOBM 330 or 333 or 331 and 332 or written permission of instructor. S-U grades only. Sem to be arranged. Organizational meeting first W of each semester at 4 p.m.

BIOBM 631 Protein Structure and Function

Fall. 3 credits. Prerequisites: BIOBM 330 or 333 or 331 and 332 or organic chemistry. Recommended: physical chemistry. S-U grades optional. Lect., M W F 9:05. L. Nicholson.

Presentations on the principles of protein structure and the nature of enzymatic catalysis. Specific topics include protein folding, stability, dynamics and evolution, folded conformations and structure prediction, ligand binding energetics, and the structural basis of catalysis.

BIOBM 632 Membranes and Bioenergetics

Spring. 2 credits. Prerequisite: BIOBM 330 or 333 or 331 and 332 or equivalent. Offered alternate years. Lect., T R 11:15.

P. C. Hinke.

Structure and dynamics of biological membranes, physical methods, model membranes, ionophores, ion-transport ATPases, mitochondrial and chloroplast electron transfer chains, and examples of transport from plants, animals, and bacteria. Emphasis given to structure of membrane proteins.

BIOBM 633 Biosynthesis of Macromolecules


Synthesis of DNA, RNA, and proteins, and regulation of gene expression.

BIOBM 635 Mechanisms of Metabolic Regulation and Mammalian Gene Expression (also Nutritional Sciences 635)

Spring. 2 credits. Prerequisites: at least 4 credits of Principles of Biochemistry and CHEM 358 or 360; or permission of instructor. Offered alternate years. Not offered 1997-98. Lect., T R 9:05.

M. N. Kazarinoff, N. Noy, P. Stover.

Molecular mechanisms by which sensory, hormonal, and nutritional inputs cause changes in enzyme activity in order to regulate metabolic transformations. Emphasis is on gene expression, protein modification, and allosteric effects using examples from mammalian systems. Consideration of identification and characterization of regulatory steps in metabolism from both theoretical and practical aspects.

BIOBM 636 Cell Biology

Spring. 2 credits. Prerequisites: BIOBM 330 or 333 or 331 and 332, or their equivalents. Lect., T R 9:05.

A. P. Bretcher.

Lectures covering current topics in cell biology, including a detailed discussion of secretion, endocytosis, membrane-bound organelles, membrane recycling, the cytoskeleton, cell motility, junctions, the cell cycle, and related topics. Together with BIOBM 632 and 639, this course provides broad coverage of the cell biology subject area.

BIOBM 637 Integration and Coordination of Energy Metabolism (also Nutritional Sciences 638)

Fall. 3 credits. Prerequisite: BIOBM 330 or 333 or 331 or equivalent. Lect., M W F 9:05. Evening prelins to be arranged. W. J. Arion.

The elements and dynamics of energy metabolism in humans and higher animals are developed systematically through biochemical characterizations of the metabolic components and structure of major tissues and organs. Emphasis is placed on correlations with physiologic functions. Mechanisms that control energy metabolism within individual tissues and coordinate these processes in vivo are analyzed in the contexts of selected physiologic and pathologic stresses.
replacement, molecular replacement, model building, refinement, and structure interpretation.

**BIOBM 750 Cancer Cell Biology (also Veterinary Pathology 750)**
Spring. 3 credits. Prerequisite: BIOBM 350 or 353 or 351 and 332 or equivalent. Offered every other year. Lects to be arranged. J. Guan, R. Levine, B. Pauli, A. Yen.

Course covers molecular, cellular and genetic aspects of cancer. The course is divided into three sections: The first section addresses general cell biology, progression and metastasis; the second section looks at cell-matrix and cell-cell interactions in cancer; and, the third section focuses on cell cycle. For a detailed course description, see the Division of Biological Sciences "Course Supplement."

**BIOBM 751 Ethical Issues and Professional Responsibilities (also Toxicology 751 and Science and Technology Studies 751)**
Spring. 2 credits. Limited to graduate students beyond first year. S-U grades only. Sem, W 2:30-3:15. Additional sections may be offered. Organizational meeting will be held on Wednesday, Jan. 21, 2:50 P.M., in 180 Biotechnology Building. J. M. Fessenden MacDonald. Ethical issues in research and the professional responsibilities of scientists are discussed in a case-study format. Topics to be discussed include regulations; data selection, manipulation, and representation; fraud, misconduct, and whistle-blowing; conflicts of interest and commitment; authorship, ownership, and intellectual properties; peer review and confidentiality; scientific response to external pressure; legal liabilities; and professional codes of ethics.

**BIOBM 830 Biochemistry Seminar**
Fall or spring. No credit. Sem, F 4-6:00.

Lectures on current research in biochemistry, presented by distinguished visitors and staff members. Lectures are open to everyone, but registration limited to graduate students in Biochemistry, Molecular and Cell Biology.

**BIOBM 831 Advanced Biochemical Methods I**
Fall. 6 credits. Limited to graduate students majoring in biochemistry. S-U grades optional. Labs and disc, 12 hours each week to be arranged. Organizational meeting first R of semester, 10:10. B. M. Tyler and staff.

This course emphasizes experimental design and the concepts implicit in current approaches to research in biochemistry and cell biology. Students are required to read papers and participate actively in discussions in order to design their own protocols before performing experiments using the techniques most common in the recent literature of these fields.

**BIOBM 832 Advanced Biochemical Methods II**
Spring. 6 credits. Limited to graduate students majoring in biochemistry. S-U grades only. Lab to be arranged. Staff (Coordinator: P. A. Karpplus, graduate faculty representative).

Research in the laboratories of two or three different professors chosen by the student. Arrangements are made jointly between the graduate field representative 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 biochemistry. S-U grades only. Sem, M 12:20-1:30. T. C. Huffaker, W. J. Brown, J. T. Lis.

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 835-836 Methods and Logic in Biochemistry, Molecular and Cell Biology**
835, fall; 836, spring. 1 credit each term. Limited to first-year graduate students majoring in the Field of Biochemistry, Molecular and Cell Biology. S-U grades only. Sem and disc to be arranged. Fall: S. E. Ealick, G. P. Hess; spring: Staff.

A seminar course with critical discussion by students of original research papers. A variety of topics in biochemistry, molecular and cell biology are covered.

**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 758)**
- **Teaching Experience (Biological Sciences [BIO G] 498)**
- **Undergraduate Research in Biology (Biological Sciences [BIO G] 499)**

**ECOLOGY AND EVOLUTIONARY BIOLOGY (BIOES)**

**BIOES 154 The Sea: An Introduction to Oceanography (also Geological Sciences 104)**
Spring. 3 or 4 credits (+credit option includes one 2 1/2 hour laboratory each week). S-U grades optional. Lecs, T R 11:40-12:55; labs, M or W 2:00-2:45, or M 7:30-9:35 p.m. C. H. Greene, W. M. White.

A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include: sea-floor spreading and plate tectonics, marine-sedimentation, chemistry of seawater, ocean currents and circulation, the oceans and climate, ocean ecology, coastal processes, marine pollution, and marine resources.

**BIOES 261 Ecology and the Environment**
Fall or summer. 4 credits. Prerequisite: one year of introductory biology. S-U grades optional. Lecs, M W F 11:15; disc, W or R 1:25, 2:30, or 3:35. N. G. Hairston, Jr., P. P. Feeny.

An introduction to principles of ecology concerning the interactions between organisms and their environment. The course covers both terrestrial and aquatic ecology, drawing examples from both plant and animal studies. Phenomena that occur at the individual, population, community, and ecosystem levels of organization are discussed. Ecological principles are extensively applied to current environmental problems and issues.

**BIOES 263 Field Ecology**
Fall. 2 credits. Limited to 25 students. Prerequisite: concurrent or previous enrollment in BIOES 154. Lecs, R 1:25; lab, F 12:20-5:00; 1 weekend field trip to the Hudson Valley. A small fee may be required for field trips. 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, sampling plankton, and use of scientific collections.

**BIOES 264 Birds in Biology, Lectures**

Using birds as a starting point, this course aims at bringing exciting new insights in bird biology to non-majors. Bird research has often generated new insights in the biological sciences. Starting from studies on birds, a number of topics from a variety of biological disciplines can be addressed. These include problems from behavioral ecology (mating systems, sperm competition, extra-pair paternity, territorial behavior, song), from population ecology (population dynamics, micro-evolution, competition), from evolutionary biology (trade-offs in life history theory, optimal clutch size) and from conservation biology (biodiversity, habitat fragmentation, inbreeding.)

**BIOES 266 Birds in Biology, Laboratory**
Spring. 1 credit. Limited to 40 students. Intended for students with no background in biology. Prerequisite: concurrent enrollment in BIOES 264. S-U grades optional. Lab, S 9:05-12:05; some all-day field trips to be arranged. Carpooling to the Vertebrate Collections at Research Park is necessary several times during the semester. Not offered 1997-98. A. A. Dhondi.

Laboratories supplement the lecture course and provide hands-on experience. Laboratories include field trips, some field-research experience, and work in the Cornell bird collections.

**BIOES 267 Introduction to Conservation Biology**
Fall. 3 credits. May not be taken for credit after NTRES 440. S-U grades optional. Lecs, M W 9:05; disc, one hour each week to be arranged. A. S. Tewksbury, J. W. Fitzpatrick.

An exploration of biological concepts related to conserving the Earth's biodiversity, introducing ecological and evolutionary principles important for understanding major conservation problems. Topics include patterns of species and ecosystem diversity, causes of extinction, genetic risks of small populations, design of nature preserves, strategies for protecting endangered species, ecosystem restoration, and the value of biodiversity.
A broad survey of the fossil evidence for human evolution with special attention to skeletal and dental anatomy, geological contexts, palaeoecology, dating methods, archaeological associations, and current theories of human origins and physical diversity.

**BIOES 373 Biology of the Marine Invertebrates**

Fall. 4 credits. Limited to 30 students. Prerequisite: one year of introductory biology for majors. Offered alternate years. Lecs, M W F 10:10; lab, W 1:25–4:25; optional field trip to Shoals Marine Laboratory. $60 fee for optional field trip. C. D. Harvell.

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 field trip is an excellent opportunity to study representatives of most of the major phyla in their natural habitat. Laboratory demonstrations on campus involve live marine and freshwater invertebrates.

**BIOES 452 Herbivores and Plants: Chemical Ecology and Coevolution (also Entomology 452)**

Spring. 3 credits. Prerequisites: one year of introductory biology, BIOES 261, CHEM 253 or 357/358 and 251 or 301, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1997–98. Lecs, M W F 11:15. Field trips, additional lectures, or laboratory demonstrations may be held in place of F lecture. P. P. Feeny.

Topics include significance of plant chemistry in mediating interactions between plants and herbivorous animals; mechanisms and strategies of plant finding and exploitation by animals, especially insects, and of defense and escape by plants, evolutionary hypotheses for ecological patterns of resistance and attack, and implications for human food and agriculture.

**BIOES 455 Insect Ecology (also Entomology 455)**

Fall. 3 credits. Prerequisites: BIOES 261 or equivalent and ENTOM 212 or knowledge of another taxon. S-U grades optional. Offered alternate years. Lecs, M W F 11:15. R. B. Root.

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.

**BIOES 456 Stream Ecology (also Entomology 456 and Natural Resources 456)**


Lectures address 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: A field project includes designs, experimentation, techniques and hypotheses testing related to environmental assessment.
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This course examines the biological and historical factors affecting the structure of plant communities, and the distribution, abundance, and population dynamics of individual species. The influence of the environment, disturbance history, competition, and herbivory on the organization of plant communities are considered. Plant populations are also studied through an analysis of plant life histories and plant-plant and plant-animal interactions. Throughout the course an attempt is made to blend empirical patterns, experimental results, and theory. Readings are drawn from the primary literature.

[BIOES 464 Macroevolution] Spring. 4 credits. Limited to 25 students. Prerequisite: BIOES 278 or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Lectures, T R 10:10–11:25; 1 disc hour each week to be arranged. A. R. McCune. An advanced course in evolutionary biology centered on large-scale features of evolution. Areas of emphasis include patterns and processes of speciation, phylogeny reconstruction, the origins and fate of variation, causes of major evolutionary transitions, and patterns of diversification and extinction in the fossil record. Discussion of these problems involve data and approaches from genetics, systematics, paleoecology, development, and ecology.

[BIOES 465 Plant Ecology and Population Biology, Laboratory] Fall. 1 credit. Prerequisite: concurrent enrollment in BIOES 463. Offered alternate years. Not offered 1997–98. Lab, F 12:00–5:00. M. A. Geber, P. L. Marks. Laboratory and field exercises 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.

[BIOES 466 Physiological Plant Ecology, Lectures (also BIOPL 466)] Spring. 3 credits. Limited to 45 students. Prerequisite: BIOES 261 or introductory plant physiology. S-U grades optional, with permission of instructor. Offered alternate years. Lab, F 8:40–10:55; 1 disc hour each week to be arranged. E. C. M. Fernandes. 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 3 hours/week in additional lab time for this course.

[BIOES 468 Physiological Plant Ecology, Laboratory (also BIOPL 468)] Spring. 2 credits. Limited to 15 students. Prerequisite: previous or concurrent enrollment in BIOES 466. Offered alternate years. Lab, W 1:25–4:25, plus additional lab hours to be arranged. T. E. Dawson. 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 3 hours/week in additional lab time for this course.

[BIOES 470 Ecological Genetics (also Entomology 470)] Spring. 4 credits. Prerequisite: BIOES 278 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1997–98. Lectures, T R 10:10–11:25; 1 disc hour each week to be arranged. Staff. A study of the relationships between genetic and ecological processes in populations. Topics include consequences of genetic variation in age-structured populations; demographic concepts of fitness; evaluation of methods for measuring genetic variation and natural selection on ecologically important traits; genetics of competitive ability and predator avoidance; genetic and ecological aspects of phenotypic plasticity; character displacement; maintenance of genetic variability; limits to selection. How theory can be used to formulate hypotheses about evolutionary mechanisms in natural populations is considered and experiments designed to test such hypotheses are evaluated.

[BIOES 471 Mammalogy] Fall. 4 credits. Recommended: BIOES 274. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1997–98. Lab, F 12:20–2:20; lab, M T W F 1:25–4:25; 1 weekend field trip required. Carpooling to the Vertebrate Collections at Research Park is necessary several times during the semester. Fee, $15. Staff. Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systematics, ecology, and natural history of mammals of the world, with primary emphasis on the North American fauna. Systematics laboratories held in the museum at Research Park. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics laboratory exercises are based on museum specimens.

[BIOES 472 Herpetology] Fall. 4 credits. Recommended: BIOES 274. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1997–98. Lectures, T R 12:20; labs, M W or T R 1:25–4:25; occasional field trips and special projects. Fee, $15. Staff. Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior, and physiology. Laboratory includes systematics, functional morphology, and behavior. Live animals are studied in the field and are used in the laboratory for nondestructive demonstrations and experiments.

[BIOES 473 Ecology of Agricultural Systems (also Soil, Crop, and Atmospheric Sciences 473)] Fall. 3 credits. Limited to 45 students. Prerequisite: BIOES 261 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1997–98. Lectures and labs, T R 2:30–3:45. During the first 6 weeks of class, the Thursday meetings may run to 5:00 because of field trips. A. G. Power, E. C. M. Fernandes.

Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics, 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.

[BIOES 474 Laboratory and Field Methods in Human Biology (also Anthropology 474)] Spring. 5 credits. Limited to 16 students with permission of instructor obtained by preregistering in E241 Conson. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Offered alternate years. Not offered 1997–98. Lectures, T R 10:10–12:05; additional hours to be arranged. Independent research project required. K. A. R. Kennedy.

Practical exercises and demonstrations of modern approaches to the methodology of physical anthropology. Emphasis on comparative human anatomy, osteology, description of skeletal and living subjects, paleopathology, skeletal maturation, and relevant field techniques for the archaeologist and forensic anthropologist. Case studies on the dissection of a profused (dead) nonhuman primate, usually a macaque or baboon. Students attend demonstrations of the dissection prepared by the prosector (a hired graduate student).

[BIOES 475 Ornithology] Fall. 4 credits. Limited to 30 students, with permission of instructor obtained by preregistering in E241 Conson. Recommended: BIOES 274. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1997–98. Lectures, T R 12:20–2:20; occasional field trips and special projects. Carpooling to the Vertebrate Collections at Research Park is necessary once a week. Fee, $15. 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 systematic identification of avian families of the world and species of New York. Independent projects emphasize research skills.

[BIOES 476 Biology of Fishes] Fall. 4 credits. Limited to 24 students. Recommended: BIOES 274 or equivalent experience in vertebrate zoology. S-U grades optional, with permission of...
An introduction to the study of fishes: their structure, evolution, distribution, ecology, physiology, behavior, classification, and identification, with emphasis on local species. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive observations or experiments. The systematics and dissection laboratories use preserved specimens.)

[BIOES 478 Ecosystem Biology] Spring. 4 credits. Prerequisite: BIOES 261 or equivalent. S-U grades optional. Offered alternate years. Not offered 1997–98. Lecs and discs, T R 10:10–12:05. L. O. Hedlin, R. W. Howarth. Analysis of ecosystems in terms of energy flow and nutrient cycles, emphasizing an experimental approach and comparative aspects of terrestrial, freshwater, and marine ecosystems. Consideration of anthropogenic effects on ecosystems, such as from acid precipitation and offshore oil pollution. Analysis of climate change and regional environmental change from an ecosystem perspective.)

[BIOES 479 Paleobiology (also Geological Sciences 479)] Fall. 3 credits. Prerequisites: one year of introductory biology for majors and either BIOES 274, GEOL 375, BIOES 373, or permission of instructor. Offered alternate years. Lecs, M W F 12:20. J. L. Cisne and H. F. A survey of the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of geology students and the geological backgrounds of biology students concerning the nature and significance of the fossil record for their respective studies.

[BIOES 660 Field Studies in Ecology and Systematics] Fall or spring. Variable credit. Prerequisites: BIOES 261, a tuxon-oriented course, and permission of instructor. S-U grades optional. Offered alternate years. Lecs and field trips to be arranged. Estimated costs: to be announced. Staff. This course provides students with opportunities to learn field techniques and new biotas 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 in the Division’s “Course Supplement” issued 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
Fall. 2 credits. Prerequisite: Undergraduates must have previous experience or course work with marine or freshwater invertebrates. Offered alternate years. Not offered 1997–98. Two extended weekend field trips in early September and October. Fee: $100 (to help cover transportation and housing at Shools Marine Lab). C. D. Harvell, N. G. Hairston, Jr. Field trips to the Shools Marine Lab and Shackleton Point Field Station. Students employ experimental approaches to study the evolution of invertebrate life histories.

Section 02: Graduate Field Course in Ecology
Spring. 3 credits. Restricted to graduate students. Offered alternate years. A fee will be required to help cover food and lodging for trip to Florida. 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 the first half of the field course in early September and during the following week. The class visits several ecosystems including sand pine scrub, cattle ranches, cypress swamps, everglades, and coral reefs.

[BIOES 661 Environmental Policy (also ALS 661 and Biology and Society 461)] Fall and spring. 3 credits each term. (Students must register for 6 credits each term, since an "R" grade is given at the end of the fall term.) Limited to 12 students. Prerequisite: permission of instructor. S. D. Pimentel. This course uses an interdisciplinary approach to focus on complex environmental problems. Ten to twelve students, representing several disciplines, investigate significant environmental problems. The team spends two semesters preparing a scientific report for publication in Science or BioScience.

[BIOES 663 Theoretical Population Genetics] Fall. 3 credits. Prerequisites: knowledge of basic population genetics (e.g., BIOGD 481), and some mathematics (e.g., MATH 111). Prerequisites for graduate students: permission of instructor required for undergraduates. S-U grades optional. Offered alternate years. Not offered 1997–98. Lec, 2 hours each week to be arranged; lab (computer), 3 hours each week to be arranged. A. S. Kondrashov. Theoretical population genetics (TPG) is one of the areas of current evolutionary biology. The course explains why TPG is successful in its domain and what its limitations are. Students analyze the effects of seven elementary factors of population dynamics (mutation, selection, drift, migration, segregation, recombination, and non-random mating). Consideration of biologically-relevant situations when several factors act simultaneously (migration-drift, mutation-selection-drift, segregation-recombination-selection, etc.) leads to understanding the changes of not only the population state, but of the "rules of the game" themselves (evolution of reproductive isolation, life history, recombination, mutability, etc.). Students study in detail several topics of general biological interest (maintenance of quantitative variability, evolution of aging, and sexual selection). Active use of computers in analyzing the models, but no formal training in programing required.)


[BIOES 668 Principles of Biogeochemistry] Spring. 4 credits. Limited to 20 students. Prerequisite: solid background in ecology, environmental chemistry, or related environmental sciences. Permission of instructor required for undergraduates. S-U grades optional. Offered alternate years. Lecs and discs, T R 10:10–12:05. R. W. Howarth, L. O. Hedlin. 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.

[BIOES 669 Plant Ecology Seminar] Spring. 1 credit. May be repeated for credit. Suggested for students majoring or minoring in plant ecology. S-U grades optional. Sem to be arranged. Staff. Includes review of current literature, student research, and selected topics of interest to participants.

[BIOES 670 Graduate Seminar in Vertebrate Biology] Fall or spring. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades only. Sem to be arranged. Staff. Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

[BIOES 672 Graduate Seminar in Physiological Ecology] Spring. 2 credits. May be repeated for credit. Limited to 12 students. Prerequisite: a course in plant or animal physiology. Permission required for undergraduates. S-U grades only. Offered alternate years. Sem, 2 hours each week to be arranged. T. E. Dawson and staff. Discussion of topics on water balance, energetics, and temperature regulation emphasize parallels and contrasts in the relations of animals and plants to their biophysical environments. Readings are taken from the primary literature and are biophysical, ecological, and evolutionary in scope. Each student leads a discussion and prepares a written review of a topic, drawing on the primary literature of his or her own research interests.

[BIOES 673 Human Evolution: Concepts, History, and Theory (also Anthropology 673)] Fall. 3 credits. Prerequisite: one year of introductory biology, ANTHR 101, or permission of instructor. Offered alternate years. Not offered 1997–98. Lec, M 2:30; sem and disc, W 7:30–9:30 p.m. K. A. R. Kennedy. The historical background of present-day concepts of man's evolutionary variations and adaptations in space and time is surveyed. 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.
BIOES 760 Special Topics in Evolution and Ecology
Fall or spring. 1–3 credits. May be repeated for credit. Enrollment limited. S-U grades optional, with permission of instructor. Hours to be arranged. Staff. Independent or group intensive study of special topics of current interest. Content varies and is arranged between student and staff member.

BIOES 767 Current Topics in Ecology and Evolutionary Biology
Fall. 4 credits. Prerequisite: permission of instructor required for undergraduates. S-U grades only. Lects and discs, T R 8–9:55; 1 weekend field trip. Staff. Critical evaluation and discussion of theory and research in ecology and evolutionary biology. Lectures by faculty and student-lead discussions of topics in areas of current importance.

Related Courses in Other Departments
Advanced Soil Microbiology (Soil, Crop, and Atmospheric Sciences 666)
Animal Social Behavior (Biological Sciences [BIONB] 427)
Early People: The Archaeological and Fossil Record (Anthropology 203 and Archaeology 255)
Evolution of the Earth and Life (Biology Sciences [BIO G] 170 and Geological Sciences 102)
Marine Ecology (Biometry and Statistics 662)
Related Courses in Entomology (Entomology 212, 331, 332, 370, 453, 471, 631, 634, 672)
Related Courses in Natural Resources (Natural Resources 301, 302, 418, 450, 496)
Taxonomy of Vascular Plants (Biological Sciences [BIOPL] 248)
Teaching Experience (Biological Sciences [BIO G] 498)
Undergraduate Research in Biology (Biological Sciences [BIO G] 499)
Undergraduate Seminar in Biology (Biological Sciences [BIO G] 400)

GENETICS AND DEVELOPMENT (BIOGD)

BIOGD 184 Understanding Genetics
Spring. 3 credits. May not be taken for credit after BIOGD 281 or 282. This course may be used toward the science distribution requirement of the College of Arts and Sciences and the Group B distribution requirement of the College of Agriculture and Life Sciences. This course may not be used to fulfill the requirements for any Program of Study in the biological sciences major. S-U grades optional. Offered alternate years. Not offered 1997–98. Lects, M W F 9:05. T. D. Fox. An introduction to genetics for students majoring in fields other than biology. Genetics is a rapidly developing science that is providing insight into all aspects of biology and practical tools which increasingly affect our lives. The course shows how major conclusions about inheritance have been derived from the experimental evidence, drawing on examples from the biology of humans, other animals, plants, fungi, and bacteria. It also illustrates current and future applications of genetic discoveries. For example, the basic principles of inheritance, in conjunction with methods for the isolation and detection of specific gene fragments, is used to understand the detection of genetic diseases and the identification of individuals (DNA fingerprinting). Other topics to be covered include the origin of mutations, use of genetic methods to alter the properties of organisms and the influence of inheritance on behavior.

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. Lects, T R 10:10–12:05; labs, W or F 2:30–4:25; additional hours to be arranged. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Problem-solving sessions strongly recommended. T or W 8:30–9:45 (additional session to be arranged if necessary). T. D. Fox, M. L. Goldberg, R. J. MacIntyre.

A general study of the fundamental principles of genetics in eukaryotes and prokaryotes. Discussions of 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 25 students. Prerequisite: one year of introductory biology or equivalent. Permission of instructor required for students who have taken BIOGD 281. S-U grades optional. Lects, M W F 10:10 (lects, also F 10:10 1st 3 weeks only); disc, R 10:10 or F 10:10 or 11:15. R. A. Calvo. A course designed for nonmajors. Lectures provide the technical background needed to understand controversial personal, social, and legal implications of modern genetics that are discussed in section meetings.

BIOGD 385 Developmental Biology
Fall. 3 credits. Prerequisite: BIOGD 281. Lects, M W F 11:15. K. J. Kemphues. An introduction to the morphogenetic, cellular, and genetic aspects of the developmental biology of animals.

BIOGD 387 Developmental Aspects of Evolution
Fall. 2 credits. Prerequisite: BIOGD 281. S-U grades optional. Offered alternate years. Lects, T R to be arranged. A. W. Blackler. An examination of the developmental mechanisms that underlie evolutionary change and organismal diversity and of the developmental constraints that contribute to evolutionary conservatism.

BIOGD 389 Embryology
Spring. 3 credits. Preference given to seniors. Prerequisites: one year of introductory biology and a knowledge of mammalian adult anatomy. Lects, T R 10:10; labs, T or R 2–4:25. A. W. Blackler. A course in the embryonic development of vertebrate animals, with emphasis on the comparative aspects of morphogenesis and function at the tissue and organ levels. The laboratory has a strong morphogenetic bias, emphasizing the comparative aspects of developmental anatomy and preparation for medical studies.

BIOGD 480 Seminar in Developmental Biology
Spring. 1 credit. May be repeated for credit. Limited to upperclass students. Prerequisite: BIOGD 281. S-U grades only. Sem to be arranged. Staff.

BIOGD 481 Population Genetics
Fall. 4 credits. Prerequisite: BIOGD 281, BIOES 278, or equivalents. Lects, M W F 10:10; disc, M 2:30 or T 1:25. C. F. Aquadro. Population genetics is the study of the transmission of genetic variation through time and space. The class explores how to quantify this variation, what the distribution of variation tells us about the structure of natural populations, and about the processes that lead to evolution. Topics include the diversity and measurement of genetic variation, mating and reproductive systems, selection and fitness, genetic drift, migration and population structure, mutation, multilocus models, the genetics of speciation, quantitative traits, and the maintenance of molecular variation. Emphasis is placed on DNA sequence variation, and the interplay between theory and the data from experiments and natural populations. Specific case studies include the population genetic issues involved in DNA fingerprinting, 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. 3 credits. Enrollment limited to 24 senior biological sciences majors, with preference given to students studying genetics and development. Prerequisites: BIOGD 281 and BIOBM 330 or 333 or 335 and 332, and written permission of instructor. S-U grades optional. Disc, T 2:30–4:25 and R 2:30–3:30. R. A. Calvo, H. T. Stinson. Presentation of some of the science and technology, plus discussion of the ethical, social, and legal implications of recent advances in human genetics. Among the topics considered are new reproductive strategies, eugenics, genetic counseling, genetic screening (pre-implantation, prenatal, neonatal, presymptomatic, carrier, and workplace), wrongful life and wrongful birth, genetic effects of abused substances, genetics and behavior, and the therapy for genetic diseases. Students lead most discussions. There is a major writing component in the course.
[BIODG 483 Molecular Aspects of Development]
Spring. 3 credits. Prerequisites: BIODG 281, BIOMM 332 (preferred) or 330 or 333; and BIODG 385. Offered alternate years. Not offered 1997–98. Lecs, T R 2:30–4:00. M. F. Wolfner.

An advanced course in developmental biology, with emphasis on the role of fruit fly development under normal and abnormal conditions. Simultaneously, a molecular 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 cell-cell communication. Numerous developmental systems are discussed and analyzed in microorganisms, plants and, especially, animals including fruit flies, nematode worms, and vertebrates such as mice and humans. Course readings include original research articles. Discussion emphasizes specific experiments and approaches, results and their interpretation.

[BIODG 484 Molecular Evolution]
Spring. 3 credits. Prerequisites: BIODG 281 and organic chemistry. Offered alternate years. Lecs, T R 11:15. R. J. MacIntyre.

An analysis of evolutionary changes in proteins and nucleic acids. Theories on the evolution of the genetic code and the construction of phylogenetic trees from biochemical data are discussed. The second half of the course concerns the evolution and the organization of genomes from viruses to higher eukaryotes.

[BIODG 485 Bacterial Genetics (also BIOMI 485)]
Fall. 2 credits. Graduate students, see BIOMI 685. Prerequisite: BIODG 281. Recommended: BIOMI 290 and BIOMI 330 or 331 and 332 or 333. Lecs, W 7:30–9:25 p.m. V. J. Stewart.

For course description, see BIOMI 485.

[BIODG 486 Advanced Eukaryotic Genetics]
Spring. 4 credits. Enrollment may be limited to 50 students. Prerequisites: BIODG 281, BIOMM 330 or 333 or 331 and 332. S-U grades optional. Lecs, T R 12:20–1:25 and R 12:20–1:10; disc R 12:25–1:25 or F 11:15–1:30. 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 cell cycle control or protein secretion, and then 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, chromosome organization, and protein trafficking.

[BIODG 488 Molecular Genetic Analysis]
Fall or spring. 3 credits. May be repeated for credit. Limited to 10 students. Prerequisites: BIODG 281 and written permission of instructor. Interview with instructor (8716 or bjs14@cornell.edu). S-U grades optional for graduate students only. Labs, T R 1:25–4:25; additional three hours each week to be arranged. B. J. Sneath.

Course teaches the basic principles of fruit fly development and provides students with hands-on research experience in modern experimental genetic methods. The course involves examining a collection of female-sterile Drosophila melanogaster mutants for P-element mutations disrupting early embryonic development. Utilizing mutant and cytoskeletal structures of mutants are characterized using fluorescence microscopy. The disrupted genes are cloned and sequenced using molecular genetic techniques. Antibodies against the gene products are prepared for immunofluorescence localization. A maximum of 3 credits may be used to fulfill the requirements in the Program of Study in Genetics and Development.

[BIODG 682 Fertilization and the Early Embryo]

This course treats the earliest events in the formation of a new organism. The methods and findings of genetic, developmental, and molecular analyses are discussed. Readings in the recent literature and discussions focus on pre-gastrulation embryos from several animal species. Topics include fertilization, pronuclear fusion, triggering mitosis, cleavage divisions, cytoplasmic determinants, changes in nuclear and cytoplasmic architecture, and midblastula transition.

[BIODG 684 Advanced Topics in Population Genetics]

An in-depth exploration of current areas of research in population genetics. Readings primarily from recent books and the current literature. Specific topics are announced the previous fall and in the division's catalog supplement. Format includes lectures, discussion, and presentations by students.

[BIODG 685 Advanced Bacterial Genetics (BIOMI 485)]
Fall. 2 credits. Limited to graduate students in Biological Sciences; see BIOMI 485. Prerequisites: BIODG 281 or equivalent, BIOMM 330 or 331 and 332 or 333, and permission of instructor. Recommended: BIOMI 290 or equivalent. Not offered 1997–98. Lec, W 7:30–9:25; disc, R 10:10–11:00. V. J. Stewart.

For course description, see BIOMI 485.

[BIODG 687 Developmental Genetics]

Selected topics focus on the use of genetic analysis in understanding mechanisms of development. Topics are drawn primarily from studies in Drosophila, Caenorhabditis, and mouse. Possible topics include pattern formation, cell lineage, neuronal development, maternal information in development, germ cell development, sex determination, and intercellular communication. Students read current literature and are given the opportunity to discuss each topic in class.

[BIODG 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. Sem to be arranged. Staff.

A seminar course with critical presentations and discussion of students' original research papers in a particular area of current interest. Content of the course and staff direction vary each year and are announced a semester in advance.

[BIODG 781 Problems in Genetics and Development]
Fall. 2 credits. Limited to first-year graduate students in the Field of Genetics and Development. Disc to be arranged. Staff.

An introduction to the research literature in selected areas through weekly problem sets and discussions.

[BIODG 782—783 Current Genetics/Development Topics]
Fall or 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. Not offered 1997–98. Staff.

[BIODG 786 Research 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. Lecs, W 12:20–1:30. S-U grades only. K. J. Kemphues.

Each graduate student presents one seminar per year based on his or her thesis research. The student then meets with the thesis committee members for an evaluation of the presentation.

[BIODG 787 Seminar in Genetics and Development]
Fall and spring. 1 credit. Limited to graduate students in Genetics and Development. S-U grades only. Sem, M 4–5:00. Staff.

Seminars in current research in genetics and developmental biology conducted by distinguished visitors and staff.

Related Courses in Other Departments

Advanced Plant Genetics (Plant Breeding 606)
Animal Development (Veterinary Anatomy 507)
Biosynthesis of Macromolecules (Biological Sciences [BIOBM] 633)
Current Topics in Biochemistry (Biological Sciences [BIOBM] 731–736)
Evolutionary Biology (Biological Sciences [BIOES] 278)
Laboratory in Molecular Biology and Genetic Engineering of Plants (Biological Sciences [BIOL] 347)
Laboratory in Plant Molecular Biology (Biological Sciences [BIOL] 641)
Molecular Biology and Genetic Engineering of Plants (Biological Sciences [BIOL] 343)
Neurogenetics (Biological Sciences [BIOB] 423)
Plant Cytogenetics (Plant Breeding 446)
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The Nucleus (Biological Sciences [BIOBM] 639)

Plant Molecular Biology II (Biological Sciences [BIOPL] 653)

Protein-Nucleic Acid Interactions (Biological Sciences [BIOMI] 692)

The Nucleus (Biological Sciences [BIOBM] 639)

Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

MICROBIOLOGY (BIOMI)

BIOMI 192 Microorganisms on the Planet Earth
A course in microbiology designed to introduce students, who have a limited background in science, to the microorganisms that populate our planet earth. Among the microorganisms studied are the bacteria, the archaebacteria, some of the single-celled plants and animals, and the viruses. Topics covered are the basic nature of microorganisms, their evolution on earth, their composition and growth, their role in the ecology of this planet, their role in human history and disease, and their use in bioengineering. This course is not a prerequisite for advanced courses in microbiology.

BIOMI 290 General Microbiology Lectures
Fall, spring, or summer (6-week session). 2 or 3 credits (2 credits if taken after BIOMI 192). Prerequisites: one year of introductory biology for majors and one year of college chemistry, or equivalent. Recommended: concurrent registration in BIOMI 291. Lect. M W F 11:15. D. R. Bond, S. M. Merkel.
A comprehensive overview of the biology of microorganisms, with emphasis on bacteria. Topics include microbial cell structure and function, physiology, metabolism, genetics, diversity, and ecology. Applied aspects of microbiology are also covered such as biotechnology, the role of microorganisms in environmental processes, and immunology and medical microbiology.

BIOMI 291 General Microbiology Laboratory
Fall or spring. 2 credits. Summer (6-week session). 2 or 3 credits. Prerequisite: concurrent or previous enrollment in BIOMI 290. Lect. F 10:10 or 12:20; labs, M W 12:20-1:25 or 2:30-4:25, or T R 10:10-12:05, 12:20-2:15, or 2:30-4:25. C. M. Rehkugler.
A study of the basic principles and techniques of laboratory practice in microbiology; and fundamentals necessary for further work in the subject.

BIOMI 292 General Microbiology Discussion
Spring. 1 credit. Prerequisite: concurrent or previous enrollment in BIOMI 290. S-U grades only. Disc. to be arranged. C. M. Rehkugler.
A series of discussion groups in specialized areas of microbiology to complement BIOMI 290.

BIOMI 300 Seminar in Microbiology
Spring. 1 credit. Required of biological science students in the microbiology program of study. Strongly recommended for students considering the microbiology program of study. S-U grades only. Sem. W 12:20. Staff.
A series of lectures and seminars designed to present students with laboratory safety training and acquaint them with research projects in microbiology on the Cornell campus.

BIOMI 391 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 398 Environmental Microbiology (also Soil, Crop, and Atmospheric [BIOL] 398)
Spring. 3 credits. Prerequisites: BIOES 261 or BIOMI 290 or SCAS 260 or permission of instructor. Lect. M W F 10:10. M. Alexander, W. C. Ghirose, E. L. Madsen. The biology, behavior, and function of microorganisms in natural environments are discussed in relation to past and present environmental conditions on Earth. The role of microorganisms in ecologically and environmentally significant processes is also considered through discussion of specific topics such as elemental cycles, nutrient cycling, transformation of pollutants, wastewater treatment, and environmental biotechnology.

BIOMI 404 Pathogenic Bacteriology and Mycology
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 bacteria and fungi; and principles of antimicrobial therapies and drug resistance. A companion seminar addresses the current and classic literature related to microbial pathophysiology on the cellular and molecular level.

BIOMI 406 Clinical Microbiology
Fall and spring. 15 credits each semester. Prerequisite: permission of instructor. Lect. T R 8:25-10:25. R. P. Mortlock.
Training and practical experience in clinical microbiology in the hospital laboratory of the Cornell Medical College and New York Hospital in New York City. Emphasis is on developing students' capability in the isolation and rapid identification of organisms from various types of clinical specimens. This course is intended to prepare the student for state and federal licensing in various areas of clinical microbiology. This is a full-time program taking place in September to August of the student's senior year.

BIOMI 408 Viruses and Disease (also Veterinary Microbiology [BIOL] 417)
Spring. 3 credits. Prerequisites: BIOMI 290, 291; BIO G 305; and permission of instructor. Recommended: BIOMG 281. Offered alternate years. Lect. M W 7:30 p.m. J. Case.
The course covers basic concepts in virology with emphasis on virus-host interactions, strategies for gene regulation, and mechanisms of pathogenicity. Selected viral infections that result in immune dysfunction and neoplasia are highlighted in the context of approaches to prevent or reduce the severity of diseases.

BIOMI 415 Bacterial Diversity
Fall. 3 credits. Prerequisites: BIOMI 290, 291, and BIOMI 330 or 331 or 333. Lect. M W F 11:15. S. H. Zinder.
A consideration of the diversity of microbiology, ecology, genetics, and practical potential of important groups of bacteria. Topics include molecular methods for determining bacterial phylogeny and taxonomy, 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 333, or their equivalents. S-U grades optional for students not specializing in the microbiology program of study. Lect. M W F 11:15. J. P. Shapleigh.
The concern is with the 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 Veterinary Microbiology, Immunology and Parasitology [BIOL] 431)
A systematic study of anthropod, protozoan, and helminth parasites of public health importance with emphasis on epidemiologic, clinical, and zoonotic aspects of these parasites.

BIOMI 485 Bacterial Genetics
Fall. 2 credits. Graduate students, see BIOMI 685. Prerequisite: BIOMG 281. Recommended: BIOMI 290 and BIOMI 330 or 331 and 332 or 333. Lect. M W 7:30-9:25 p.m. V. J. Stewart.
Concepts and principles of formal genetic analysis as 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 652 [Section 03] Molecular Plant-Microbe Interactions (BIOPL 652, Sec 03)
Spring. 1 credit. Prerequisites: BIOGD 281, BIOM 330 or 331 or 335, and BIOPL 653 (section 01) or their equivalents. S-U grades optional. Lecs, M W F 10:10 (12 hrs) Mar. 25-Apr. 20. S. C. Winans.
For course description, see BIOMI 652, Sec 03.

BIOMI 685 Advanced Bacterial Genetics
Fall. 2 credits. Limited to graduate students; see BIOMI 495. Prerequisites: BIOMG 301 or equivalent. BIOM 330 or 331 or 332 or equivalent. Permission of instructor recommended. BIOM 280 or equivalent. Not offered 1997–98. Lecs, T R 9:10–11.25. J. D. Helmann.
The physical and chemical bases of protein-nucleic acid interactions are explored including both theory and specific examples. Proteins considered include bacterial nonspecific and sequence specific DNA and RNA binding proteins, nucleic acid polymerases, recombinases, topoisomerases, DNA repair enzymes, and nucleases.

BIOMI 692 Protein-Nucleic Acid Interactions
Spring. 3 credits. Prerequisites: BIOM 330 or 331 or 333 or 635. Lecs, T R 10:10–11.25. J. D. Helmann.
The physical and chemical bases of protein-nucleic acid interactions are explored including both theory and specific examples. Proteins considered include bacterial nonspecific and sequence specific DNA and RNA binding proteins, nucleic acid polymerases, recombinases, topoisomerases, DNA repair enzymes, and nucleases.

BIOMI 694 Genetics of Diverse Bacteria
Spring. 3 credits. Prerequisite: BIOM 485 or equivalent. Lecs, M W 2:30–3:45. S. C. Winans.
Selected topics in bacterial diversity, with strong emphasis placed on underlying molecular mechanisms. Topics include interactions between bacteria and plants and animals, prokaryotic developmental biology, biodegradation of xenobiotics, and synthesis of antibiotics.

BIOMI 791 Advanced Topics in Bacterial Genetics
Fall or spring. 1 credit. May be repeated for credit. Prerequisite: graduate standing in microbiology. S-U grades only. Disc. T 4–5:00. Fall. S. C. Winans; spring. V. J. Stewart.
Discussion and critical evaluation of selections from the contemporary literature in bacterial genetics and molecular biology.

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 to be arranged. Staff.
Lectures and seminars on special topics in microbiology.

BIOMI 797 Graduate Seminar in Microbiology
Fall and spring. 1 credit each semester. All students in the Graduate Field of Microbiology must enroll for at least their first three semesters in residence. Students are expected to lead discussions on recent primary literature in microbiology. S-U grades only. Sem to be arranged. Staff.

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. Sem to be arranged. Staff.
A seminar relating to the research activities of those enrolled. Students who have completed the BIOMI 797 series requirement are required to present a seminar concerning their research interests and activities at least once each year.

BIOMI 799 Microbiology Seminar
Fall and spring. Required of all graduate students in the Graduate Field of Microbiology and open to all who are interested. Sem to be arranged. Staff.

Related Courses in Other Departments
Advanced Animal Virology, Lectures (Veterinary Microbiology 708)
Advanced Food Microbiology (Food Science 607)
Advanced Immunology Lectures (Biological Sciences [BIO G] 705 and Veterinary Microbiology 705)
Advanced Soil Microbiology (Soil, Crop, and Atmospheric Sciences 666)
Advanced Work in Bacteriology, Virology, or Immunology (Veterinary Microbiology 707)
Algal Physiology (Biological Sciences [BIOP] 346)
Bacterial Plant Diseases (Plant Pathology 647)
Basic Immunology, Lectures (Biological Sciences [BIO G] 305 and Veterinary Microbiology 315)
Bioprocessing Applications in Agriculture (Agricultural and Biological Engineering 467)
Ciliophorology (Biological Sciences [BIOSM] 409)
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)
Intermediate Soil Science: Chemistry and Microbiology (Soil, Crop, and Atmospheric Sciences 364)
Introduction to Bioprocess Engineering (Chemical Engineering 643)
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 [BIOES] 457)
Magical Mushrooms, Mischievous Molds (Plant Pathology 401)
Microbiology for Environmental Engineering (Civil and Environmental Engineering 651)
Plant Virology (Plant Pathology 645)
Principles of Biogeochemistry (Biological Sciences [BIOS] 668)

NEUROBIOLOGY AND BEHAVIOR

BIOMB 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). S-U or 5-credit option required of students in the neurobiology and behavior program of study. Each 4-credit discussion section is limited to 15 students. Students must be enrolled in the 5-credit option. Staff. A general introduction to the field of behavior. Topics include evolution and behavior, behavioral ecology, sociobiology, chemical ecology, communication, rhythmicity, orientation and navigation, and hormonal mechanisms of behavior.

BIOMB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits (4 credits with discussion and written projects). 4-credit option required of students studying neurobiology and behavior. Each discussion limited to 20 students, with preference given to students studying neurobiology and behavior. Not open to freshmen. Prerequisites: one year of introductory biology for majors and one year of chemistry. May be taken independently of BIOMB 222. S-U grades optional. Lecs, M W F 12:20; disc to be arranged. P. W. Sherman 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.

BIOMB 222 Hormones and Behavior (also Psychology 332)
Spring. 3 or 4 credits; the 4-credit option involves a one-hour section once a week in which students are expected to read original papers in the field and participate in discussion. Limited to juniors and seniors; open to sophomores only by permission. Prerequisites: BIOMB 221 or 222 or one year of introductory biology plus a course in psychology. S-U grades optional. Lecs/disc to be arranged. E. Adkins-Regan.
Following a review of the neural and endocrine systems, this course connects endocrine physiology to specific behaviors observed in various species, including humans. Although the relationship between sexual physiology and behavior is strongly emphasized, the lectures also describe hormonal contributions to parental behavior, aggression, stress, learning and memory, homeostasis, and biology rhythms. Topics for the discussion sections are chosen by the students within the context of hormonal influences on behavior.
BIONB 324 Biopsychology Laboratory (also Psychology 324)  
Fall. 4 credits. Limited to 20 upperclass students. Prerequisites: laboratory experience in biology or psychology, BIONB 222 and PSYC 123 and 222; and permission of instructor. Labs, T R 1:25-4:25. Staff.  
Experiments designed to provide research experience in animal behavior (including learning and its disorders and hormonal mechanisms). A variety of techniques, species, and behavior patterns are included. Live animals are used in the laboratory.

BIONB 325 Neurodiseases—Molecular Aspects  
Fall. 3 credits. Prerequisites: two courses from BIONB 222, BIOGID 201, BIOBM 350, or 331; co-registration in one of the two is acceptable. S-U grades optional. Lecs, T R 9:05; disc, T 2:30. T. R. Podleski.  
The intent of this course is to teach students how to use recombinant DNA techniques for the study of disease and injury. 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 this approach, for example Alzheimer's, Huntington's, color blindness, affective disorders, disorders affecting ion channels, and muscular dystrophies. In addition to the molecular studies, when appropriate, the course is devoted to discussions of other aspects of the diseases. Emphasis is placed on how these studies provide a useful approach to studying the 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 BIOPH 311, or permission of instructor. S-U grades optional. Offered alternate years. Lecs, M W F 10:10; disc, 1 hour each week to be arranged. H. C. Howland.  
The visual systems of vertebrates are discussed in breadth and depth. Topics covered include the optics of eyes, retinal neurophysiology, structure and function of higher visual centers, and ocular development.

BIONB 328 Biopsychology of Learning and Memory (also Psychology 332)  
Spring. 3 credits. Prerequisites: one of biology and either a course in biopsychology or BIONB 222. Lecs, M W F 11:15. Staff.  
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.

BIONB 329 Drugs and the Brain  
Spring. 3 credits. Prerequisites: BIONB 222 or equivalent and permission of instructor. S-U grades optional. Offered alternate years. Lecs, T R 10:10-11:25; disc to be arranged. R. Harris-Warrick.  
An introduction to neuropharmacology. After a brief introduction to pharmacology, there is discussion of the major neurotransmitter families. Topics include the biological actions of the major psychoactive drugs on the brain, including cocaine, amphetamines, alcohol, psychedelics, marijuana, antidepressants and antipsychotics.

BIONB 396 Introduction to Sensory Systems (also Psychology 396 and 696)  
Spring. 3 or 4 credits (4 credits with term paper). Requirements: 4-credit option requires permission of instructor. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology or behavior or perception or cognition or biopsychology. Students are expected to have elementary knowledge of perception, neurophysiology, behavior, and chemistry. No auditors. Offered alternate years. Not offered 1997-98. Lecs, M W F 10:10. B. P. Halpern. This course is taught using the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with both those characteristics of sensory systems that are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments. Classroom discussion can increase, but not decrease, a student's final grade. There are two preliminary exams and a final exam. The principles and limitations of major methods used to examine sensory systems are considered. General principles of sensory systems and auditory, visonic systems are covered. One aspect of each system (e.g., localization of objects in space by sound, color vision, and thermoreception) is selected for special attention. Two or more textbooks, and a course packet of reproduced articles are used. At the level of An Introduction to the Physiology of Hearing, 2nd edition, by J. O. Pickles, Physiological acoustics, neural coding, and psychoacoustics, by W. L. Gulick, G. A. Gescheider, and R. D. Frisina, The Retina. An approachable part of the brain, by J. F. Dowling, Handbook of Physiology—The Nervous System. III. Sensory Processes, edited by J. M. Brookhard and V. B. Mountcastle.

BIONB 420 Topics in Neurobiology and Behavior  
Fall or spring. Variable credit. May be repeated for credit. Primarily for undergraduates. S-U grades optional. To be arranged. Staff.  
Courses on selected topics in neurobiology and behavior, can include lecture and seminar courses. Topics, instructors, and time of organizational meetings are listed in the division's catalog supplement issued at the beginning of the semester.

BIONB 421 Effects of Aging on Sensory and Perceptual Systems (also Psychology 431 and 631)  
Fall. 3 or 4 credits (4 credits with term paper). Limited to 10 students. Prerequisites: introductory course in biology or psychology, plus a second course in perception, neurobiology, cognition, or biopsychology. No auditors. S-U grades optional. Offered alternate years. Lecs, T R 10:10-11:25. B. P. Halpern. A literature-based examination of post-maturational changes in the perceptual, structural, and physiological characteristics of sensory, motor, and auditory systems. Emphasis is on human data, with non-human information included when especially relevant. The course examines the current developments in human sensory prosthetic devices and regeneration of receptor structures. Brief written statements (preferably by electronic mail) of questions and problems related to each set of assigned readings are required at least one day in advance of each class meeting. This course is taught using the Socratic Method, in which the instructor asks questions of the students. Students are expected to come to each class having already done, and thought about, the assigned readings.

BIONB 422 Modelling Behavioral Evolution  
Spring. 4 credits. Limited to 25 students. Prerequisites: BIONB 221, one year of calculus, one course in probability or statistics, and permission by instructor (Office: W309 Mudd Hall; phone: 254-4352). This course is open to advanced undergraduates and graduate students. S-U grades optional. Not offered 1997-98. Lecs, T R 2:30-4:00; computer lab, one class period per week to be arranged. K. H. Reeve.  
This is an intensive lecture and computer lab course on modeling strategies and techniques in the study of behavioral evolution. Population genetics (including quantitative genetics), 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, animal communication, and the evolution cooperation and conflict within animal social groups. Students learn to assess critically recent evolutionary theories of animal behavior, as well as to develop and testable models for biological systems of interest or to extend pre-existing models in novel directions. The Mathematica software program is used as a modeling tool in the accompanying computer lab (no prior experience with computers required.)

BIONB 423 Neurogenetics  
Fall. 3 credits. Limited to junior, senior, and graduate students. Prerequisites: permission of instructor, one year of introductory biology or equivalent, and BIOGID 281. Strongly recommended: BIONB 222. S-U grades optional. Offered alternate years. Not offered 1997-98. Lecs, T R 2:30; disc, R 3:35. Staff.  
Readings, discussions, and student presentations focus on the uses of genetics for the study of the nervous system. Emphasis is on recent advances in genetic and molecular biological techniques and their application to the study of neural development and behavior. Both invertebrate and vertebrate systems are discussed, and main consideration is given to the fruit fly and the mouse. Readings are taken primarily from original journal articles.

BIONB 424 Neuroethology (also Psychology 424)  
In the 1950s through the 1970s, ethologists attempted to understand the mechanisms of animal behavior through the use of comparative methods, ethologists attempted to understand the mechanisms of animal behavior through the use of comparative methods, evolutionary analysis, and careful observations of animals in their native habitats, and clever experimentation. Now, with the explosion of knowledge and techniques in the neurosciences, many of the ethologist's mechanisms are being explained in terms of neural systems. This course reviews the status of research in neuroethology, including mechanisms of acoustic communication in insects and in...
vertebrates, echolocation in bats and sound localization in owls, electroreception and electrolocation, and visual processing. In addition, the course reviews studies of the neural systems involved in decision making, in initiating action, and in coordinating fixed acts. Assigned readings include original articles from the scientific literature. A term paper or equivalent is required. Recitations scheduled in class.

**BIONB 425 Natural History of Ion Channels**

Course takes a broad view of ion channels and cellular bioelectricity, with emphasis on the gene superfamily including voltage-gated channels. Evolutionary divergence is considered across phylogenetic history and tissue differentiation. Functional and structural variety, particularly in neural cells, examined from modern electrophysiological and molecular biological perspectives. Contributions to behavioral plasticity and neural development are considered.

**Bio NB 426 Animal Communication**
Spring. 4 credits. Limited to 50 students. Prerequisite: BIONB 221. Offered alternate years. Lecs, T R 2:30–4:25; disc, one hour each week to be arranged. T. D. Scefas

A detailed examination of the study of communication by non-human animals. The course begins with an exploration of different conceptual frameworks used in the study of communication, then turns to specific studies of the mechanisms, ontogeny, functional design, and evolutionary history of the signaling systems used by animals. The class considers how communication provides humans with a window on the minds of other animals. Readings are drawn from the primary literature.

**BIONB 427 Animal Social Behavior**
Fall. 4 credits. Limited to 30 students. Prerequisites: BIONB 221 and BIOES 261 or 278, and advance permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Lec and disc, T R 2:30–4:25. S. T. Emlen

An intensive course for upper-division students interested in behavioral ecology and sociobiology. Lectures, discussions, and student presentations examine topics including adaptation, spacing systems, mating systems, sexual selection, sex ratios, inbreeding and outbreeding, mate choice, conflict and cooperation in animal societies, and the evolution of deceit, honesty, and altruism.

**BIONB 428 Topics in Behavior**
Fall or spring. 2–4 credits. (Credits based on number of lectures and/or field exercises as outlined in the division's catalog course supplement and subject to approval through the associate director's office.) May be repeated for credit. Prerequisite: undergraduates. S-U grades optional.

Courses on selected topics in behavior; can include lecture and seminar courses; may include laboratory. Past topics have included animal orientation, bio-rhythms, and communication. Topics, instructors, and time of organizational meeting are listed in the division's catalog supplement issued at the beginning of each semester.

**BIONB 429 Olfaction and Taste: Structure and Function (also Psychology 429)**
Spring. 3 or 4 credits. (4 credits with term paper or research project, which can, but need not, study nonhuman vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Graduate students, see PSYCH 629. Prerequisite: a 300-level course in biopsychology or equivalent. Offered alternate years. Lecs, T R 9:05. B. P. Halpern

The structural and functional characteristics of olfaction and taste are explored by reading and discussing current literature in these areas. Structure is examined at the light levels of electron microscopes as well as at the molecular level. Function is examined primarily in its neurophysiological and biochemical aspects. The emphasis is on vertebrates, especially air-breathing vertebrates in the case of olfaction, although there is some coverage of invertebrate forms. A textbook and a course packet of reproduced articles are used. At the level of Smell and Taste in Health and Disease, edited by T. V. Getchell, R. L. Doty, L. M. Bartoshuk, and J. D. Snow; The Neurobiology of Taste and Smell, edited by T. E. Finger and W. L. Silver.

**BIONB 491 Principles of Neurophysiology**
Fall. 3 credits. Limited to 20 students. Prerequisite: BIONB 222 or written permission of instructor. S-U grades optional for graduate students. Lecs, M W 10:10; lab, M W T R 12:20–4:25; additional hours as arranged. B. J. Johnson

A laboratory-oriented course designed to teach the theory and techniques of modern cellular neurophysiology. 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 the cellular basis for resting and action potentials and synaptic transmission. A variety of preparations are used as model systems. Computer acquisition and analysis of laboratory results are emphasized.

**BIONB 492 Sensory Function (also Psychology 492)**
Spring. 3 or 4 credits. (The 4-credit option involves a one-hour section once a week, in which students are expected to participate in discussion. The 4-credit option is not always offered.) Prerequisite: 600-level biopsychology or BIONB 222 or BIOAP 311, or permission of instructor. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Offered alternate years. Not offered 1997–98. Lecs, M W F 10:10; disc, hours to be arranged. B. P. Halpern, H. C. Howland

This course covers classical topics in sensory function such as vision, hearing, touch, and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, the development of sensory system, and nonclassical topics such as electronic and internal chemoreceptors. Both human and nonhuman systems are discussed. In all cases the chemical, physical, and neurophysiological bases of sensory information are treated, and the processing of this information is followed into the central nervous system. At the level of The Senses, edited by Barlow and Mollon, and An Introduction to the Physiology of Hearing, 2nd edition, by Pickles.

**BIONB 493 Developmental Neurobiology**
Fall. 3 credits. Prerequisite: BIONB 222 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1997–98. Lecs, T R 11:40–12:55. R. Booker

Lectures covering the development of the nervous system, taking examples from both vertebrates and invertebrates. Emphasis is on cellular and molecular issues, that is, How do nerve cells differentiate both morphologically and biochemically? The role of cues such as hormones and growth factors are discussed. Genes in developmental neurobiology are discussed. Readings are taken from original journal articles.

**BIONB 494 Comparative Vertebrate Neuroanatomy**

Organization and evolution of neuroanatomical pathways as substrates for species-typical vertebrate behaviors. The course is divided into three major segments: 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 BIOBM 320 or 352. Offered alternate years. Lecs, T R 2:55–4:10. D. Deitcher

Focus of the course is on how different molecular and genetic approaches have led to major advances in neuroscience. Lectures, student presentations, and student original research articles. Focus is on original research articles. Topics include ligand-gated channels, potassium channels, seven membrane spanning receptors, development of the neuromuscular function, neurotransmitter release, second messengers, and learning and memory.

**BIONB 496 Bioacoustic Signals in Animals and Man**
Spring. 3 credits. Limited to 12 junior, senior, and graduate students. Prerequisites: one year of introductory biology, PHYS 101–102 or 207–208, and permission of instructor. S-U grades optional. Offered alternate years. Not offered 1997–98. Lecs, M W 9:05; lab to be arranged. C. W. Clark, R. R. Hoy

Humans and most terrestrial animals live in a world of sound. Acoustic signals mediate social interactions and predator-prey behavior. This course teaches students about animal acoustic communication by introducing them to the different communication systems that are based on sound. The course presents the physical properties of sound, the physiological mechanisms of sound production and hearing, and an analysis of the behavioral context of signaling. In the laboratory students learn to record, synthesize, and analyze acoustic signals with the aid of tape recorders and the Macintosh
BION 497 Neurochemistry and Molecular Neurobiology
Fall or spring. Limited to 30 students. Prerequisites: BION 222 or either BIOB 330 or 331 and 332, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1997-98. Lecs, T 9:05-10:10, disc, T 12:25-1:25. R. M. Harris-Warrick.

This course focuses primarily on the biochemistry/molecular biology of neurons. Emphasis is on the molecular properties of these cells that account for their unique function. The presynaptic regulation of release and postsynaptic mechanism of action of the major classes of neurotransmitters are discussed, as well as selected neuromodulators and hormones. Readings are selected primarily from research journals.

BION 623 Chemical Communication (also Chemistry 622)
Fall. 3 credits. Primarily for research-oriented students. Limited to 30 students. Prerequisites: one year of introductory biology for majors or equivalent, course work in biochemistry, and CHEM 358 or equivalent. Offered alternate years. Lecs, M W 1:25; disc, F 1:25. J. Meinwald, T. Eisner, W. L. Roelofs, and guest lecturers.

The production, transmission, and reception of chemical signals in communicative interactions of animals, plants, and microorganisms. Studies of insects are emphasized. Specific topics are treated with varying emphasis on chemical, biochemical, ecologial, behavioral, and evolutionary principles. The discussion sessions focus on readings from the recent literature and involve student-led discussions of contemporary topics.

BION 626 Sex Differences in Brain and Behavior (also Psychology 524)
Spring. 2 credits. Limited to 12 students. Prerequisite: Permission of instructor. BION 322 or permission of instructor. Discs and sems to be arranged. Not offered 1997-98. T. J. DeVoogd.

A survey of the newly discovered animal models for sex differences in the brain. Topics include the role of steroids in brain development, whether hormones can modify the structure of the adult brain, and the consequences of such sex differences in anatomy for behavior.

BION 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 to be arranged. Staff.

Designed to provide several study groups each semester on specialized topics. A group may meet for whatever period is judged adequate to enable coverage of the selected topic. Ordinarily, topics are selected and circulated during the preceding semester. Discussion of current literature is encouraged. Suggestions for topics should be submitted by faculty or students to the chair of the Section of Neurobiology and Behavior.

BION 721 Introductory Graduate Survey in Neurobiology and Behavior
Fall. 2 credits each term. Required of graduate students in neurobiology and behavior. Concurrent registration in BION 221 and 222 not required. S-U grades only. Lecs and discs, T R 11:15-12:05, alternate weeks. Staff.

Lectures by faculty and student-led discussions on topics of current importance in neurobiology and behavior. Topics are linked to the materials presented in BION 221 and 222. Class meets twice a week, every other week. Students are required to write four term papers, over the two semesters, on selected topics in two of three sub-areas: (1) cellular and molecular neurobiology; (2) integrative neurobiology; (3) behavior.

BION 723 Advanced Topics in Animal Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students in behavior. Prerequisite: permission of instructor. S-U grades optional. Sem to be arranged. Staff.

A seminar on a specific topic in animal behavior. The instructor presents lectures during the first few course meetings; the remainder of the course is devoted to student presentations. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BION 724 Field Methods in Animal Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students in behavior. Prerequisite: permission of instructor. S-U grades optional. Sem and fieldwork to be arranged. Staff.

A seminar-field experience course designed for first-year graduate students in animal behavior. Weekly seminars discussing field methodology, data collection, and hypothesis testing are followed by an intensive period (ten days to two weeks) in the field. Specific topics and field sites vary from semester to semester. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BION 790 Advanced Topics in Cellular and Molecular Neurobiology
Fall or spring. Variable credit. May be repeated for credit. Limited to graduate students and advanced undergraduates studying neurobiology and behavior. Prerequisite: BION 222. S-U grades optional. Sem and disc to be arranged. Staff.

A lecture-seminar course on selected topics in cellular and molecular neurobiology. Students read original papers in the scientific literature and lead discussions of these articles. Suggestions for topics may be submitted by faculty or students to the chair of the Section of Neurobiology and Behavior. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BION 792 Advanced Laboratory in Cellular and Molecular Neurobiology
Fall or spring. 2 credits. May be repeated for credit. Primarily for graduate students. Prerequisites: BIOB 330 or 331 or equivalent, BION 491 or equivalent, and written permission of instructor. S-U grades optional. Lab to be arranged. Staff.

A two-week intensive laboratory course designed to provide experience with a specific technique currently used in cellular and molecular neurobiology. The technique under study and instructor in charge vary from semester to semester and are listed in the division's catalog supplement issued at the beginning of the semester.

BION 793 Advanced Topics in Integrative Neurobiology
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. Lab to be arranged. Staff.

A course designed to provide in-depth knowledge of current research in anatomical and physiological basis of vertebrate and invertebrate behavior. Readings are primarily from specialty books and selected journal articles. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

BION 794 Advanced Laboratory Techniques in Integrative Neurobiology
Fall or spring. Variable credit. May be repeated for credit. Prerequisite: permission of instructor based upon a personal interview. Lab to be arranged. Staff.

A laboratory in the integrative, or neuroethological, approach to studies of animal behavior. Designed to provide practical working knowledge of research methods in anatomical, physiological, and behavioral approaches to studies of vertebrate and invertebrate behavior. Laboratory technique to be covered and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

Related Courses in Other Departments
Animal Behavior (Psychology 535)
Biochemistry and Human Behavior (Psychology 361 and Nutritional Sciences 361)
Brain and Behavior (Psychology 425)
Developmental Bipsychology (Psychology 422)
Evolution of Human Behavior (Psychology 326)
Human Behavior: A Sociobiological Perspective (Anthropology 476)
Insect Behavior Seminar (Entomology 662)
Neurobiology of Animal Behavior (Biological Sciences [BIOSM] 327)
Primates and Evolution (Anthropology 490)
Primate Behavior and Ecology (Anthropology 490)
Teaching Experience (Biological Sciences [BIO J] 498)
The Brain and Sleep (Psychology 440/640)
Undergraduate Research in Biology (Biological Sciences [BIO J] 499)
PLANT BIOLOGY (BIOPL)

BIOPL 240  Green World/Blue Planet (formerly Plants and Global Issues)
Spring. 3 credits. S-U grades optional. Lecs, TR 11:00–1:20, T. G. Owens and staff. Prerequisite: one year of introductory biology or the equivalent.

BIOPL 241  Introductory Botany
Fall. 3 credits. Lecs, TR 9:05; lab, MW 10:30–12:55. K. J. Nicklas. Special 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 banding and preparing material for identification. First and second weeks of laboratory are field trips, starting with the first day of class. Those who register for an evening laboratory are still required to attend the afternoon field trips.

BIOPL 242  Plant Physiology, Lectures
Spring. 3 credits. Primarily for undergraduates in agricultural sciences, but also for any Biological Sciences students wanting to know about plant function. Suitable as a second-level course for nonmajors to satisfy the biology distribution requirement. Prerequisites: one year of introductory biology and/or BIOPL 241. Recommended: one year introductory chemistry. Concurrent enrollment in BIOPL 244 required of undergraduates except those majoring in the social sciences and humanities, for whom it is recommended. May not be taken for credit after BIOPL 342 except by written permission of instructor. Lecs, M W F 10:10. 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, flowering, fruiting, dormancy, and abscission; stress; tissue culture; and genetic engineering.

BIOPL 243  Taxonomy of Cultivated Plants (Crop Plant Identification 243)
Fall. 3 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after BIOPL 248. Offered alternate years. Lecs, TR 11:15; lab, MW 10:10; labs, W 2–4:25. M. A. Luckow. A study of 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, flowering, fruiting, dormancy, and abscission; stress; tissue culture; and genetic engineering.

BIOPL 244  Plant Physiology, Laboratory
Spring. 2 credits. Prerequisite: concurrent enrollment in BIOPL 242. May not be taken for credit after BIOPL 344. Disc and lab, M T W or R 11:00–2:25. Staff. Experiments exemplify concepts covered in BIOPL 242 and concentrate in a variety of biological and biochemical techniques, including use of small amounts of radioisotopes.

BIOPL 245  Plant Biology
Summer (6-week session). 3 credits. Limited to 24 students. Lecs, M-F 11:30–12:45, labs, M W 2–5:00. S. Williams. Introductory botany to demonstrate basic biological principles. Emphasizes structure, reproduction, and classification of flowering plants. Most of the laboratory work is conducted outdoors in an area that surpasses most biological stations. Those who lack botany background are expected to work more closely with the instructor on supplemental instructional materials.

BIOPL 246  Plants and Civilization
Fall. 3 credits. S-U grades optional. Lecs, TR 11:15; disc, R 12:20 or 1:25. D. M. Bates. An introduction to the classification of vascular plants, with attention to the goals of taxonomy, the processes of plant evolution, and the means of understanding the place and future of humans in the biosphere. Traditional medicines, underutilized organisms, resource management, and ownership of nature, and methodology are among the topics covered.

BIOPL 247  Ethnobotany (formerly BIOPL 246, Plants and Civilization)
Fall. 3 credits. S-U grades optional. Lecs, TR 11:15; disc, R 12:20 or 1:25. D. M. Bates. A consideration of the principles, methods, and issues of ethnobotany. 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, underutilized organisms, resource management, and ownership of nature, and methodology are among the topics covered.

BIOPL 248  Taxonomy of Vascular Plants
Spring. 4 credits. Prerequisite: one 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 11:00–2:25. J. D. Davis. An introductory botany classification of vascular plants, with attention to the goals of taxonomy, the processes of plant evolution, and the means of analyzing evolutionary relationships among plants. The laboratory concentrates on methods of plant identification and presents an overview of vascular plant diversity, with particular attention to the flowering plants.

BIOPL 341  Plants in Laboratory Teaching
Fall. 2 credits. Limited to 16 students. Prerequisite: one year of introductory biology. S-U grades optional. Disc and lab, TR 3:10–4:30. D. J. Paolillo. This course is intended for science education students who intend to teach biology at the high school level. The focus is on how to use plants in the biology laboratory in interesting ways, with particular emphasis on using plants to demonstrate basic biological principles. Hands-on experience is provided in experimental setup and performance. Additional emphasis given to experimental design, data collection and analysis, and actual experience in a high school biology teaching laboratory.

BIOPL 342  Plant Physiology, Lectures
Spring. 3 credits. Prerequisites: one 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
Fall. 3 credits. Prerequisite: one 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 analysis of basic plant processes. The course emphasizes genetic transformation methodology, molecular genetic approaches to the study of selected plant systems, and prospects for plant improvement using biotechnology. The course is directed at undergraduates who wish to become familiar with plants as experimental organisms. Selected topics attempt to illustrate the uniqueness of plant life and how it differs from other systems.

BIOPL 344  Plant Physiology, Laboratory
Spring. 2 credits. Prerequisite: concurrent enrollment in BIOPL 342. May not be taken for credit after BIOPL 244. Similar to BIOPL 244 but at a more advanced level. Lab, W 1:25–4:25; disc, W 12:20. Staff. Experiments exemplify concepts covered in BIOPL 342 and offer a variety of biological and biochemical techniques, including use of small amounts of radioisotopes, with emphasis on experimental design.

BIOPL 345  Plant Anatomy
Fall. 4 credits. Limited to 15 students. Prerequisite: one year of introductory biology or a semester of botany. Offered alternate years. Lecs, M W 9:05, labs, M W 2–4:25. D. J. Paolillo. 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 346  Algal Physiology
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and BIOPL 242 or 342, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1997–98. Lecs, T R 8:30–9:55. T. G. Owens. This course takes an interdisciplinary approach to the study of algae with an emphasis on the physiology, biochemistry, and ecology of this diverse group of organisms. The algal classes are briefly described with consideration of traditional and emerging criteria for classification of the algae.
majority of the course focuses on interactions of algae with the physical/chemical environment, uptake of inorganic compounds, algal photosynthesis, metabolic strategies, and population dynamics of planktonic algae and benthic macrophytes. There is no laboratory section with this course.

**BIOL 347 Laboratory in Molecular Biology and Genetic Engineering of Plants**

Fall. 2 credits. Limited to 24 students. Prerequisite: BIOL 343 or permission of instructor. Concurrent enrollment is BIOL 342 encouraged. S-U grades optional. Lab, W 12:25–4:25.

M. E. Nausheralah.

The laboratory provides experience in handling and experimenting with the plant Arabidopsis thaliana. Selected experiments include the preparation and analysis of nucleic acids, methods used in the detection and isolation of plant genes, analysis of gene expression using antibody and nucleic acid probes, mutant isolation, and methods of gene transfer to plants.

**BIOL 348 The Healing Forest**

Spring. 2 credits. Prerequisites: BIOL 247 or BIOL 241, 243, or 248 or permission of instructor. Lect/disc, R 2:30–4:25.


An ethnobotanical consideration of the role of plants in traditional and western medicine. Studies of indigenous and lay societies illustrate the ecological, systematic, biochemical, and cultural aspects of herbal medicines and are placed in the broader context of such interdependent themes as the conservation of biological and cultural diversity, human health, bioprospecting, compensation for indigenous knowledge, and sustainable development.

**BIOL 440 Phylogenetic Systematics**

Fall. 4 credits. Limited to 24 students.

Prerequisite: graduate standing or permission of instructor. Offered alternate years. Not offered 1997–98. Lect, T R 10:10; labs, T R 2:00–4:25.

K. C. Nixon.

Basic and advanced theory and methods of phylogenetic analysis. Students are introduced to classical cladistics using parsimony and gain experience with computer-aided analysis of taxonomic data, including both morphological and molecular data sources. Topics discussed include applications of phylogenetic methods to biogeography and evolutionary studies.

**BIOL 441 Systematics and Evolution of Crops**

Fall. 2 credits. Prerequisite: an advanced-level course in the plant sciences with taxonomic content or permission of instructor. Offered alternate years. Not offered 1997–98. Lect, R 12:20–2:15.

D. M. Bates.

An integrated study of the systematics and evolution of agronomic and horticultural species. Processes of domestication, the evolutionary history of selected cultivars, the nature of weeds and land races, classification and nomenclature as applied to cultivated plants, and underexploited plant resources are among the topics considered.

**BIOL 442 Current Topics in Ethnobiology**

Fall. 2 or 4 credits (4 credits with an independent research component and term paper).


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 ethnohistory, and the role of plants and animals in human lives, in subsistence and exchange, and in thought.

**BIOL 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. A series of 1-credit modules on specialized topics in systematics. Topics and instructors vary each semester. May not be taught every semester. Topics and instructors are listed in the division's catalog supplement issued at the beginning of the semester.

**BIOL 444 Plant Cell Biology**

Fall. 4 credits. Limited to 24 students.

Prerequisites: one year of introductory biology or permission of instructor. Lects, M W F 9:05; lab, M or W 1:25–4:25.

R. O. Wayne.

Evidence from microscopy, physiology, biochemistry, and molecular biology is used to try to unravel the mystery of the living cell. The dynamics of protoplasm, membranes, and the various organelles are studied. The mechanisms of cell division, the relationship of the cytoskeleton to cell shape and motility, the interaction of the cell with its environment, and the processes that give rise to multicellular differentiated plants are investigated.

**BIOL 445 Photosynthesis**

Fall. 3 credits. Prerequisites: CHEM 104 or 208, MATH 106 or 111, and either PHYS 102 or 208 or permission of instructor. Offered alternate years. Not offered 1997–98. Lects, M W F 10:10. T. G. Owens.

A detailed study of the processes by which plants use light energy to grow. Structure of the photosynthetic apparatus, light absorption and antenna processes, photochemistry, and electron transport are emphasized. The course incorporates biophysical, biochemical, physiological, and molecular aspects of photosynthesis. Photosynthetic carbon metabolism is not covered in detail. Discussions include relevant material in bacterial, algal, and higher-plant photosynthesis.

**BIOL 447 Molecular Systematics**

Fall. 3 credits. Prerequisites: BIOES 278 or BIOGD 281 or BIOBM 332, or written permission of instructor. Offered alternate years.


The theory and practice of using molecular evidence, particularly DNA sequence data, for addressing diverse systematic and evolutionary questions. Emphasis is on phylogeny reconstruction, particularly in eukaryotic systems. The organization and evolution of nuclear and organelar genomes is described from the standpoint of their suitability for systematic and evolutionary studies.

**BIOL 448 Plant Evolution and the Fossil Record**

Spring. 3 credits. Prerequisite: BIOL 241 or equivalent, or permission of instructor. Offered alternate years. Not offered 1997–98. Lects, T R 9:05; lab, R 12:20–2:15. L. J. Crepet.

An introduction to evolution, surveying major changes in plants from the origin of life to the present. Emphasis is placed on plant form and function, adaptations to particular ecologic settings, and evolutionary theory as it relates to plants.

**BIOL 453 Principles and Practice of Historical Biogeography (also Entomology 453)**

Fall. 3 credits. Prerequisite: a course in systematic or paleontology of instructor. S-U grades optional. Offered alternate years. Lects, T R 10:10; lab/disc, R 2:30–4:25. J. K. Liebher, M. A. Luckow.

This course provides a comprehensive survey of the current methods and techniques used in historical biogeography, and the development of modern biogeographic theory in the context of classical and ecological methods of analysis. Brief summaries of geological and paleontological aspects of biogeography are presented, and large-scale biogeographic patterns discussed. The laboratories focus on hands-on computer applications of modern techniques and discussion of controversial issues in biogeography.

**BIOL 466 Physiological Plant Ecology, Lectures (also BIOES 466)**

Spring. 3 credits. Limited to 35 students.

Prerequisite: BIOES 261 or introductory plant physiology. S-U grades optional, with permission of instructor. Offered alternate years. Lects, T R 10:10–11:25; optional disc to be arranged. T. E. Dawson.

For course description, see BIOES 466.

**BIOL 468 Physiological Plant Ecology, Laboratory (also BIOES 468)**

Spring. 2 credits. Limited to 15 students.

Prerequisite: previous or concurrent enrollment in BIOL 466. Offered alternate years. Lab, T 12:25–4:25, plus additional lab hours to be arranged; 1 weekend field trip required. Fee, $15. T. E. Dawson.

For course description, see BIOES 468.

**BIOL 461 Laboratory in Plant Molecular Biology**

Spring. 4 credits. Prerequisites: BIOGD 281 or equivalent, BIOBM 330 or 331 or equivalent, and permission of instructor. Students (including graduate students) must preregister by Nov. 29, in the Section of Plant Biology office (Room 228, Plant Science Building). S-U grades optional. Lab, T 9:05–4:30. J. B. Nasrallah, M. R. Hanson, S. D. Tanksley.

Selected experiments on genome organization, gene expression, and gene transfer 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 Soil, Crop, and Atmospheric Sciences 642)**


A detailed study 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., acid soils). Specific mineral elements are emphasized to illustrate these topics.
BIOL 643 Plant Physiology, Advanced Laboratory Techniques
Spring. 4 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. S-U grades only. Offered alternate years. Lab, T or W 8–5:00; disc, M 4:30–5:30. Staff.
An introduction to some modern methods in experimental plant biology. A partial list of techniques used includes: fluorescence microscopy, infrared CO₂ analysis, gel electrophoresis and Western blots, cellular electrode measurements, microtiter plate technology for enzyme assays, sensitive growth measurements, HPLC and GC-MS, and computer interfacing with laboratory equipment.

BIOL 644 Plant Growth and Development
Spring. 3 credits. Prerequisites: BIOL 345 and either 242 or 342 or their equivalents, or written permission of instructor. Offered alternate years. Lecs, M W F 9:05. P. J. Davids, D. J. Paolillo. Explores the changes that occur during plant growth and development and their control: morphological and anatomical changes in apical tissue development, organ formation, embryonic development, gene regulation, hormone action and interaction, the influence of light in development, flowering, fruiting, dormancy, abscission, and senescence.

BIOL 645 Families of Tropical Flowering Plants
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Offered every three years. Not offered 1997–98. Lecs and disc, F 11:15. K. C. Nixon.
The families of flowering plants encountered solely or chiefly in tropical regions are considered in lectures, discussions, and demonstrations, with the aim of providing basic points of recognition for, and an understanding of, diversity and relationships in the families for the student venturing into the tropics.

BIOL 646 Families of Tropical Flowering Plants: Field Laboratory
Intersession. 3 credits. Limited to 20 students, with preference given to graduate students from member institutions of the Organization for Tropical Studies. Prerequisite: BIOL 243 or 248 or equivalent. Recommended. BIOL 645. S-U grades only. For more details and application, contact the L. H. Bailey Hortorium, 407 Mann Library. Offered every three years. Not offered 1997–98. K. C. Nixon.
An intensive orientation to families of tropical flowering plants represented in forests of the American tropics. Emphasis on field identification combined with laboratory analysis of available materials in a "whole biology" context.

BIOL 647 Seminar in Systematic Botany
Fall or spring. 1 credit. May be repeated for credit. Prerequisite: written permission of instructor required for undergraduates. S-U grades optional. Sem, T 11:15–1:10. Bailey Hortorium staff. Lectures and discussions led by staff, visitors, and students on topics of current importance to systematic botany.

BIOL 648 Plant Biochemistry
Selected areas of plant biochemistry are reviewed in the context of the plant life cycle and responses to the environment. Topics include metabolism of lipids, carbohydrates, organic acids, lipids, and proteins; nitrogen and sulfur assimilation; respiration; photosynthesis; development and replication of chloroplasts; and cell-wall composition and properties. Attention is paid to operation of control mechanisms.

BIOL 649 Transport of Solutes and Water in Plants
Fall. 3 credits. Prerequisite: BIOL 342 or equivalent. Offered alternate years. Lecs, T R 10:10–11:30. R. M. Spanswick.
Transport of ions, water, and organic materials in plants; mechanisms of ion transport; relationships between ion transport and metabolism; ion uptake and transport in higher plants; phloem transport, and water relations of single cells and whole plants.

BIOL 651 Quantitative Whole-Plant Physiology
An exploration of the extent to which physiological processes and their interactions can be formulated in a quantitative manner and integrated to describe various aspects of plant behavior, including growth and yield. Consideration is given to characterization of the plant environment, energy balance, gas exchange, water relations, photosynthesis, respiration, translocation, nutrient supply, and the timing of developmental events.

BIOL 652 Plant Molecular Biology II
Spring. 1–4 credits (1 credit per section). Prerequisites: BIOLGD 281 and BIOMM 330 or 332, or their equivalents. Recommended: BIOMM 331. S-U grades optional.
A series of four-week modules on specialized topics. Coordinator: S. H. Howell.

Section 01 Molecular Plant-Pathogen Interactions (also Plant Pathology 662)
An examination of the molecular properties that control the development of host-parasite interactions in both microorganisms (bacteria and fungi) and higher plants. Contemporary theories describing the genetic and molecular mechanisms of microbial pathogenesis and plant resistance are discussed.

Section 02 Molecular Aspects of Plant Development
The molecular genetics of plant development. This module focuses on vegetative development and includes topics such as the development of the shoot, root, and vasculature and the operation of the vegetative shoot apical meristem. The module is a companion to BIOL 653, Sec 04 (Plant Development I), which covers molecular aspects of reproductive development.

Section 03 Molecular Plant-Microbe Interactions (BIOMI 652)
Course focuses on the interactions of Agrobacterium and Rhizobium with plants. Topics on Agrobacterium-plant interactions include plant-microbe recognition mechanisms, T-DNA transfer process, oncogenesis and use of Agrobacterium to produce transgenic plants. Topics on Rhizobium-plant interactions include regulation of nitrogenase activity and expression, organization and function of the sym plasmid, nodule development, and plant genetics involved in plant-microbe interaction.

Section 04 Plant Gene Evolution and Phylogeny
Practical applications of molecular systematics: evolution for plant molecular biologists and other non-systematists. The course focuses on two basic issues: methods and principles for inferring relationships among genes and the use of data to hypothesize relationships among plants. Evolutionary patterns and processes of genes and gene families are discussed, as well as rates of sequence evolution, paralogy and ology, the effects of recombination and concerted evolution of gene phylogenies, and the implications of using gene or allele phylogenies to infer organismal evolutionary patterns. The principles of distance and parsimony methods are described, and computer methods for reconstructing gene phylogenies are discussed.

BIOL 653 Plant Molecular Biology I
Fall. 1–5 credits (1 credit per section). Prerequisites: BIOLGD 281 and BIOMM 330 or 332, or their equivalents. Recommended: BIOMM 331. S-U grades optional.
A series of four-week modules on specialized topics. Coordinator: S. H. Howell.

Section 01 Concepts and Techniques in Plant Molecular Biology (also Plant Breeding 653.1)
1 credit. Lecs, M W F 10:10 (12 lecs) Sept. 5-Sept. 29. J. Steffens, D. B. Stern.
A review and update on molecular biology concepts relevant to plant sciences including DNA synthesis, RNA transcription and processing, and protein structure and translation. Methods applicable to plant molecular biology are described including isolation of nucleic acids, gel electrophoresis, recombinant DNA techniques, mutant production, DNA-protein interactions, and use of antibodies.

Section 02 Plant Biotechnology (also Plant Breeding 653.2 and Plant Pathology 663)
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.
The module is a companion to BIOPL 652, signaling during pollination, and fertilization. This course covers the organization and measurement of nuclear DNA variation in plants as well as the development and exploitation of molecular markers for breedings and the isolation of genes underlying interesting phenotypes.

Section 04 Molecular Aspects of Plant Development I
1 credit. Lec, M W F 10:10 (12 lecs) Oct. 31-Nov. 26. J. B. Nasrallah. This module focuses on the molecular genetics of plant reproduction. 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 the integration of environmental and developmental signals during the transition to flowering, the establishment of pattern during floral morphogenesis, cell death and sex determination, gamete development, cell-cell signaling during pollination, and fertilization. The module is a companion to BIOPL 652, Molecular Aspects of Plant Development II, which covers molecular aspects of vegetative development.

Section 05 Molecular Biology of Plant Organelles
1 credit. S-U grades optional. Lec, M W F 1:25 (12 lecs) Oct. 24-Dec. 1. M. R. Hanson (odd years), D. B. Stern (even years). An in-depth examination of the molecular biology of plant mitochondria (odd years) and plastids (even years). Topics include the organization and expression of organelle genomes, RNA editing, organelle transformation, expression of nuclear genes for organelle proteins. Special topics include cytoplasmic male sterility and gene regulation during plastid development.

BIOL 654 Botanical Nomenclature
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Offered alternate years. Lect and disc to be arranged. Staff. An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.

BIOL 656 Topics in Plant Evolution
Spring. 1 credit. Prerequisite: BIOL 416 or equivalent background in evolution, or written permission of instructor. Lab and disc to be arranged. K. J. Niklas. A series of selected topics to provide a background in plant evolution, paleobotanical literature, and evolutionary theory. Among the topics discussed are the origin of a terrestrial flora, the evolution of the seed plants, and the origin and adaptive radiation of the angiosperms.

BIOL 740 Plant Biology Seminar
Fall and spring. No credit (no official registration). Required of graduate students doing work in plant biology. Sem, F 11:15. Staff. Lectures on current research in plant biology, presented by visitors and staff.

BIOL 741 Problems in Plant Cell and Molecular Biology
Fall. 2 credits. Limited to first- and second-year graduate students in the Plant Cell and Molecular Biology Program. Disc to be arranged. Staff. An introduction to the research literature in plant molecular and cellular biology through weekly problem sets and discussions.

BIOL 742 Current Topics in Plant Molecular 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 to be arranged. Staff. A seminar with critical presentation and discussion by students of original research papers concerning the molecular biology of plants. Staff direction varies each year and is announced a semester in advance.

BIOL 743 Current 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 required for undergraduates. Lec to be arranged. Staff. An introduction for graduate students to the research being conducted by Cornell faculty in the Plant Cell and Molecular Biology Program.

BIOL 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.

BIOL 746 Research Seminar in Systematic Botany
Spring. 1 credit. Limited to graduate students, except by permission of instructor. S-U grades optional. Disc, T 12:20. Bailey Hortorum staff. A student-led seminar presentation based on his or her thesis research or a related topic.

BIOL 749 Graduate Research in Botany
Fall or spring. Variable credit. May be repeated for credit. S-U grades only. Hours to be arranged. Similar to BIO G 499 but intended for graduate students who are working with faculty members on an individual basis.

BIOL 840 Current Topics in Plant Physiology
Fall or spring. 2 credits. May be repeated for credit. S-U grades only. Sem to be arranged. Seminar reports by graduate students on current literature in experimental plant physiology or related areas.

Related Courses in Other Departments
Introductory Mycology (Plant Pathology 309)
Marine Botany: Ecology of Marine Plants (Biological Sciences [BIOISM] 449)
Mycology Conferences (Plant Pathology 649)
Phytochemistry (Plant Pathology 709)

Plant Ecology and Population Biology, Lectures and Laboratory (Biological Sciences [BIOES] 463 and 465)
Plant Ecology Seminar (Biological Sciences [BIOES] 669)
Plant Cytogenetics Laboratory (Plant Breeding 446)
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 Division of Biological Sciences, the undergraduate specialization in Ocean Sciences offered through the course of the Earth Systems Program, and the summer program of courses offered by the Sholes Marine Laboratory. Further information on these programs can be found at Cornell Marine Programs Office, G14 Stimson Hall.

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) BIOES 154, The Sea: An Introduction to Oceanography,
2) BIOES 364, Field Marine Science or a 400-level BIOES field course at the Sholes Marine Laboratory,
3) BIOES 402, Marine Ecology.

Undergraduate Specialization in Ocean Sciences
Science of Earth Systems majors have the option of specializing their program of study in the area of ocean sciences. This interdisciplinary specialization is intended for students with interests in understanding the interaction of biological, chemical, geological, and physical processes in ocean systems. In addition to fulfilling the Science of Earth Systems general requirements (see the SES program description in Interdisciplinary Centers, Programs, and Studies section of catalog), students in ocean sciences are required to take four advanced courses from the following list to fulfill their major requirements:

1) BIOES 373 Marine Invertebrate Zoology
2) BIOES 457 Limnology
3) BIOES 462 Marine Ecology
4) BIOES 478 Ecosystem Biology
5) BIOES 309 Coastal Ecology and Bioclimates
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, numerous guest lecturers include engineers, ailologists, 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 Simson 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). SML and SEA offer a joint SEA/Island semester for 18 credits, which combines both programs (Biosm 364, 365, 367, 368, 372).

The following marine sciences courses are currently administered by the Cornell Marine Programs Office.

**BIOSM 160 The Oceanography of the Gulf of Maine**

**Summer. 4 credits. S-U grades optional.** Limited to 24 students. A special 2-week course offered aboard the **SSV Corwith Cramer** and 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 Simson Hall or the Sea Education Association office at P.O. Box 6, Woods Hole, MA, 02543. Estimated cost (includes tuition, room and board aboard ship and on the island, and ferry transportation), $3,140. Daily lectures, labs, and fieldwork for 2 weeks. SML faculty.

An exciting opportunity to explore the offshore and nearshore environments of the Gulf of Maine for pre-college and first-year non-science majors. Students spend ten days aboard the Sea Education Association’s **SSV Corwith Cramer** and sail from Woods Hole, MA, to the island 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 to collect data characteristic of the Isles of Shoals coastal environment.

**BIOSM 161 Introduction to Field Marine Science**

**Summer. 4 credits. 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 Simson Hall. Estimated cost (includes tuition, room and board), $1,800. Offered alternate years.

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 covered. Specific topics include beach, salt marsh, tidal mud flat, tide pool, and benthic offshore environments; identification of marine plants and animals; chemical and physical oceanography; marine geology; and ecology of kelp beds and urchin bars.
of meteorology and the role of abiotic and biotic factors in the life of coastal and marine plants and animals including humans.

**BIOSM 327 Neurobiology of Animal Behavior**
Summer. 4 credits. Prerequisite: one year of college-level biology. A special 2-week course offered at Cornell’s Shoals Marine Laboratory (SML) on an island off the coast of Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $1,850. Daily labs, lectures, and fieldwork for 2 weeks. Recommended: course work in neurobiology, psychology, and animal behavior. S-U grades optional. Explore the neural mechanisms underlie all behaviors, from simple reflexes to complex social interactions. The functional elements of those mechanisms often are common to both vertebrate and invertebrate nervous systems.

**BIOSM 329 Ecology of Animal Behavior**
Summer. 4 credits. Prerequisite: one year of college-level biology. 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. Estimated cost includes tuition, room and board, and ferry transportation, $1,800. Daily labs, and fieldwork for 2 weeks. SML faculty.

**BIOSM 336 Field Marine Science**
Summer. 6 credits. Prerequisite: one year of college biology. A special 4-week course offered twice each summer 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. Estimated cost includes tuition, room and board, $2,900. Daily lectures, labs, and fieldwork for 5 core faculty members assisted by up to 15 visiting lecturers, including representatives of governmental agencies. SML faculty.

**BIOSM 363 Marine Biology for Teachers**
Designed to give an overview of living marine organisms, and educational resources of the marine environment.

**BIOSM 367 SEA Introduction to Maritime Studies**
4 credits. Prerequisite: one year of college-level biology, recognized scuba certification, and a medical examination. 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. Estimated cost includes tuition, room and board, $1,900. Predominantly for teachers, grades 6 through 12, interested in marine education. Designed to provide a broad background in oceanography with special attention to areas pertinent to the subsequent cruise. Students gain hands-on experience with a spectrum of modern research techniques for behavioral, systems, cellular, and molecular approaches. A visiting scientist program allows student interaction with research scientists.

**BIOSM 368 SEA Introduction to Coastal Oceanography**
3 credits. Prerequisite: concurrent enrollment in BIOSM 366 and 367. 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 369 SEA Practical Marine Science**
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 costs are to be paid in place of regular Cornell tuition and fees: tuition for the entire 17-credit SEA Semester, about $8,500; room and board about $2,500.

Instructors for the SEA Semester include faculty of the Sea Education Association and the Woods Hole Oceanographic Institution and others.

**Shore Component (six weeks)**

**BIOSM 366 SEA Introduction to Oceanography**
3 credits. Prerequisite: concurrent enrollment in BIOSM 367 and 368. A survey of the characteristics and processes of the global ocean. Oceanographic concepts are introduced and developed from their bases in biology, physics, chemistry, and geology. Provides a broad background in oceanography with special attention to areas pertinent to the subsequent cruise. Guest lecturers from the Woods Hole Research community interpret current trends and activities in this rapidly evolving field. Students develop individual projects to be carried out at sea.

**BIOSM 367 SEA Introduction to Maritime Studies**
4 credits. Prerequisite: concurrent enrollment in BIOSM 366 and 367. 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 Coastal Oceanography**
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), marine engineering, ship construction, marine engineering systems, and the physics of sail are taught from their bases in astronomy, mathematics, and physics. Provides the theoretical foundation for the navigation, seamanship, and engineering that students employ at sea.

**Sea Component (six weeks)**
Courses 369 and 370 take place aboard the R/V Westward, a 125-foot steel auxiliary-powered staysail schooner built in 1961, or the R/V Corwith Cramer, a 134-foot steel auxiliary-powered brigantine built in 1987 for SEA. Both ships normally put to sea with a ship’s company of thirty-four. The professional staff of nine includes the captain, the chief scientist, three science watch officers, three deck watch officers, an engineer, and a steward. Additional professional and support crew are frequently aboard. Up to twenty-four students round out the complement.

**BIOSM 369 SEA Practical Oceanography I**
4 credits. Prerequisite: BIOSM 366. A special 4-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. Estimated cost includes tuition, room and board, and ferry transportation, $1,800. Daily labs, lectures, and fieldwork for 10 days. Recommended: course work in biology, physics, chemistry, and geology. Provides an introduction to the basic principles of marine biology, ecology, and oceanography. Students are trained in the practical application of oceanography techniques.
BIOSM 370 SEA Practical Oceanography II
4 credits. Prerequisites: BIOSM 368 and 369. Building on the experience of Practical Oceanography I, students assume increasing responsibility for conducting oceanographic research and overseeing operations of the vessel. The individual student may assume responsibility 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.

BIOSM 374 Field Ornithology (An Introduction)
Summer. 2 credits. Prerequisite: one year of college-level biology. S-U grades optional. A special one-week course offered at Sholes Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board), $900. Daily lecs and lab for 1 week. SML staff. An introduction to field ornithology focusing on the biology, ecology, and behavior of the avifauna on the Isles of Shoals. The course focuses on 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 various census techniques, territory mapping, banding, behavioral observations, and creating a field notebook.

BIOSM 402 Marine Pollution
Summer. 4 credits. Prerequisites: one year of college-level biology and chemistry or permission of instructor. S-U grades optional. A special 2-week course offered at Cornell's Sholes Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board), $900. Daily lecs and fieldwork for 2 weeks. SML staff. An introduction to marine pollutants; their 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 409 Ciliophorology
Summer. 2 credits. Prerequisite: permission of instructor. A special 1-week course offered at Cornell's Sholes Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board), $900. Daily lecs and lab for 1 week. SML faculty. A special course that examines ciliophoran biology in depth through lectures and laboratory exercises. Topics include a detailed look at the ciliate faunules found in such diverse habitats as salt marshes, sandy sediment interstitial spaces, the Gulf Stream and the Sargasso Sea, marine caves, and benthic hydrothermal vents. Laboratory focuses on examining silver stained specimens, and covers staining techniques, as well as back scattered and secondary SEM and TEM methodologies.

BIOSM 413 Adaptations of Marine Organisms
Summer. 6 credits. Prerequisite: BIOSM 364 or permission of instructor. S-U grades optional. A special 3-week course offered at Cornell's Sholes Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board) $2,700. Daily lecs, labs, and fieldwork for 3 weeks. SML faculty. An introduction to the physiological ecology and functional morphology of marine plankton and animals, with emphasis on selected algal and invertebrate examples from the Gulf of Maine. Topics covered include photosynthesis in the marine environment; respiration in intertidal organisms; carbohydrates, proteins, and lipids as nutrients in the sea; accretion and tolerance of tide-pool biota; and biological responses to competition and grazing. Field and laboratory exercises explore physiology and procedures used to characterize the physical, chemical, and biotic environment of intertidal and shallow subtidal organisms, including determination of temperature, light, salinity, oxygen and nutrient levels, and in vivo functional analyses of metabolic phenomena. The process of scientific investigation is the predominant theme of the course.

BIOSM 418 Tropical Marine Science
Summer. 8 credits. Limited to 12 students. Prerequisites: one year college-level biology; BioES 261 or BioSM 364 or equivalent, or BIOSM 366 or equivalent experience; recognized SCUBA certification; medical exam; and permission of instructor. fic lab, 2 weeks; 6 weeks monitoring study and individual research projects, field lecs, and computer analysis on computers. D. F. Shapiro. A special 8-week course offered in Akumal, Mexico. For more details, contact Shoals Marine Laboratory, G-14 Stimson Hall, 265-3717. Estimated cost (includes room, board, tuition, and airfare) $4,000. For competent divers only. In addition to lectures and laboratories covering the basic principles of coral reef ecology, students participate in a coral reef monitoring survey. Following two weeks of course work, students engage in independent research projects. This course applies skills learned in the Underwater Research course at Shoals Marine Laboratory.

BIOSM 449 Marine Botany: Ecology of Marine Plants
Summer. 4 credits. Prerequisite: BIOSM 364 or one year of introductory biology. S-U grades optional. A special 2-week course offered at Cornell's Sholes Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board), $1,800. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty. An overview of the major marine algal groups, including aspects of anatomy, morphology, development, life histories, physiology, and use. Laboratories and fieldwork emphasize relationships between distribution and major environmental parameters and involve student projects.

BIOSM 477 Marine Vertebrates
Summer. 6 credits. Prerequisites: A course in vertebrate biology. S-U grades optional. A special 2-week course offered at Cornell's Sholes Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board), $2,700. Daily lecs, labs, and fieldwork for 3 weeks. SML faculty. Topics in marine vertebrate biology emphasizing laboratory studies, field collections or observations, and readings from the current literature. Topics covered include systematics of fishes of the Gulf of Maine, elasmobranch biology, interpretation of life history and parameters from otolith microstructure, teleost skeleton muscle structure and function, population biology and the contemporary Gulf of Maine fishery, Mesozoic marine reptiles, the biology of sea turtles in cold water, coloniality in sea birds, avian adaptations to life at sea, evolution and systematics of marine mammals, diving physiology, and ecology and conservation of existing marine mammal populations. Dissection of vertebrate animals is a part of one or more laboratory sessions.

ARKEO Archaeology of Maritime Communities (Archaeology 300: Individual Study in Archaeology)
Summer. 2 credits. Prerequisite: a special interest in history. A special 1-week course offered at Cornell's Sholes Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $950. Daily lecs, labs, and fieldwork for 1 week. SML faculty. Fieldwork on various sites and their adjacent offshore marine environments. Artifact analysis, preliminary conservation, and the proper recording of finds are emphasized. Methods of archaeological research, including the use of archives and historical materials, and publication methodologies as well as the larger questions in the discipline are discussed.
ARKEO Archaeology Underwater
(ARCH 319)
Summer. 2 credits. Prerequisites: recognized scuba certification and a medical examination required for students engaging in underwater research; also open to non-divers. A special 1-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. Estimated cost (includes tuition, room and board), $1,000. Daily lectures, labs, and fieldwork for 1 week. SML faculty.

An introduction to the subject and a review of this contemporary subdiscipline of archaeology. The approach of the course is practical, with a strong potential for actual on-site experience in search, site recognition, survey, and recording. The course also covers the history and development of the subject, the legal aspects of underwater research, and the worldwide potential of the field. Since any archaeological research project involves a great deal more than digging, the course provides ample opportunities for those who are interested in the subject but are not divers or sufficiently experienced in scuba.

GEOL Marine and Coastal Geology
(Geological Sciences 213)
Summer. 2 credits. Prerequisite: an introductory course in geology or permission of instructor. A special 1-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. Estimated cost (includes tuition, room, and board), $900. Daily lectures, labs, and fieldwork for 1 week. SML faculty.

With “the New England coast” defined as beginning at the -200 meter isobath and proceeding westward, the course examines specific geological events and processes important in shaping the area’s bedrock and surficial sediments. Petrology, geophysics, and the Pleistocene geology of the region are integrated into a larger context. The geologic history of New England within the plate tectonic model is emphasized. Examination of insular geology is used to integrate micro-, meso-, and macro-scale geological evolution of continental margins in general. Marine geology is approached through basic geophysical exploration and bottom-sediment collection followed by data analysis and interpretation. Experience aboard a coastal research vessel is an integral part of the course.

NTRES Coastal and Oceanic Law and Policy Resources 306
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 and an application consult the SML office, G14, Stimson Hall. Estimated cost (includes tuition, room and board), $900. Daily lectures and disc for 1 week. SML faculty.

Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and analysis of the efficacy of various legal techniques. A case study that requires extensive use of the laboratory’s library and personnel is assigned. The week concludes with a mock hearing.

NTRES Wetland Resources
(Natural Resources 417)
Summer. 2 credits. Prerequisite: one year of college-level biology. A special 1-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. Estimated cost (includes tuition, room and board), $900. Daily lectures, labs, and fieldwork. SML faculty.

An examination of coastal and adjacent freshwater wetlands from historical, functional, and preservation perspectives, including fresh- and salt-marsh ecology and management. Field trips to selected examples of the wetlands under discussion and follow-up laboratories emphasize features, plant identification and classification, and examination of the dominant insect and vertebrate associations.

FACULTY ROSTER

New York State College of Agriculture and Life Sciences

Adler, Krag K., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
Alani, Eric E., Ph.D., Harvard U. Asst. Prof., Genetics and Development
Anderson, John M., Ph.D., New York U. Prof., Emeritus, Genetics and Development
Banks, Harlan P., Ph.D., Cornell U. Liberty Hyde Bailey Prof. of Botany Emeritus, Plant Biology
Bates, David M., Ph.D., U. of California at Los Angeles. Prof., Bailey Hortorum
Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Physiology/Veterinary Physiology
Brans, Peter J., Ph.D., U. of Illinois. Prof., Genetics and Development
Cade, Thomas J., Ph.D., U. of California at Los Angeles. Prof., Emeritus, Ecology and Systematics
Calvo, Joseph M., Ph.D., Duke U. Prof., Environmental Sciences, Biochemistry, Molecular and Cell Biology
Chabot, Brian F., Ph.D., Duke U. Prof., Ecology and Systematics
Clayton, Roderick K., Ph.D., University of California Inst. of Technology. Prof Emeritus, Plant Biology
Corradino, Robert A., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology
Crepet, William L., Ph.D., Yale U. Prof., Bailey Hortorum
Daniel, Louise J., Ph.D., Cornell U. Prof., Emeritus, Biochemistry, Molecular and Cell Biology
Davies, Peter J., Ph.D., U. of Reading (England). Prof., Plant Biology
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Fox, Thomas D., Ph.D., Harvard U. Prof., Genetics and Development
Ghiorse, William C., Ph.D., Rensselaer Polytechnic Inst. Prof., Microbiology
Gibson, Jane, Ph.D., U. of London (England). Prof. Emeritus, Biochemistry, Molecular and Cell Biology
Goldberg, Michael L., Ph.D., Stanford U. Prof., Genetics and Development
Hanson, Maureen R., Ph.D., Harvard U. Prof., Genetics and Development
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*Emeritus Faculty

BIOL SC 1997-1998
Naylor, Harry B., Ph.D., Cornell U. Prof., Emeritus, Microbiology
Niklas, Karl J., Ph.D., U. of Illinois. Assoc. Prof., Plant Biology
Nixon, Kevin R., Ph.D., U. of Texas at Austin. Assoc. Prof., Bailey Hortorum
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PadoI, Dominick J., Jr., Ph.D., U. of California at Davis. Prof., Plant Biology
Parthasarathy, Vishwam V., Ph.D., Cornell U. Prof., Plant Biology
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Stewart, Valley J., Ph.D., U. of Virginia. Assoc. Prof., Microbiology/Genetics and Development
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Wayne, Randy O., Ph.D., U. of Massachusetts. Assoc. Prof., Plant Biology
Winas, Stephen C., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Microbiology
Winkler, David W., Ph.D., U. of California at Berkeley. Assoc. Prof., Ecology and Systematics
Wu, Ray, Ph.D., U. of Pennsylvania. Prof., Biochemistry, Molecular and Cell Biology
Zahler, Stanley A., Ph.D., U. of Chicago. Prof., Emeritus, Genetics and Development
Zinder, Stanley A., Ph.D., U. of Wisconsin. Prof., Microbiology
Other Teaching Personnel
Blankenship, James E., M.S., Cornell U. Sr. Lecturer, Biochemistry, Molecular and Cell Biology
Calvo, Rita A., Ph.D., Cornell U. Sr. Lecturer, Genetics and Development
Cordis, Marcia L., Ph.D., Cornell U. Lecturer, Neurobiology and Behavior
Ecklund, P. Richard, Ph.D., Oregon State U. Sr. Lecturer, Neurobiology and Behavior
Glase, Jon C., Ph.D., Cornell U. Sr. Lecturer, Neurobiology and Behavior
McFadden, Carol H., Ph.D., Cornell U. Sr. Lecturer, Physiology
Merkel, Susan K., Cornell U. Lecturer, Microbiology
Nivison, Helen T., Ph.D., U. of California at Davis. Lecturer, Biochemistry, Molecular and Cell Biology
Rehkgoder, Carole M., M.S., Cornell U. Sr. Lecturer, Microbiology
Sneath, Barbara, Ph.D., Syracuse U. Lecturer, Genetics and Development
Tyler, Bonnie M., Ph.D., Massachusetts Inst. of Technology. Sr. Lecturer, Biochemistry, Molecular and Cell Biology
Joint Appointees
Bloom, Stephen E. Assoc. Prof., Poultry and Avian Sciences/Biological Sciences
Borer, Arthur C., Adjunct Prof., U. of New Hampshire/Biological Sciences
Foote, Robert H., Jacob Gould Schurman Prof. Emeritus, Animal Science/Physiology
Howell, Stephen H., Adjunct Prof., Boyce Thompson Institute/Plant Biology
Kochian, Leon V., Adjunct Assoc. Prof., USDA Science and Education Administration/Plant Biology
Korf, Richard P., Prof. Emeritus, Plant Pathology/Bailey Hortorum
Last, Robert L., Adjunct Prof., Boyce Thompson Institute/Genetics and Development
Lieberherr, James K., Assoc. Prof., Entomology/Bailey Hortorum
Mason, Hugh S., Adjunct Asst. Prof., Boyce Thompson Institute/Plant Biology
May, Gregory D. Adjunct Asst. Prof., Boyce Thompson Institute/Plant Biology
Pimentel, David, Prof., Entomology/Ecology and Systematics
Richmond, Milo E., Assoc. Prof., USDA Fish and Wildlife Service/Natural Resources/Ecology and Systematics
Rossman, Michael J., Adjunct Prof., Purdue U./Biochemistry, Molecular and Cell Biology
Stern, David B., Adjunct Assoc. Prof., Boyce Thompson Institute/Plant Biology
Thompson, John F., Adjunct Prof., USDA Science and Education Administration/Plant Biology
Weeden, Norman F., Assoc. Prof., Horticultural Sciences/Bailey Hortorum
Wheeler, Quentin D., Prof., Entomology/Bailey Hortorum
College of Arts and Sciences
Aquedro, Charles F., Ph.D., U. of Georgia. Prof., Genetics and Development/Ecology and Systematics
Bass, Andrew H., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
Blackler, Antonie W., Ph.D., U. of London (England). Prof., Genetics and Development
Booker, Ronald, Ph.D., Princeton U. Assoc. Prof., Neurobiology and Behavior
Brechtmann, Anthony P., Ph.D., Leeds U. (England). Prof., Biochemistry, Molecular and Cell Biology
Brown, William J., Ph.D., U. of Texas Health Science Center at Dallas. Assoc. Prof., Biochemistry, Molecular and Cell Biology
Capanoica, Robert R., Sc.D., Massachusetts Inst. of Technology. Prof. Emeritus, Neurobiology and Behavior
Dawson, Todd E., Ph.D., U. of Washington. Assoc. Prof., Ecology and Systematics
Dechter, David, Ph.D., Harvard Med. School. Asst. Prof., Neurobiology and Behavior
Feigenson, Gerald W., Ph.D., California Inst. of Technology. Prof., Biochemistry, Molecular and Cell Biology
Geber, Monica A., Ph.D., U. of Utah. Asst. Prof., Ecology and Systematics
Gibson, Quentin H., Ph.D./D.Sc., Queen's U. (Northern Ireland). Greater Philadelphia Professor Emeritus in Biological Sciences, Biochemistry, Molecular and Cell Biology
Gillbert, Perry W., Ph.D., Cornell U. Prof. Emeritus, Neurobiology and Behavior
Halpern, Bruce P., Ph.D., Brown U. Prof., Neurobiology and Behavior/Psychology
Hedin, Lars O., Ph.D., Yale U. Asst. Prof., Ecology and Systematics
Heppel, Leon A., Ph.D., U. of California at Berkeley. Prof. Emeritus, Biochemistry, Molecular and Cell Biology
Hess, George P., Ph.D., U. of California at Berkeley. Prof., Biochemistry, Molecular and Cell Biology
Hinkle, Peter C., Ph.D., New York U. Prof., Neurobiology and Behavior
Huffaker, Tim C., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Biochemistry, Molecular and Cell Biology
Karplus, P. Andrew, Ph.D., U. of Washington. Assoc. Prof., Biochemistry, Molecular and Cell Biology
Kennedy, Kenneth A. R., Ph.D., U. of California at Berkeley. Prof., Ecology and Systematics
Leonard, Samuel L., Ph.D., U. of Wisconsin. Prof. Emeritus, Genetics and Development
McCobb, David, Ph.D., U. of Iowa. Asst. Prof., Neurobiology and Behavior
MacDonald, June M. Fessenden, Ph.D., Tufts U. Assoc. Prof., Biochemistry, Molecular and Cell Biology/Program on Science, Technology, and Society
McFarland, William N., Ph.D., U. of California at Los Angeles. Prof. Emeritus, Ecology and Systematics
Morin, James G., Ph.D., Harvard U. Prof., Ecology and Systematics
Nicholson, Linda, Ph.D., Florida State U. Asst. Prof., Biochemistry, Molecular and Cell Biology
Podleski, Thomas R., Ph.D., Columbia U. Prof., Neurobiology and Behavior
Provine, William B., Ph.D., U. of Chicago. Charles A. Alexander Professor of Biological Sciences, Ecology and Systematics/History
Salpeter, Miriam M., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Applied and Engineering Physics
Seyler, Thomas D., Ph.D., Harvard U. Prof., Neurobiology and Behavior
Sherman, Paul W., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
Turgeon, Robert, Ph.D., Carleton U. (Canada). Prof., Plant Biology
Wallace, Bruce P., Columbia U. Prof. Emeritus, Genetics and Development
Wilson, David B., Ph.D., Stanford U. Prof., Biochemistry, Molecular and Cell Biology
Wolfner, Mariana F., Ph.D., Stanford U. Prof., Genetics and Development

Other Teaching Personnel
Albrecht, Genia S., Ph.D., U. of Washington. Sr. Lecturer, Biochemistry, Molecular and Cell Biology
Eberhard, Carolyn, Ph.D., Boston U. Sr. Lecturer, Plant Biology
Johnson, Bruce R., Ph.D., Boston U. Sr. Lecturer, Neurobiology and Behavior

Joint Appointees
Adkins-Regan, Elizabeth, Prof., Psychology/Neurobiology and Behavior
Levin, Simon A., Adjunct Prof., Princeton U./Ecology and Systematics
Likens, Gene E., Adjunct Prof., Institute of Ecosystem Studies/Ecology and Systematics

New York State College of Veterinary Medicine
Fortune, Joanne E., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology
Gasteiger, Edgar L., Ph.D., U. of Minnesota. Prof. Emeritus, Physiology
Gilmour, Robert F., Ph.D., SUNY Upstate Medical Center. Assoc. Prof., Physiology
Robertshaw, David, Ph.D., Glasgow U. (Scotland). Prof., Physiology/Veterinary Physiology
Tapper, Daniel N., Ph.D., Cornell U. Prof. Emeritus, Physiology/Veterinary Physiology
Wasserman, Robert H., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology/Nutritional Sciences

Other Teaching Personnel
Concannon, Patrick W., Ph.D., Cornell U. Sr. Lecturer, Physiology

Joint Appointees
Houpt, Katherine A., Prof., Veterinary Physiology
Houpt, T. Richard, Prof., Veterinary Physiology
Nathanielsz, Peter W., Leading Prof., Clinical Sciences/Veterinary Physiology
Wootton, John F., Prof., Veterinary Physiology

College of Engineering

Joint Appointees
Cisne, John L., Assoc. Prof., Geological Sciences/Biological Sciences
Jelinski, Lynn W. Prof., Biotechnology Program/Biological Sciences
Webb, Watt W., Prof., Applied and Engineering Physics/Biological Sciences

Division of Biological Sciences
Stinson, Harry T., Jr., Ph.D., Indiana U. Prof., Biological Sciences/Genetics and Development

Joint Appointees
Snedeker, Suzanne M., Asst. Prof., Center for the Environment/Biological Sciences

Division of Nutritional Sciences

Joint Appointees
Aron, William J., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
Kazarinoff, Michael N., Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

Wright, Lemuel D., Ph.D., Oregon State Coll. Prof. Emeritus, Nutritional Sciences/Biochemistry, Molecular and Cell Biology

*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.
COLLEGE OF ENGINEERING

ADMINISTRATION
John E. Hopcroft, dean
Michael S. Isaacson, associate dean for research and graduate studies
Kenneth C. Hover, associate dean for undergraduate programs
Mark K. Spiro, associate dean for administration
Deborah Cox, assistant dean for student services
Marsha Pickens, assistant dean for alumni affairs and development

FACILITIES AND SPECIAL PROGRAMS
Most of the academic units of the College of Engineering are on the Joseph N. Pew, Jr. Engineering Quadrangle. Facilities for applied and engineering physics are located in Clark Hall on the College of Arts and Sciences campus, and facilities for agricultural and biological engineering are centered in Riley-Robb Hall on the campus of the New York State College of Agriculture and Life Sciences.

Special university and college facilities augment the laboratories operated by the various engineering schools and departments, and special centers 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 Manufacturing Enterprise. A joint venture of Cornell, industrial organizations, and the federal government to encourage the development and implementation of modern manufacturing systems.

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 Electronic Packaging Alliance. A cooperative venture involving Cornell and several corporations in the areas of computing and microelectronics, organized to undertake precompetitive, interdisciplinary research in electronic packaging.

Cornell High Energy Synchrontron 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.

Laboratory of Plasma Studies. A center for interdisciplinary research in plasma physics and lasers.

Materials Science Center. An interdisciplinary facility with substantial support from the National Science Foundation, providing sophisticated scientific measurement and characterization equipment.

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.

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 research and instructional program centered in a laboratory that has a complete real-time model of an electric power system.

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.

SRC Program on Microscience and Technology. A center sponsored by the Semiconductor Research Corporation to promote research essential to the development of VLSI devices and circuits.

Ward Laboratory of Nuclear Engineering. Irradiation, isotope production, and activation analysis facilities for interdisciplinary research.

The programs listed on this page are sponsored by College of Engineering units and several are industry affiliated. These are in the areas of injection molding, computer science, materials science, geologic study of the continents, and nanometer scale structures.

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:

Agricultural and Biological Engineering
Chemical Engineering
Civil Engineering
College Program
Computer Science
Electrical Engineering
Engineering Physics
Geological Sciences
Materials Science and Engineering
Mechanical Engineering
Operations Research and 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 the Engineering Advising office. 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 College Program (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 a bioengineering option within one of the field programs or through the College Program.
Information about the bioengineering option is available in the Engineering Advising office, 167 Olin Hall. Students interested in environmental engineering and science may pursue the environmental option offered by the School of Civil and Environmental Engineering, the major offered by the Department of Agricultural and Biological Engineering, or the Science of Earth Systems (SES) option offered by the Department of Geological Sciences. Double majors combining environmental science and engineering are feasible.

*Agricultural and biological engineering, chemical engineering, civil engineering, electrical engineering, engineering physics, materials science and engineering, mechanical engineering, and operations research and engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

°Freshman Writing Seminars are offered by over thirty different departments in sequence.

All students considering the environmental science and engineering option (designated by ENGRI) and are to be taken by engineering students.

In general, students intending to affiliate with the field program must have taken at least one year of calculus (MATH 191 or 193) before taking PHYS 213. CHEM 211 is a course designed for students who have attained a minimum grade of C- in MATH 191 or equivalent before taking PHYS 112. To major in agricultural and biological engineering and become jointly enrolled in the Colleges of Agriculture and Life Sciences and Engineering, students must meet the requirements of the field program, including proficiency in swimming to satisfy this requirement. Technical Writing

In addition to the two Freshman Writing Seminars required, engineering students must take a course that includes a significant amount of technical and scientific writing. This course may be used to satisfy another graduation requirement. A student can fulfill the technical writing requirement by enrolling in an engineering course specifically designed to include a writing-intensive component or by taking a course in technical or scientific writing. Courses that currently satisfy this requirement are ENGRD/A&EP 264, CHEM E 432, COMM 352, COMM 360, COMM 363, ELE E 215, ENGRG E 350, ENGRG E 435, M&A E 427, M&A E 435, and M&A E 443-444 if both courses are taken. Students participating in the Engineering Cooperative Program may also arrange for a writing-intensive co-op experience to satisfy this requirement. Updated information on these approved courses may be obtained from the Engineering Advising office, 167 Olin Hall.

*Please note that enrollments are limited in COMM and ENGRG writing courses.

Computing

In either the first or second term of their freshman year, students normally take COMS 100, Introduction to Computer Programming. Before graduation they must take an additional course with a significant amount of computing applications; this course may also be used to meet another graduation requirement. Courses that satisfy this requirement are ABEN 453, ABEN 475, ENGRD/COM S 211 or 212, ENGRD/COM S 222, ENGRD/CEE 241, ENGRD/A&EP 264, ELE E 423, M&A E 389, M&A E 489, M&A E 575, M&A E 578, and M&A E 670. The recommended choice for students intending to enter the Field Program in Engineering Physics is ENGRD 264; in Chemical Engineering, ENGRD 211, 222 or 241; in Civil Engineering, ENGRD 241; in Computer Science, ENGRD 211 or 212; in Electrical Engineering, ENGRD 211; in Mechanical Engineering, M&A E 389, M&A E 489, M&A E 575, or M&A E 670; and in Operations Research and Engineering, ENGRD 211.

Engineering Distribution

Three engineering distribution courses (9 credits) are required. One course must be an Introduction to Engineering Course (designated by ENGRD) and is to be taken by the student during their 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 the following categories listed below. A student may use any one of the possible substitutions described.
from approved courses in four categories: (a) humanities or history, (b) social sciences, (c) foreign languages, and (d) expressive arts. (No freshman seminar may be used to meet the liberal studies requirement.)

- At least two courses must be chosen from category (a).
- No more than 3 credits toward this requirement may be taken in category (d).
- At least two courses in either category (a) or (b) must be from the same field of study. One of these courses must be at or above the 200-level or be an explicit prerequisite of the other.

Following each category is a list of approved courses. Every effort has been made to keep the lists up to date, but errors sometimes occur. Students who wish to use a course that seems to fit the category description but is not listed should contact the Engineering Advising office.

**a) Humanities or History**

American Studies 101, 201, 202
Architecture 131, 132, 181, 182
Art 317, 318
Africana Studies 202, 204, 205, 211, 280, 285, 304, 510, 561, 570, 381, 422, 425, 431, 432, 435, 455, 475, 483
Anthropology 290, 451, 452, 453, 455
Archeology (courses in Old World Archeology and 493)
Asian Studies (courses in Asian art, literature, religion or cultural history)
Biology and Society 201, 301, 306, 361, 382, 404, 442
Communication 116, 120, 314, 410, 416, 420
Consumer Economics and Housing (110, 111, 247, and any course having one or more of these as a prerequisite)
Design and Environmental Analysis 150, 250
Economics (all courses except 315, 317, 318, 319, 320, 321, 326. Engineering students should generally take ECON 301-302 and not 101-102; unless they have had no calculus.)
Education 210, 212, 271, 311, 317, 378, 415, 477
Government (all courses)
Human Development and Family Studies (all courses)
Human Service Studies (all courses)
International and Comparative Labor Relations (all courses)
Labor Economics (all courses except 345 and 448)
LINGUISTICS (all courses)
Natural Resources 201
Organizational Behavior (all courses)
Rural Sociology (all courses)
Sociology (all courses)
Textiles and Apparel 245

2) **Materials science**

ENGRD 261, Introduction to Mechanical Properties of Materials

3) **Mechanics**

ENGRD 202, Mechanics of Solids

ENGRD 203, Dynamics

Students in the Field Program in Engineering Physics may substitute A&EP 333 for ENGRD 203.

4) **Probability and statistics**

ENGRD 270, Basic Engineering Probability and Statistics

Students in the Field Program in Electrical Engineering may substitute ELE E 310 for ENGRD 270. Students in the Field Program in Engineering Physics may substitute A&EP 333 for ENGRD 203.

5) **Electrical sciences**

ENGRD 210, Introduction to Electrical Systems

ENGRD 231, Introduction to Digital Systems

ENGRD 264, Computerized-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 250, Engineering Applications in Biological Systems

8) **Biology and chemistry**

BIO G 101 and 105, 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:

Chemical Engineering: ENGRD 219

Civil Engineering: ENGRD 202, and ENGRD 219 (for environmental option)

Computer Science: ENGRD 211 or ENGRD 212

Electrical Engineering: ENGRD 231 (co-enrollment in ELE E 232 strongly recommended)

Materials Science and Engineering: ENGRD 261

Mechanical Engineering: ENGRD 202

Operations Research and Engineering: ENGRD 270

**Liberal Studies Distribution**

The six required liberal studies courses (totaling at least 18 credits) may be chosen

**Russian Literature** (all courses)

Science and Technology Studies 233, 433, 444, 525

**Spanish Literature** (all courses)

Theater Arts (only courses in Theater Studies, film analysis and history)


**b) Social Sciences**


Agricultural Economics (ARME) 100, 250, 430, 431, 432, 450, 464

Anthropology (all courses except 101 and courses in Biological and Ecological Anthropology)

Archeology (all courses except those in Methodology and Technology)

Architecture 342

Asian Studies (courses in Asian anthropology, economics, government, linguistics, or sociology)

Biology and Society 201, 301, 406, 407

City and Regional Planning 100, 101, 314, 361, 382, 404, 442

Communication 116, 120, 314, 410, 416, 420

Consumer Economics and Housing (110, 111, 247, and any course having one or more of these as a prerequisite)

Design and Environmental Analysis 150, 250

Economics (all courses except 315, 317, 318, 319, 320, 321, 326. Engineering students should generally take ECON 301-302 and not 101-102; unless they have had no calculus.)

Education 210, 212, 271, 311, 317, 378, 415, 477

Government (all courses)

Human Development and Family Studies (all courses)

Human Service Studies (all courses)

International and Comparative Labor Relations (all courses)

Labor Economics (all courses except 345 and 448)

LINGUISTICS (all courses)

Natural Resources 201

Organizational Behavior (all courses)


Rural Sociology (all courses)

Sociology (all courses)

Textiles and Apparel 245

c) Foreign Language
This category includes all foreign language courses; if two or more foreign language courses are used to fulfill part of the liberal studies requirement, they must be a sequence of courses in the same language. The rules for placement and advanced placement credit in languages are those of the College of Arts and Sciences. Speakers of languages other than English may obtain up to 6 advanced placement credits equal to two courses according to these rules.

d) Expressive Arts
African Studies 303, 425, 430
Art (studio courses)
Biological Sciences 208, 209
Communications (all courses except 116, 120, 314, 410, 416, 420, 426, 465)
Design and Environmental Analysis 101, 102, 114
Engineering (all Engineering Communications courses, which are designated ENGRC)
English (expository and creative writing courses, whose numbers end in the 80's, e.g., 288, 289, 382, etc.)
Floriculture (courses in Freehand Drawing and Scientific Illustration)
Industrial and Labor Relations 452
Music (courses in musical performance, musical organizations and ensembles; three 1-credit courses equals one course)
Theater Arts (all courses except those listed in category (a) above)

Electives
• Approved electives—six (6) 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 (ENGRI).
2. Engineering distribution courses.
3. Courses stressing written or oral communication.
4. Upper-level engineering courses.
5. Advanced courses in mathematics.
6. Rigorous courses in the biological and physical sciences.
7. Courses in business, economics, or language (when they serve the student’s educational and academic objectives).
8. Courses that expand the 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 (9) credits (approved by engineering field program faculty and 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 (9) hours 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 within 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 Office
From the time that students enter the college as freshmen until they are affiliated with a major field or the College Program before the second term of the sophomore year, they are under the administration of the Engineering Advising office, which implements the academic policies of the College Curriculum Governing Board. The office offers general advising and counseling services and serves as the primary resource center for undergraduate students in the college. The Engineering Minority Programs office and the Women’s Programs in Engineering office provide additional specialized services.

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 193) and MATH 192
• Two of the following: CHEM 211, 207, 208, PHYS 112, 213, 214
• COM S 100
• Two (2) Freshman Writing Seminars
• One (1) Introduction to Engineering course (ENGRI designation)
• Two (2) Physical Education courses
*Students with an interest in pre-med, chemical engineering, the environmental option in civil engineering, or the science of earth systems option in geological 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 have a 2.0 cumulative grade point average and (2) have satisfied the field's course and grade requirements as specified below:

Field Program Courses and Minimum Grade Requirements
Agricultural and Biological Engineering
No more than one grade below C- in mathematics and science courses and ABEN 151 or equivalent.
Applied and Engineering Physics
2.7 GPA in all mathematics and physics courses
Chemical Engineering
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
Civil & Environmental Engineering
A 2.0 GPA in all engineering and science courses; for students in the civil engineering option a grade of C- in ENGRD 202, for students in the environmental option a grade of C- in ENGRD 219.
Computer Science
A grade of B- in COM S 280, ENGRD 211 or 212 and all mathematics courses
Electrical Engineering
A grade of C or better in all 200-level mathematics and physics courses, and either ELE E 210 or ENGRD 231
Geological Sciences
Good academic standing in the College of Engineering
Materials Sciences & Engineering
A grade of C in ENGRD 261
Mechanical & Aerospace Engineering
A grade of C- in mathematics and science courses and ENGRD 202
Operations Research
A grade of C- in MATH 191 (OR 193) and 192, 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.

SPECIAL PROGRAMS

College Program
Individually arranged courses of study under the College Program are possible for those well-qualified students whose educational objectives cannot be met by one of the regular field programs. Often the desired curriculum is in an interdisciplinary area. Each program is developed by the student in consultation with faculty advisers and must be approved by the College Program Committee, which is responsible for supervising the student's work.

Students apply to enter the College Program by the end of the first term of the sophomore year. A student should seek assistance in developing a coherent program from professors in the proposed major and minor subject areas. If approved, the program is the curricular contract to which the student must adhere. Normally, students applying to the
College Program should have a 3.0 cumulative grade point average. Every curriculum in the College Program, with the exception of certain faculty-sponsored programs, must comprise an engineering major and an educationally related minor. The major may be in any subject area offered by schools or departments of the college; the minor may be in a second engineering subject area or in a logically connected non-engineering area. The combinations must clearly form an engineering education in scope and in substance and should include engineering design and synthesis as well as engineering sciences. In addition to 48 credits in the major and minor subjects, including at least 32 credits in engineering courses, each program includes the normally required courses in humanities and social sciences and approved electives. Further information about the College Program may be obtained from the associate dean for undergraduate programs, 222 Carpenter Hall.

Important Note: Because no single standardized curriculum exists, the College Program is not accredited. College Program students who intend to seek legal licensing as a Professional Engineer should be aware that this non-accredited degree program will require additional education, work, and/or experience to qualify for eligibility to take the Fundamentals of Engineering examination.

**Bioengineering Option**

Students who elect this option will graduate with a B.S. degree in one of the traditional fields and with an administrative note on their transcript formally recognizing their efforts in bioengineering.

The requirements for completion of the option are four courses (12 credit hours minimum) and one credit hour of Bioengineering Seminar (ENGRG 501). These courses can simultaneously satisfy other degree requirements and are not necessarily four additional courses. These four courses must be selected from two categories: science-based courses and bioengineering courses. At least one course must be from the science-based course list and at least one from the bioengineering course list. Each student interested in the bioengineering option can request (through the Engineering Undergraduate Programs and Student Services office) a faculty consultant who will advise the student in course selection for this option. The bioengineering faculty consultant is in addition to the student's regular academic adviser.

A list of approved courses is available in the Engineering Advising office, 167 Olin Hall or in the Engineering Undergraduate Programs and Student Services office, 222 Carpenter 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 the Engineering Advising office, 167 Olin Hall. Information on co-op programs abroad is available from the Engineering Professional Programs office in 148 Olin Hall.

**Dual Degree Option**

A special academic option, intended for superior undergraduate students, is a three-year program in which both a Bachelor of Arts 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 Architecture, Art and Planning may apply and, after acceptance of their application, begin the dual degree program in their second or third year. Those interested should contact the appropriate coordinators of dual degree programs at the following locations: 172 Goldwin Smith Hall (for Arts and Sciences); or 135 East Sibley Hall (for Architecture and Planning) and the associate dean for engineering undergraduate programs in 222 Carpenter Hall or in the Engineering Advising office, 167 Olin Hall.

**Double Major in Engineering**

The Double Major option, which makes it possible to develop expertise in two allied fields of engineering, generally requires at least one semester beyond the usual four years. Students affiliate with one field in the normal way and then petition to enter a second field before the end of their junior year. All the requirements of both fields must be satisfied. Information is available from the Engineering Advising office, 167 Olin Hall, and the individual field consultant offices.

**Engineering Communications Program**

The ability to communicate effectively is an essential aspect of successful professional practice. The Engineering Communications Program offers instruction in written, oral, and visual presentation of information. Engineering Communications (ENGRG 380 and Communications for Engineering Managers (ENGRG 435) are three-credit seminars designed to give students a thorough introduction to these areas. Material from real-life engineering contexts is analyzed, and many assignments are presented as professional case studies. Students write and speak to audiences having different levels of technical expertise and deal with societal, organizational, and ethical issues in communications. These courses fulfill the college's technical writing requirement (see Requirements for Graduation). In addition to offering communications seminars, the program works with the engineering disciplines to integrate communications into technical courses. Occasionally, the program's instructors offer independent studies, projects in technical/professional communications, and courses on topics of special interest. The program awards several annual prizes for writing and oral presentations. For further information, contact the director, 465 Hollister Hall.

**Engineering Cooperative Program**

A special program for undergraduates in most fields of engineering is the Engineering Cooperative 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 job co-op students are able to explore their own interests and acquire a better understanding of engineering as a profession.

Sophomores in the upper half of their class are eligible to apply for the co-op program. (Students in computer science and agricultural and biological engineering-related enterprises are eligible although they may not be registered in the College of Engineering.) Applicants are interviewed by representatives of cooperating companies and select their work assignments from any offers 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 their 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 company 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 Professional Programs office, 148 Olin Hall.

**MASTER OF ENGINEERING DEGREE PROGRAMS**

One-year Master of Engineering (M.Eng.) programs are offered in thirteen 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. The M.Eng. degrees and the academic fields under which they are described are listed below.

- M.Eng. (Aerospace): Mechanical and Aerospace Engineering
- M.Eng. (Agricultural and Biological): Agricultural and Biological Engineering
- M.Eng. (Chemical): Chemical Engineering
- M.Eng. (Civil & Environmental): Civil and Environmental Engineering
- M.Eng. (Computer Science): Computer Science
- M.Eng. (Electrical): Electrical Engineering
- M.Eng. (Engineering Physics): Applied and Engineering Physics
- M.Eng. (Geology): Geological 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&IE): Operations Research and Industrial Engineering
Candidates for a professional master's degree who wish to specialize in areas related to manufacturing may avail themselves of two special programs. The manufacturing systems engineering option may be entered in any one of the fields listed above. This option is attested to by a Dean's Certificate in addition to a diploma at the time of graduation. An industrial internship program provides opportunities to combine on-campus education with off-campus industrial experience.

An M.Eng. option of potential interest to engineers from all fields is the program in engineering management, offered by the School of Civil and Environmental Engineering. This option is described in the section related to the M.Eng. (Civil & Environmental) degree. A new management option in the M.Eng. (Chemical) degree program is also available.

Cornell engineering graduates in the upper half of their class will generally be admitted to M.Eng. programs; however, requirements for admission vary by field. Superior Cornell applicants who will be, at the time of matriculation, eight or fewer credits short of a baccalaureate degree may petition for early admission. Other applicants must have a baccalaureate degree or its equivalent from a college or university of recognized standing, in an area of engineering or science that is judged appropriate for the proposed field of study. They must also present evidence of undergraduate preparation equivalent to that provided by a Cornell undergraduate engineering education, a transcript, two letters of recommendation, and a statement of academic purpose. A candidate who is admitted with an undergraduate background that is judged inadequate must make up any deficiencies in addition to fulfilling the regular course requirements for the degree. Applicants from foreign universities must submit the results of the Graduate Record Examination aptitude tests and must have an adequate command of the English language. Financial aid providing partial support is available for very highly qualified candidates, primarily those who are residents of the U.S. Industry-sponsored internships, which extend the program to two years, are also available to residents of the United States. Application forms and further information are available from the graduate field offices.

Cooperative Programs with the Johnson Graduate School of Management

Two programs culminate in both Master of Engineering and Master of Business Administration degrees. One, which Cornell students enter during their undergraduate career, makes it possible to earn the B.S., M.Eng., and M.B.A. in six years—one year less than such a program would normally require. The second program, which is available to students who already hold baccalaureate degrees from Cornell or other institutions, requires five semesters and leads to both the M.Eng. and M.B.A.

Undergraduate students at Cornell interested in the six-year program should seek advice and information from the department with whose field they intend to affiliate during their upperclass years. Information about admission to either program and about scholarship aid may be obtained from the Engineering Professional Programs office, 140 Olin Hall.

ACADEMIC PROCEDURES AND POLICIES

Advanced Placement Credit

The College of Engineering awards a significant amount of advanced placement (AP) credit to entering freshmen who demonstrate proficiency in the subject areas of introductory courses. Students can earn AP credit by receiving qualifying scores on any of the following:

1. advanced placement examinations given and scored by the College Entrance Examination Board (CEEB); or
2. General Certificate of Education (GCE) Advanced ("A") Level Examinations; or
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 193, 192, 293, and 294 are required.

First-term math (MATH 191 or 193). AP credit may be earned by:

• a score of 3 or 4 on the CEEB BC exam, or
• a score of 4 or 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 score of 5 on the CEEB BC exam, or
• a passing score on the Cornell departmental exam for first-year math.

Physics: PHYS 112. AP credit may be earned by:

• a score of 3 or 4 on the mechanics portion of the CEEB 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 293.

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 Professor Rich Galik, the departmental representative. His telephone number is 607/255-3633.

Chemistry: CHEM 207 or CHEM 211 is required.

CHEM 207 or CHEM 211. AP credits may be earned by:

• a score of 5 on the CEEB AP exam, or
• a passing score on the Cornell departmental exam for Chemistry.

Note: Students who 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 adviser.

Computing: COM S 100 is required. AP credit may be earned by:

• a score of 4 or 5 on the CEEB A or 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 for Academic Affairs, Division of Biological Sciences, 200 Stimson Hall, to discuss proper placement.

Freshman Writing Seminar: Two Freshman Writing Seminars (for a total of six credits) are required.

AP credit for one Freshman Writing Seminar may be earned by a score of 5 on the CEEB AP English exam. A score of 4 on the AP English exam will earn a student three credits in English. These three credits cannot be applied toward the Freshman Writing Seminar requirement, but can be applied toward the expository arts category in the Liberal Studies Distribution requirement. AP credit earned in the humanities and social sciences cannot be used to fulfill the "upper level" liberal studies requirement.
Liberal Studies Distribution: Six courses beyond two Freshman Writing Seminars are required. Students may earn AP credit toward the liberal studies distribution by taking College Entrance Examination Board (CEEB) AP tests. AP credit earned in the humanities or social sciences cannot be used to fulfill the "upper level" liberal studies requirements.

Modern Languages: Students may earn AP credit for competence in a foreign language by taking the College Entrance Examination Board (CEEB) AP test or by taking the Cornell Advanced Standing Examination (CASE). Those who score 4 or 5 on the CEEB AP test are entitled to three credits. In order to qualify for the CASE exam, the student must score at least 650 on a College Placement Test (taken either in high school or at Cornell during Orientation Week). A score of 2 on the CASE entitles the student to three credits, and a score of 3 entitles the students 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 adviser.

Advanced Placement and Credit for International Credentials

Students who have successfully completed either a General Certificate of Education (GCE) Advanced ("A") Level Examination or an International Baccalaureate (IB) Higher Level Examination may be eligible for advanced placement credit in the College of Engineering as follows:

General Certificate of Education Advanced Level Examination (GCE "A")

Hong Kong Advanced Level examinations and the joint examination for the Higher School Certificate and Advanced Level Certificate of Education in Malaysia and Singapore—principal passes only—are considered equivalent in standard to GCE "A" Levels.

<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 or B</td>
<td>8 credits (MATH 191/193 and 192)</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>4 credits (MATH 191/193)</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 8 Advanced Placement (or advanced standing) credits in mathematics.</td>
</tr>
</tbody>
</table>

International Baccalaureate (IB) Higher Level Examination

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>7</td>
<td>8 credits</td>
</tr>
<tr>
<td>Chemistry</td>
<td>6</td>
<td>6 credits</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6 or 7</td>
<td>4 credits (CHEM 207)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6 or 7</td>
<td>8 credits (engineering students must consult with the math department to determine prerequisite for placement in third-semester math course.)</td>
</tr>
<tr>
<td>Physics</td>
<td>6 or 7</td>
<td>4 credits (PHYS 112)</td>
</tr>
</tbody>
</table>

Note: Advanced Placement credit based on GCE or IB results may also be awarded for courses that satisfy the liberal studies requirement in the College of Engineering. In such cases, the College of Engineering follows the AP guidelines found earlier in this publication under "General Information."

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 the Engineering Advising office, 167 Olin Hall. Those who wish to take departmental examinations 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 Curriculum Committee in 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 the Engineering Advising office, 167 Olin Hall.

Transfer Credit

Undergraduate students who have completed courses at recognized and accredited colleges may, under certain conditions, have credits for such courses transferred to Cornell. Such courses must represent academic work in excess of that required for the secondary school diploma. Courses deemed acceptable for transfer credit must be equivalent in scope and rigor to courses 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 the Engineering Advising or Registrar's offices 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 to satisfy requirements in mathematics, science, engineering courses, or Freshman Writing Seminars, 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 which 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 the Engineering Advising office.
- Cornell does not award credit for courses in which a student has earned a grade of less than C. Schools and departments may stipulate a higher minimum grade.
- College courses completed under the auspices of cooperative college and high school programs will be considered for advanced placement credit only if students demonstrate academic proficiency by taking the appropriate AP or Cornell departmental placement examination, as described in the Advanced Credit section.
- After matriculation, no more than 18 credits of transfer or Cornell extramural credit may be used to satisfy bachelor's degree requirements. Summer session courses taken at Cornell are not considered transfer credits.
- Transfer students may transfer up to 36 credits for each year spent in full-time study at another institution, provided that the courses are acceptable for meeting graduation requirements. No more than 72 transfer credits may be used to meet graduation requirements.
- A more detailed description of the college's regulations governing transfer credit may be found in the pamphlet, Advanced Placement and Transfer Credit for First-Year Engineering Students, as well as the Engineering Undergraduate Handbook, both available from the Engineering Advising office, 167 Olin Hall.

Academic Standing

Full-time students are expected to remain in good academic standing. The criteria for good standing change somewhat as a student progresses through the four years of the engineering curriculum. At all times, the student must be making adequate progress toward a degree, but what this actually means varies from field to field.

Requirements for freshman engineering students to be in good standing at the end of the first semester are as follows. Failure to meet these standards will result in a review by the Committee on Academic Standards,
Petitions, and Credit (ASPAC), and the actions of warning, stem 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 second-semester freshman and first-semester 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, stem 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;
2. a C- or better in the mathematics course, if one was taken;
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 123 to 129, depending upon the field program. Therefore, an average semester credit load ranges from approximately 15 to 16 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 193), 192, 293, and 294. Those who fail to meet this standard are allowed to repeat a course once, in the following semester.

Success to complete a C- the second time will generally result in dismissal from the engineering program. Many advanced mathematics courses offer mathematics prerequisites, and having to repeat the prerequisite course may delay your progress in the mathematics curriculum.

Dean's List

Dean's List citations are presented each semester to engineering students with exemplary academic records. The criteria for this honor, which are determined by the dean of the college, are a term average of 3.25 (without rounding) or higher with no failing, unsatisfactory, missing, or incomplete grades (even in physical education) and 12 credits or more of letter grades. Students may earn Dean's List status retroactively if they meet these criteria after making up incompletes according to college rules.

Graduating with Distinction and Honors Program

Graduating with Distinction

Merit 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 requires a GPA of 3.50 (either overall or for the last four full-time semesters in Engineering); magna cum laude requires a GPA of 3.75 (based on all credits taken at Cornell); and summa cum laude requires a GPA of 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 3.50. (i.e., the student must also be eligible for one of the three: cum laude distinctions.) If the student's major field has an approved honors program and both the GPA and program requirements are fulfilled, the faculty of the major 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 (1) course each semester in which the choice between letter grade and S-U is an option. (Additional courses offered "S-U only" may be taken in the same semester as the "elect 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 also satisfy certain academic and non-academic requirements that pertain to full-time students at Cornell. They must also spend at least three semesters of time affiliated with an engineering field program or with the College Program.

Students who are voluntarily not enrolled at Cornell as full-time students may take individual courses extramurally through the School of Continuing Education and Summer Sessions. Students who have been required to take time off are permitted to register for courses extramurally only with the approval of their field (or the college, for unaffiliated students). No more than 18 credits earned through extramural study or acquired as transfer credit (or a combination thereof) may be used to satisfy the requirements for the bachelor's degree in engineering.

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 are planned in consultation with the staff of the Engineering Advising office, 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 can apply at the Engineering Advising office application forms are available in 167 Olin Hall. Students who would enter the college as second-semester sophomores 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 the Engineering Advising office, 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 the Engineering Advising office, the first step is an interview to establish conditions for the leave and subsequent return. Those who take a leave before affiliating with a field and while not in good standing may be given a conditional leave. This requires them to meet specific conditions, established at the time the leave is granted, before they will be reinstated.

Leaves of absence are not generally granted for more than two years. A leave of absence granted during a semester goes into effect on the day it is requested and lasts for a minimum of six months. If a leave is requested after the twelfth week of a semester, the courses in which the student was registered at the time of the request are
Students who owe money to the university are ineligible for leaves of absence. If courses taken during a leave are to satisfy Cornell degree requirements, they must be approved in advance through a formal transfer petition. No more than 18 credits earned while on leave can be used to meet degree requirements.

Students who intend to take a leave of absence should check with the Office of Financial Aid and Student Employment to discuss financial implications; this is especially true for those who have taken out educational loans. Medical insurance eligibility may also be affected.

To return after a leave of absence, the conditions established when the leave was granted must be satisfied, and the college must be notified in writing, at least six weeks prior to the date the student plans to return to campus.

Medical Leave: Medical leaves are granted by the college only upon recommendation by a physician from Gannett Health Center. Such leaves are granted for at least six months and up to five years with the understanding that the student may return at the beginning of any term after the medical condition in question has been corrected. In some cases 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 if 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 several courses in a semester. Unless the student is ahead in the curriculum, returning later to repeat the semester makes better academic sense than continuing without the necessary background. In many cases, the leave is discretionary for 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 the Engineering Advising office; 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 the leave, and explain 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 the Engineer-

AGRICULTURAL AND BIOLOGICAL ENGINEERING
Program in the Department of Agricultural and Biological Engineering has a unique focus on biological systems, including the environment, that is realized through a combination of fundamental engineering sciences, biology, applications courses, and liberal studies. The program leads to a joint Bachelor of Science degree from the Colleges of Engineering and Agriculture and Life Sciences, and is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET).

Three concentrations in Agricultural and Biological Engineering are offered: Environmental Systems Engineering, Biological Engineering, and Agricultural Engineering. All courses are in engineering, science, mathematics, computing, physics, chemistry, basic and advanced biology, fundamental engineering sciences (mechanics, thermodynamics, fluid mechanics, and transport processes), engineering applications, and design. Students select application courses in the department in areas that include biotechnology, soil and water management, and environmental and facilities engineering. A state-of-the-art resume referral service is available for students who desire assistance in career and job-search matters. Nearly 300 national companies visit the campus annually to recruit technical graduates. Additional job opportunities are posted electronically, and a state-of-the-art résumé referral service is offered for a small fee. Both undergraduate and graduate students can use these services to pursue permanent or summer employment opportunities. Further information on all services is available from the Engineering Career Services office, 201 Carpenter Hall (255-5006); http://www.career.cornell.edu/ccs.


Bachelor of Science Curriculum
Agricultural and Biological Engineering is at the focus of 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, energy and biodiversity; and developing engineering systems that monitor, replace, or intervene in the biology of living organisms. The undergraduate Engineering
The field program requirements are outlined below.

**Basic Subjects**

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<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MATH 191 (or 193), 192, 293, 294, Calculus for Engineers and Engineering Mathematics</td>
</tr>
<tr>
<td>CME 211, General Chemistry, or equivalent</td>
</tr>
<tr>
<td>PHYS 112, 213, 214, Physics I, II, and III (CHEM 208 or organic chemistry may be substituted for PHYS 214)</td>
</tr>
<tr>
<td>Introductory biological sciences</td>
</tr>
<tr>
<td>ABEN 151, Introduction to Computing</td>
</tr>
<tr>
<td>ABEN 200, Undergraduate Seminar</td>
</tr>
<tr>
<td>Engineering distribution (two courses, including ENGRD 202, Mechanics of Solids)</td>
</tr>
<tr>
<td>Liberal studies (two freshman seminars and at least two courses in humanities or history)</td>
</tr>
</tbody>
</table>

**Advanced and Applied Subjects**

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved electives (at least 3 credits in ABEN or equivalent)</td>
</tr>
<tr>
<td>Engineering sciences in any field (must include fluid mechanics and thermodynamics), plus ABEN 250 and 350 (Engineering Applications in Biological Systems, Bio. &amp; Env. Transport Processes), and a minimum of four agricultural and biological engineering courses (at least 12 credits) chosen from courses numbered 450 to 495</td>
</tr>
<tr>
<td>Environmental, biological or agricultural sciences (at least 3 credits of biological sciences beyond the introductory level)</td>
</tr>
<tr>
<td>Total (minimum)</td>
</tr>
</tbody>
</table>

**Agricultural and Biological 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 the Department of Agricultural and Biological 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 of 3.50 and must be eligible for one of the cum laude distinctions at the time of graduation.

**Content**

An ABEN honors program shall consist of at least nine credits beyond the minimum required for graduation in ABEN. These nine credits shall be drawn from one or more of the following with at least four credit hours in the first category:

- A significant research experience under the direct supervision of a faculty member or as part of a regularly recognized course in the department (e.g., ABEN 151 or 250) under ABEN 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**

Each applicant to the ABEN honors program must have an ABEN faculty advisor to supervise the honors program. A written approval of 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.

**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 agricultural and biological 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 of the required 30 credits are earned for an engineering design project that culminates in a written and oral report.

A candidate for the M.Eng. (Agricultural and Biological) degree may choose to concentrate in one of the subareas of agricultural and biological engineering or take a broad program without specialization. The subareas include biological engineering, energy, environmental engineering, environmental management, food 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 agricultural and biological 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 ABEN Student Services office, 207 Riley Robb Hall (255-2173), or by e-mail at abengradfield@cornell.edu.

**APPLIED AND ENGINEERING PHYSICS**


**Bachelor of Science Curriculum**

The undergraduate engineering physics curriculum is designed for students who want to pursue careers in 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 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 their physics base with a good background in a conventional area of engineering or applied science.

The industrial demand for engineering physics graduates with baccalaureate is high, and many students go directly to industrial positions where they work in a variety of areas that either combine, or are in the realm of, various more conventional areas of engineering. Recent examples include bioengineering, computer technology, electronic-circuit and instrumentation design, energy conversion, engineering management, geological analysis, laser and optical technology, microwave technology, nuclear technology, software engineering, solid-state-device development, technical management, and financial consulting. A number of our graduates go on for advanced study in all areas of basic and applied physics, as well as in a diverse range of areas in advanced science and engineering. Examples include applied physics, astrophysics, atmospheric sciences, biophysics, cell biology, computer science and engineering, electrical engineering, environmental science, fluid mechanics, geotechnology, laser optics, materials science and engineering, 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 this breadth of opportunity because the student 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 ENGR110, The Laser and Its Applications in Science, Technology, and Medicine (a freshman introduction to engineering course); ENGRD 495, Engineering Instrumentation Design (a recommended sophomore engineering distribution course); AEE 330, Modern Experimental Optics (a junior/senior course); AEE 363, Electronic Circuits (a sophomore/junior course); PHYS 410, Advanced Experimental Physics; and AEE 438, Computational Engineering Physics (a senior computer laboratory).
Undergraduates who plan to enter the Field Program in Engineering Physics are advised to arrange their 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 take some computing applications or 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 192, may wish to explore accelerating their mathematics requirements so as to enroll in A&EP 321 and 322 in the sophomore year. For advice on this option, consult with the A&EP associate director. In addition to the requirements of the Engineering Common Curriculum, the upperclass course 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
Applications of quantum mechanics† | 3 or 4
Four technical electives | 12–16

*The Engineering Common Curriculum allows students to take only 4 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 latter years, and for best maintaining such options as a semester or year abroad, or early graduation.

†Some courses (though the list is not all-inclusive) that will satisfy this requirement are PHYS 444, Nuclear and High-Energy Particle Physics; PHYS 454, Introductory Solid-State Physics; A&EP 438, Computational Engineering Physics I; and Nonlinear Optics; A&EP 609, Nuclear Physics for Applications; ELE E 430, Lasers and Optical Electronics; and ELE E 531, Quantum Electronics I.

If a scientific computing course was not selected as an engineering distribution course, one of these technical electives may be needed to satisfy the computing applications requirement. For students going on to graduate school a third course in mathematics is recommended.

**Areas of concentration.** A distinctive aspect of the Engineering Physics curriculum is the strong opportunity it provides students to develop individualized programs of study to meet their particular educational and career goals. These can include the pursuit of dual majors 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 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 technical 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 Michael S. Isaacson.

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 a sizable flexibility in scheduling. If scheduling conflicts arise, the school may allow substitution of courses nearly equivalent to the listed required courses.

The Engineering Physics program requires that a minimum GPA of 2.7 (B-) be attained in all 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 on those students who, in addition to having completed 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 3.50 and must be eligible for one of the *cum laude* distinctions at the time of graduation.

**Content**

The student must

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 evaluation at each 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 consent to the A&EP associate director for undergraduate studies. This proposal will be reviewed by the A&EP Honors Committee and either approved or returned to the candidate to correct deficiencies in the proposal. The proposed research project or scheduling conflicts arise, the school may allow substitution of courses nearly equivalent to the listed required courses.

The Engineering Physics program requires that a minimum GPA of 2.7 (B-) be attained in all 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.
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, nanostructure 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 (A&EP 661) and the microprocessing and microfabrication of materials (A&EP 660). The design project may focus on such areas as semiconductor materials, device physics, nanostructure technology, or optoelectronics. Another area of study may be applied optics where core courses can be chosen from applied physics, electrical engineering, and physics.

Each individual program is planned by the student in consultation with the program chair. The objective is to provide a combination of a good general background in physics and introductory study in a specific field of applied physics. Candidates may enter with an undergraduate preparation in physics, engineering physics, or engineering. Those who have majored in physics usually seek advanced work with an emphasis on engineering; those who have majored in an engineering discipline generally seek to strengthen their physics base. Candidates coming from industry usually want instruction in both areas. All students granted the degree will have demonstrated competence in an appropriate course in physics; if this has not been accomplished at the undergraduate level, subjects such as electricity and magnetism, or classical, quantum, and statistical mechanics should be included in the program.

The general requirement for the degree is a total of 30 credits for graduate-level courses or their equivalent, earned with a grade of C or better and distributed as follows:

1) a design project in applied science or engineering (not less than 6 nor more than 12 credits)
2) an integrated program of graduate-level courses, as discussed below (17 to 23 credits)
3) a required special-topics seminar course (1 credit)

The design project, which is proposed by the student and approved by the program chair, is carried out on an individual basis under the guidance of a member of the university faculty. It may be experimental or theoretical in nature; if it is not experimental, a laboratory physics course is required.

The individual program of study consists of a compatible sequence of courses focused on a specific area of applied physics or engineering. It is planned to provide an appropriate combination of physics and physics-related courses (applied mathematics, statistical mechanics, applied quantum mechanics) and engineering electives (such as courses in biophysics, chemical engineering, electrical engineering, materials science, computer science, mechanical engineering, or nuclear engineering). Additional science and engineering electives may be included. Some courses at the senior level are acceptable for credit toward the degree; other undergraduate courses may be required as prerequisites but are not credited toward the degree.

Students interested in the M.Eng. (Engineering Physics) degree program should contact Professor H. Craighead.

APPLIED MATHEMATICS

The Center for Applied Mathematics administers a broadly based and interdepartment 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 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."

CHEMICAL 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. Special programs in biochemical engineering and polymeric materials are available. 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 and entered Cornell Fall 1994 or later is as follows:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Semester 3</td>
<td></td>
</tr>
<tr>
<td>MATH 293, Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 213, Electricity and Magnetism</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 389, Physical Chemistry 1 (engineering distribution)</td>
<td>4</td>
</tr>
<tr>
<td>ENGRD, Mass and Energy Balances 219 (engineering distribution)</td>
<td>3</td>
</tr>
<tr>
<td>Humanities or social sciences</td>
<td>3</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Semester 4</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 294, Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 290–391, Physical Chemistry (field)</td>
<td>6</td>
</tr>
<tr>
<td>ENGRD 241, 222, or 221</td>
<td>3</td>
</tr>
<tr>
<td>Humanities or social sciences</td>
<td>3</td>
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<table>
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<tr>
<th>Semester 5</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CHEM 357, Introductory Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 251, Organic Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 313, Chemical Engineering Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 323, Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>Humanities or social sciences</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Semester 6</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Science elective</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 301, Nonresident Lectures</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 324, Heat and Mass Transfer</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 332, Analysis of Separation Processes</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 390, Reaction Kinetics and Reactor Design</td>
<td>3</td>
</tr>
<tr>
<td>Humanities or social sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester 7</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 452, Chemical Engineering Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 472, Process Control</td>
<td>3</td>
</tr>
<tr>
<td>Electives*</td>
<td>6</td>
</tr>
<tr>
<td>Humanities or Social Sciences</td>
<td>3</td>
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</table>

<table>
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<tr>
<th>Semester 8</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 462, Chemical Process Design</td>
<td>4</td>
</tr>
<tr>
<td>Humanities or social sciences</td>
<td>3</td>
</tr>
<tr>
<td>Electives*</td>
<td>3</td>
</tr>
<tr>
<td>Approved elective</td>
<td>3</td>
</tr>
</tbody>
</table>

*The electives in semester seven and eight comprise 6 credits of field approved electives, and 5 credits of CHEM process or systems elective. CHEM process or systems electives include CHEM 564, Design of Chemical Reactors; CHEM 640, Polymeric Materials; CHEM 643, Introduction to Bioprocess Engineering; CHEM 656, Separations Using Membranes or Porous Solids; CHEM 661, Air Pollution Control.

Applying science electives include BIOM 290, General Microbiology Lectures; BIOM 330, 331, 332, and 333, Principles of Biochemistry; CEE 654, Aquatic Chemistry; CHEM 640, Polymeric Materials; FOOD 409, Food Chemistry, MS&E 331, Structure of Materials; MS&E 332, Electrical and Magnetic Properties of Materials; MS&E 441, Microprocessing of Materials; MS&E 449, Introduction to Ceramics, MS&E 452, Properties of Solid Polymers; any A&EP course numbered 333 or above; any CHEM course numbered 301 or above; any PHYS course numbered 300 or above.

Students who entered before fall 1994 should contact the field office for a copy of the curriculum.

Master of Engineering (Chemical) Degree Program

The professional master's degree, M.Eng. (Chemical), is awarded at the end of one year of graduate study with successful completion of 30 credits of required and
elective courses in technical fields including engineering, mathematics, chemistry, physics, and business administration. Courses emphasize design and optimization based on the economic factors that affect design alternatives for processes, equipment, and plants. General admission and degree requirements are described in the college's introductory section.

Specific requirements include:

1) two courses in advanced chemical engineering fundamentals chosen from CHEM 711, 713, 731, 732, and 751

2) two courses in applied chemical engineering science chosen from CHEM 520, 564, 566, 640, 663, 656, and 661

3) a minimum of 3 credits of a design project, CHEM 565

Dean's certificate programs in Bioengineering, Engineering Management, Energy Engineering, and Manufacturing are available. A program offered jointly with the Food Science Department is also available, leading to both the Master of Engineering and the Master of Professional Studies degrees.

CIVIL AND ENVIRONMENTAL ENGINEERING


Bachelor of Science Curriculum

The School of Civil and Environmental Engineering 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, students may emphasize structural engineering, geotechnical engineering, hydraulics and hydrology, or transportation. The environmental engineering curriculum emphasizes study of environmental engineering, environmental and water resource systems, and hydraulics and hydrology. Sample curricula are available in the school office, 220 Hollister Hall.

Requirements for Admission to the Field:

Students planning to enter the Field Program in Civil and Environmental Engineering are required to complete either ENGRD 202, Mechanics of Solids (for those interested in the Civil option) or ENGRD 219, Mass and Energy Balances (for those interested in the Environmental option) before or during the sophomore year with a grade of C- or better. In addition, the field requires a grade point average of at least 2.0 in engineering and sciences courses and cumulatively for all courses.

Recommended Engineering Distribution Courses:

The recommended engineering distribution course for students planning to enter the environmental engineering option in ENGRD 202, Mechanics of Solids. Students entering the environmental option who have not taken ENGRD 202 will be required to do so as part of the Field Program.

Recommended engineering distribution courses for students planning to enter the civil engineering option are:

ENGRD 261, Introduction to Mechanical Properties of Materials, for students interested in structural engineering or civil engineering materials;

ENGRD 201, Introduction to the Physics and Chemistry of the Earth, for students interested in geotechnical engineering;

ENGRD 221, Thermodynamics, for students interested in fluid mechanics and hydraulics/hydrology;

ENGRD 211, Computers and Programming, for students interested in transportation.

Field Program:

These field program requirements will apply to all students in the Classes of 1998 and later.

Environmental Engineering Option

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:

Courses Credits
ENGRD 241, Engineering Computation* 3
CHEM 357, Introductory Organic Chemistry 3
BIOMI 290, General Microbiology, Lectures 3
CEE 304, Uncertainty Analysis in Engineering† 4
CEE 323, Engineering Economics 3
CEE 331, Fluid Mechanics 4
CEE 341, Introduction to Geotechnical Engineering 4
CEE 351, Environmental Quality Engineering 3
ABEN 475, Environmental System Analysis 3

Additional requirements include a set of two field-approved electives and three design electives from an approved list of courses which is available in the school office. In addition, students must complete one technical communications course from among the courses designated ENGRDC or approved Communications courses. If the technical communications course is taken as an express 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 both the computer application requirement and a field program requirement.

†ENGRD 270 may be accepted (on petition) as a substitute for CEE 304 in the field program, but only if ENGRD 270 is taken before entry into the field, or in some special cases where co-op or study abroad programs necessitate such a substitution.

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 degree, have satisfactorily completed the honors program in Civil and Environmental 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 3.50 and must be eligible for one of the cum laude distinctions at the time of graduation.

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 or as part of a regularly recognized course in the College of Engineering (i.e., ENGRG 470: Undergraduate Engineering Teaching 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 or faculty mentor to supervise the student's individual program. (This need not be the student's faculty adviser.) The application to the program shall be a letter from the student describing the specific proposed honors program and include the explicit approval of the faculty adviser and the honors 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.

Master of Engineering (Civil) Degree Program

The M.Eng. (Civil) degree program is a 30-credit (usually ten-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 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, and it includes an intensive, full-time, three-week 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 503) and a two-course design project (CEE 501 and 502).
2) Specialization in a major—three to five courses in either environmental engineering, environmental and public systems engineering, geotechnical engineering, hydraulic engineering, remote sensing, structural engineering, or transportation engineering.
3) Two courses in a single related or minor area.
4) Technical electives (up to two courses).

Courses in the minor and electives may consist of graduate or advanced courses in fields related to the major, 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 School of Civil and Environmental Engineering cooperates with the the Johnson Graduate School of Management in two joint programs leading to both Master of Engineering and Master of Business Administration degrees. See the introductory section under College of Engineering.

Applications for the six-year B.S./M.Eng./M.B.A. program must be submitted at the beginning of the fourth term of study.

COMPUTER SCIENCE


Bachelor of Science Curriculum

The Department of Computer Science is affiliated with both the College of Arts and Sciences and the College of Engineering. Students in either college may major in computer science.

For details, visit our web site at http://www.cs.cornell.edu/Info/ugrad

The Major

Computer Science majors take courses in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory. Electives in artificial intelligence, computer graphics, computer vision, databases, multimedia, and networks are also possible. Requirements include:

• four semesters of calculus (MATH 111–122–221–222 or 191–192–293–294)
• two semesters of introductory computer programming (COM S 100 and ENGRD 211 or 212)
• a seven-course computer science core (ENGRD 222, COM S 280, 314, 381, 410, 414, and 482)
• two 400+ computer science electives, totaling at least 6 credits
• a computer science project course (COM S 413, 415, 418, 453, 465, or 473)
• a 3+ credit mathematical elective course (ORIE 270, MATH 300+, T&AM 300+, etc.)
• two 300+ courses (field approved electives) that are technical in nature and total at least six credits
• three courses which are related to one another from a discipline other than computer science. These courses must be numbered 300-level or greater and total at least eleven credits.

The program is broad and rigorous, but it is structured in a way that supports in-depth study of outside areas. Intelligent course selection can set the stage for graduate study and employment in any technical area and any professional area such as business, law, or medicine. With the advisor, the computer science major is expected to put together a coherent program of study that supports career objectives and is true to the aims of liberal education.

Computer Science 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 degree, have:

• maintained a cumulative GPA ≥ 3.50
• qualified for cum laude honors in the College of Engineering
• completed 8 credit hours of COM S course work at or above the 500-level
• completed 6 credit hours of COM S 490 research with a COM S faculty member, (Spread over at least two semesters) obtaining grades of A- or better

Content

Honors courses may not be used to satisfy the COM S 400+ elective requirement or the COM S project requirement.

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 also 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
Bachelor of Science Curriculum

The undergraduate Field Program in Electrical Engineering provides a foundation that reflects the broad scope of this engineering discipline. Concentrations include computer engineering; 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 physics; and semiconductor devices and applications.

Electrical Engineering Field Program

Students planning to enter the Field Program in Electrical Engineering must take ENGRD 231 as an engineering distribution course. The fall of the sophomore year is the preferred term for ENGRD 231/ELE E 232 for students without advanced standing in mathematics. Electrical engineering students with an interest in computer engineering are encouraged to take ENGRD 211 as an engineering distribution course prior to entering 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 ELE E 210) are taught only once each academic year, either spring or fall, as indicated in the course descriptions.

Field Required Courses

- ELE E 210, Introduction to Electrical Systems 3
- ELE E 215, Electrical Systems Laboratory 3
- ELE E 232, Practicum in Digital Systems 1
- ELE E 301, Electrical Signals and Systems I 3
- ELE E 303, Electromagnetic Fields and Waves 3
- ELE E 315, Electronic Circuit Design 4

Field Approved Electives (34-credit minimum in the following categories)

Electrical Engineering Electives 21 minimum
- Electives Outside Field (5 courses) 9 minimum
Total minimum field credits 51

ELE E 310 can be taken in place of ENGRD 270 or TAM 310 to satisfy the college application of probability and statistics requirement.

Students must complete satisfactorily ELE E 210, ELE E 215, MATH 294, and PHYS 214 by the end of the first semester toward the degree in subsequent years. Students with advanced standing may take one or more graduate-level courses prior to graduation and may actually begin the fifth year Master of Electrical Engineering program in their last semester of undergraduate course work so long as 8 or fewer credits remain toward B.S. degree requirements and a 3.0 GPA has been maintained. Admission must be approved in advance of the last semester of undergraduate work.

Undergraduate Field Program in Electrical Engineering provides a foundation that reflects the broad scope of this engineering discipline. A table listing the engineering design content of all relevant electrical engineering and computer science courses is available in the electrical engineering undergraduate program office, or on the department web page at http://www.ee.cornell.edu.

Maximum technical course scheduling flexibility in the field program is possible for those students who do not complete their 6 credits of College Approved Electives prior to entry into the field program. Accordingly, intended electrical engineering students are advised to consider course selection carefully during their first three terms in engineering.

ELECTRICAL ENGINEERING

ELECTRICAL ENGINEERING


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 six 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 fulfilled on schedule.

For further details and assistance in planning a curriculum, students can consult with their advisors, the undergraduate office in 303 Upson Hall, or the Johnson School directly.

All students majoring in electrical engineering are expected to meet the following academic standards:

1. Students must achieve a grade-point average of at least 2.3 every semester.
2. No course with a grade of less than C- may be used to satisfy degree requirements in the field program or serve as a prerequisite for a subsequent electrical engineering course.
3. Students must complete satisfactorily ELE E 210, ELE E 215, MATH 294, and PHYS 214 by the end of the first semester in the Field Program of Electrical Engineering, and make adequate progress toward the degree in subsequent semesters.
4. Honors program students must meet the GPA and progress requirements specified in the Electrical Engineering Handbook to remain active participants.

Past 20 years of the Electrical Engineering Honors Program Eligibility, Entry, and Continuation

A student may apply to enter the EE Honors Program as early as the beginning of the fifth semester and 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
would consist of a one-credit seminar on the Honors Seminar for academic credit, but any student in the honors program is required to take the seminar during his or her junior year. The Honors Seminar enrollee will be required to write short papers on one of the topics covered in the seminar. Electrical Engineering faculty members will be expected to give a lecture or short series of lectures as part of the Honors Seminar at least every two or three years. Students in the honors program and other students may attend the Honors Seminar. Other students may attend the Honors Seminar for academic credit, but will be graded on an S/U basis for one credit hour.

Honors Project
Any student in the honors program is required to accumulate at least three credit hours from an honors project consisting either of research, teaching, or directed reading. All Honors Projects should place some emphasis on development of communication skills. A 3-credit teaching-oriented honors project would consist of a one-credit seminar on teaching coupled with two credit hours worth of classroom teaching at the level and intensity of Academic Excellence Workshop facilitators. Research- and reading-oriented honors projects, while similar to the senior projects we now offer, should require explicitly a certain amount of writing.

Additional Coursework
Any student in the honors program is required to take at least four credit hours of advanced ELE E field coursework that has at least a 300-level prerequisite. These four credit hours are in addition to any credit hours required as part of the ELE E field program. The program described above would require honors program participants to amass at least nine credit hours over and above the 126 credit hours required for a B.S. degree; thus an honors degree would require a minimum of 135 credit hours.

Master of Engineering (Electrical) Degree Program
The M.Eng (Electrical) degree program prepares students either for professional work in electrical engineering and closely related areas or for further graduate study in a doctoral program. The M.Eng. degree differs from the M.S. degree mainly in its emphasis on 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 engineering. An electrical engineering design project is also required and may account for 3 to 8 credits of the M.Eng. program. Occasionally, students take part in very extensive projects and may apply for a waiver of the 8-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 8 credits of approved courses that have significant technical content, but are taught in disciplines other than engineering, mathematics, or the physical sciences.

Although admission to the M.Eng (Electrical) program is highly competitive, all well-qualified students are urged to apply. Further information is available from the Master of Electrical Engineering Program Office in 222 Phillips Hall.

GEOLOGICAL SCIENCES

Bachelor of Science Curriculum
The Department of Geological Sciences offers two options in its field program, the GeoScience Option and the Science of Earth Systems (SES) Option. The GeoScience Option emphasizes the structure, composition, and evolution of our planet, while the SES Option is more concerned with environmental processes and the interactions of water, life, rock, and air that produce our planetary environment.

The GeoScience Option reveals the earth's turbulent history from the formation of our solar system to the plate tectonic cycles that dominate the earth's present behavior. That history is highlighted by the co-evolution of life and the Earth system from the origin of life to the modern inter-glacial phase during which our species has so proliferated. Topics of study also include the 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 exploration or in environmental geology. Alternatively, it is a valuable major for a pre-law or pre-med student.

One additional field-required course and at least one field-approved elective must be taken. Students interested in geobiology or paleontology, or in exploration seismic records. High-pressure, high-temperature mineral, and element analyses, and extensive libraries and computer techniques from GEOL 434; or (d) An approved outdoor field course taught by another college or university (4-credit minimum).

A selection of field-approved electives may provide specializations in: geomorphology, including physical geology and environmental geology; geophysics, including regional-scale geophysics, environmental geophysics, and environmental geology; and civil engineering. Students intending to specialize in economic geology or pursue careers in the mining industries or mineral exploration should choose one of the following economics courses among their liberal studies distribution courses. Students who want a more general background or who 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 GEO 491 and 492, Undergraduate Research, for a fourth-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 include equipment for processing seismic signals and digital images of the earth's surface, instruments for highly precise isotopic and element analyses, and extensive libraries of earthquake records, satellite images, and exploration seismic records. High-pressure, high-temperature mineral, and element analysis 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

Geoscience Option
The GeoScience Option stresses a balanced overview of geological sciences with considerable flexibility in the student's area of specialization achieved by careful selection of field-approved electives. Students are required to take GEOL 201 (ENGRD 201) as an Engineering Distribution course. For students interested in geology or paleontology, BIO G 101-103-102/104 (or BIO G 109-110) are recommended. CHEM 208 may be substituted for PHYS 214.

The Geoscience Option requires the following courses: the introductory outdoor field course, GEOL 210 and 214, and the five core courses, GEOL 326, 355, 356, 375, and 388.

One additional field-required course and at least one field-approved elective must be GEOL 400 through 600-level courses. The core courses may be taken in any reasonable sequence, except that GEOL 355, which is offered in the fall, should be taken before GEOL 356, which is offered in the spring.

GEOL 326, 355, 356, 375 and 375 should be taken relatively early in the major program.

In addition, a requirement for an advanced outdoor field experience may be met by completing one of the following 4-credit options: (a) GEOL 491 (Geological Field Research, 2 credits each) with a significant component of field work; (b) GEOL 491 or 492 based on field observations obtained in GEOL 212 (Special January Field Trip, 2 credits) or GEOL 417 (Field Mapping in Argentina, 3 credits) for a combined 4 credit minimum; (c) GEOL 437 (Geophysical Field Methods, 3 credits) plus at least 1 credit of GEOL 491 or 492 using geophysical techniques: from GEOL 443; or (d) An approved outdoor field course taught by another college or university (4-credit minimum).

A selection of field-approved electives may provide specializations in: geophysics, including physical geology and mineralogy; geology (paleontology), and geology applied to petroleum industries, environmental problems, hydrology, and civil engineering. Students intending to specialize in economic geology or pursue careers in the mining industries or mineral exploration should choose one of the following economics courses among their liberal studies distribution courses. Students who want a more general background or who 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 GEO 491 and 492, Undergraduate Research, for a fourth-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 include equipment for processing seismic signals and digital images of the earth's surface, instruments for highly precise isotopic and element analyses, and extensive libraries of earthquake records, satellite images, and exploration seismic records. High-pressure, high-temperature mineral, and element analysis 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
Science of Earth Systems (SES) Option

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. The aim is to prepare students for graduate study and careers across the broad spectrum of earth sciences required for successful understanding and management of our planet. The option provides a rigorous base of environmental science that strongly complements Cornell's programs in environmental and agricultural engineering. The SES Option makes an attractive double major with respect to either the Environmental Engineering Option offered by the Department of Civil and Environmental Engineering or the Agricultural Engineering major offered by the Department of Agricultural and Biological Engineering.

Students are required to take a second semester of chemistry, two semesters of biology, and ENGRD 201 (Physics and Chemistry of the Earth) as one of the Engineering Distribution courses. In addition, students must take one of the two-credit SES Colloquium, which is designed to inform students about the field and to provide a sense of community for SES students and faculty from the several colleges who participate in the SES program. The option requires a set of four core courses, normally taken in the junior or senior years, which provide breadth and integration. An additional set of four intermediate to advanced courses are selected to provide depth and a degree of specialization. These courses permit the student to specialize in atmospheric, hydrologic or ocean sciences, biogeochemistry, environmental geophysics, an approved combination of these areas, or a combination with courses in economics, government, or education in preparation for further study leading to careers in environmental law or management or K-12 education.

The field requirements for the SES Option are summarized as follows. CHEM 208 is required, and may be taken instead of PHYS 214. ENGRD 201 (GEOL 201) is a required engineering distribution course. The Field Program includes BIO G 101/103-102/104 or BIO G 109-110, the four SES core courses listed below, four additional courses selected with the advisor's approval to provide specialization in one or a combination of the areas covered by SES, and four other field-approved electives. Two of the specialization courses will count as field-required courses, and two as field-approved electives. At least three of the field-approved electives must be non-GEOL courses. The four core SES courses include the following:

- Areas of specialization include at present:
  - Climate Dynamics, the study of the physical and chemical processes producing Earth's climate system;
  - Ocean Sciences, the study of the biological, chemical and physical processes at work in the ocean;
  - Hydrological Sciences, the study of the interactions of rock, water, snow and ice on Earth's land surfaces;
  - Biogeochemistry, study of element cycling near Earth's surface and how organisms both mediate and benefit from these fluxes;
  - Environmental Geophysics, remote sensing of Earth's surface and subsurface applied to the study of the environment, global change, and natural hazards;

As alternatives to these specializations, students may select courses in Civil and Environmental Engineering (Environmental Option) or Agriculture and Biological Engineering to obtain a double Major in SES and in either of these two departments.

In addition to faculty in associated with the Department of Geological Sciences, faculty currently associated with the SES program include the following: P. Baveye (ABEN); W. Brutsaert (CEE); R. Bryant (SCAS); T. Dawson; (BIOES); P. Gerasch (ASTR); L. Hedin (BIOES); R. Howarth (BIOES, SCAS); M. Kelley (EE); J.-Y. Farlane (ABEN); W. Philpot, (CEE); S. Riba (SCAS); J. Yavitt (NTRES).

Geological Science 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 degree, have satisfactorily completed the honors program in Geological 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 ≥ 3.50 and must be eligible for one of the cum laude distinctions at the time of graduation.

Content

In addition to the minimum graduation requirements, a student must:

1. take at least 9 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 (GEOL 491-492, 2 credits each) of breadth, depth, and quality.

Timing

A student interested in completing an honors thesis must, by the beginning of their seventh semester, have a written proposal of his/her honors project accepted by his/her adviser and the director of undergraduate studies.

Procedures

Each application to the Geological Sciences honors program must have a faculty adviser to supervise the honors program. 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.

Master of Engineering (Geological Sciences Degree Program)

The Master of Engineering (Geological Sciences) is a one-year professional degree that provides students with intensive training for, and a fast-track into, careers in the burgeoning areas of environmental geoscience and resource exploration. Emphasis is on developing skills with cutting-edge geophysical and computational techniques for remote sensing, subsurface imaging, and modeling of subterranean fluid flow. Extensive facilities are available for GIS, image processing, and seismic and georadar field surveying.

Currently, program options include geohydrology and environmental geophysics. Under development is a new option in petroleum exploration, designed for those interested in careers in the resurgent oil exploration industry. Past design projects have included field studies in areas as diverse as the Finger Lakes and the Caribbean.

The program requires 30 credits of postgraduate instruction, at least 10 of which must involve engineering design. Students must also complete a design project, worth between 3 and 12 credits, that has a significant geological component and results in substantial conclusions or recommendations.

General information on admission and degree requirements for the M.Eng. degree programs can be found in the college's introductory section.
To continue in good standing in the Field of Materials Science and Engineering, students must:

1. Maintain an overall 2.0 term average.
2. Maintain an average of 2.3, with no grade of C prior to affiliation.
3. Complete MS&E 261 with a minimum grade of C prior to affiliation.

The department's core curriculum consists of all the required MS&E courses including the MS&E distribution course and the four courses comprising the student's area of specialization.

An attractive and very challenging program combines the materials science and engineering curriculum with that of either electrical engineering or mechanical engineering, leading to a double major. The combination of materials science and engineering with electrical engineering is particularly well suited to students who will eventually be employed in the electronic materials industry. Mechanical engineers knowledgeable in materials science also will be well equipped for technical careers. Curricula leading to the double-major degree must be approved by both the departments involved and students are urged to plan such curricula as early as possible.

Material 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 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 of 3.50 and must be eligible for one of the *cum laude* distinctions at the time of graduation.

Content

The requirements for an honors degree in Materials Science and Engineering are:

1. Students must take at least nine credits above the minimum required for graduation in Materials Science and Engineering, so that the minimum number of credits for an honors degree is 135. 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, which must be approved by the upperclass advisers.
2. A senior honors thesis (eight credits) with a grade of at least an A.

Note: Undergraduates typically enter the Honors program at the beginning of their senior year (seventh semester), so that they must have a cumulative GPA equal to or greater than 3.50 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 before graduation.

Procedures

Each application to the Materials Science and Engineering honors program must have a faculty adviser to supervise the honors program. A 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.

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 3-credit technical elective must include advanced mathematics (modeling, computer application, or computer modeling), beyond the MS&E undergraduate requirements.

MECHANICAL AND AEROSPACE ENGINEERING

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 transportation, the environmental impact of engineering activity (including pollutants and noise), and 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 sophomores 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 should delay ENGRD 221 until the first semester of the junior year. The Sibley School is supportive of students with unusual requirements, but any delays or substitutions must be discussed with and receive approval from the student's adviser.

The requirements for the degree of Bachelor of Science in Mechanical Engineering are as follows:
The eleven required courses are:

- M&AE 212, Mechanical Properties and Processing of Engineering Materials
- M&AE 221, Thermodynamics
- M&AE 225, Mechanical Design and Synthesis
- T&AM 203, Dynamics
- ELE E 210, Introduction to Electrical Systems
- 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 can petition for approval of two related courses to form a custom concentration.

The standard concentrations are:

- Fluids/Aerospace Engineering, M&AE 305, 306, 423, 500, 507
- Thermo-Fluids M&AE 423, 449, 506
- Materials Processing M&AE 412, 514
- Mechanical Systems M&AE 389, 465, 467, 469, 478, 489
- Vehicle Engineering M&AE 386, 449, 486, 506, 507

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, 464, 486, and 489.

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 and OR&E 270.

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 organizations are not accepted. Advisers 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 in technology (equipment, machinery, instruments, devices, processes)
- courses in business enterprise operations (economics, financial, legal, etc.)
- courses in organizational behavior
- courses in cognitive sciences.

Recommendation on Humanities/Social Sciences Electives

Students are encouraged to build a program that includes studies in history of technology, societal impacts of technology, history, foreign languages, ethics, communications, political science, aesthetics, economics, architecture, and flexibility.

An additional graduation requirement of the field program is proof of elementary competence in technical drawing. The demonstration of competence is expected before completion of M&AE 325, Mechanical Design and Analysis. This proof may be given in a number of ways, including satisfactory completion of:

- a technical drawing course in high school or in a community college
- ENGRG 102, Drawing and Engineering Design
- another technical drawing course at Cornell, or
- a departmental examination.

The computer applications requirement of the Common Curriculum may be satisfied by several courses, including M&AE 389 or 489.

The writing requirement of the Common Curriculum is satisfied by M&E 427.

Introduction to Electrical Systems (ELE E 210) may be replaced or supplemented by Electronic Circuits (PHYS 360).

A limited set of third-year courses is offered during the summer under the auspices of the Engineering Cooperative Program.

**Applicability**

The curriculum requirements described above apply to the Class of '98 and beyond. Graduates of the Class of '97 may choose to complete their studies under the previous requirements or those described above. Generally the Sibley School expects the Classes of '96 and '97 to use the requirements described above. More detailed materials describing the Mechanical Engineering Program can be obtained from the Sibley School of Mechanical and Aerospace Engineering, Upson Hall.

**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&AE 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 aerodynamics, acoustics and noise, turbulent flows, rarefied and non-equilibrium flows, combustion, dynamics and control, CFD, etc.

A coordinated program of courses for the entire year is agreed upon by the student and the faculty adviser. This proposed program, together with a statement of purpose, is submitted for approval to the M&AE Master of Engineering Committee during the first week of the following class; any subsequent changes must also be approved by the committee.

An individual student's curriculum includes a 4- to 8-credit design course, a major concentration consisting of a minimum of 12 credits, 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 an aerospace engineering design focus and have the close supervision of a faculty member.
The courses that constitute the major concentration must be graduate-level courses in aerospace engineering. In general, all courses must be beyond the level of those required in an undergraduate engineering program; credit may be granted for an upper-level undergraduate course if the student has done little or no previous work in that subject area, but such courses must have the special approval of the M&AE Master of Engineering Committee.

The technical electives may be courses of appropriate level in mathematics, physics, chemistry, or engineering; a maximum of 6 credits may be taken in areas other than those 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&AE graduate field office (104 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, energy and power systems, fluid mechanics, heat transfer, materials and manufacturing engineering, mechanical systems and design, CFD, CAE, CAM, etc.

A coordinated program of courses for the entire year is approved by the student and the faculty adviser. This proposed program, together with a statement of purpose, is submitted for approval to the M&AE Master of Engineering Committee during the first week of class; any subsequent changes must also be approved by the committee. An individual student's curriculum includes a 4- to 8-credit design course, a major concentration consisting of a minimum of 12 credits, and enough technical electives to meet the total degree requirement of 30 credits (of which at least 28 credits must have letter grades).

The design projects may arise from individual faculty and student interests or from collaboration with industry. All projects must have a mechanical engineering design focus and have the close supervision of a faculty member.

The courses that constitute the major concentration must be graduate-level courses in mechanical and aerospace engineering or a closely related field such as theoretical and applied mechanics. In general, all courses must be beyond the level of those required in an undergraduate engineering program; credit may be granted for an upper-level undergraduate course if the student has done little or no previous work in that subject area, but such courses must have the special approval of the M&AE Master of Engineering Committee.

The technical electives may be courses of appropriate level in mathematics, physics, chemistry, or engineering; a maximum of 6 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 enrolled in the M.Eng. (Mechanical) degree program may take courses that also satisfy the requirements of the Manufacturing, Energy, or Electronic Packaging option programs leading to special dean's certificates in those areas.

**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. D. Clark, H. H. Fleischmann, D. A. Hammer, V. O. Kostroun, and S. C. McGuire

**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, 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 specialties. 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.

The following courses are included in the 30-credit program:

- **Fall term**
  - NS&E 509, Nuclear Physics for Applications
  - A&EP 612, Nuclear Reactor Theory
  - A&EP 633, Nuclear Engineering
  - Technical elective

- **Spring term**
  - A&EP 651, Nuclear Measurements Laboratory
  - 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, magneto-hydrodynamics, controlled thermonuclear fusion, and environmental engineering. The list below gives typical electives.

- M&AE 651, Advanced Heat Transfer
- ELE E 581, Introduction to Plasma Physics
- ELE E 582, Basic Plasma Physics
- ELE E 471, Feedback Control Systems
- ELE E 472, Digital Control Systems
- A&EP 661, Microcharacterization
- NS&E 484, Introduction to Controlled Fusion: Principles and Technology
- NS&E 621, Radiation Effects In Microelectronics
- MS&E 459, Physics of Modern Materials Analysis

**Program for Applications of Nuclear Analytical Methods (PANAM)**

This new program was initiated in 1993-94. It provides for specialization by Ph.D. candidates with either a major or a minor in NS&E. For those with majors in non-nuclear fields who expect to use nuclear analytical methods in their research, the sequence NS&E 509-591-590 forms a suitable minor in NS&E. The laboratory course 551 has been offered since spring 1989. The lecture course 509, offered for the first time in 1993, covers nuclear physics without requiring quantum mechanics as a prerequisite. For NS&E majors, PANAM offers the opportunity to extend and develop new nuclear-analytical methods, for example, uses of cold neutrons and neutron-depth profiling with conversion electrons. They would normally follow the M.Eng. program in the first year, continue with advanced courses in the second year (including a full quantum-mechanical treatment of nuclear physics), and begin, as early as possible, independent projects as precursors to thesis research.
Bachelor of Science Curriculum in Operations Research and Industrial Engineering

The program is designed to provide a broad and basic 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. Exceptional students interested in pursuing graduate study 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 Industrial 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:

**Term 2, 3 or 4**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRD 211, Computers &amp; Programming or ENGRD 212, Structure and</td>
<td></td>
</tr>
<tr>
<td>Interpretation of Computer Programs</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term 5**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 320, Optimization I</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 350, Financial and Managerial Accounting</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 360, Engineering Probability and Statistics II</td>
<td>4</td>
</tr>
</tbody>
</table>

A course in humanities and social sciences 3

Field-approved elective 3

**Term 6**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 310, Industrial Systems Analysis</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 321, Optimization II</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 361, Introductory Engineering Stochastic Processes I</td>
<td>4</td>
</tr>
<tr>
<td>Behavioral science</td>
<td>3</td>
</tr>
</tbody>
</table>

Course in humanities and social sciences 3

The behavioral science requirement can be satisfied by any one of several courses, including the Johnson Graduate School of Management (JGSM) course, NCC 554 (offered only in the fall), which is recommended for those contemplating the pursuit of a graduate business degree, and ILROB 170, 171, and 320. The adviser must approve the selection in all cases.

The basic senior-year program, from which individualized programs are developed, consists of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Minimum credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 580, Design and Analysis of Simulated Systems</td>
<td>4</td>
</tr>
<tr>
<td>Three upperclass OR&amp;IE electives as described below</td>
<td>9</td>
</tr>
<tr>
<td>Two field-approved electives (at least 3 credits must be outside OR&amp;IE)</td>
<td>6</td>
</tr>
<tr>
<td>Two courses in humanities and social sciences</td>
<td>6</td>
</tr>
<tr>
<td>Two approved electives</td>
<td>6</td>
</tr>
</tbody>
</table>

Available OR&IE electives are as follows:

Manufacturing and distribution systems: OR&IE 416, 417, 451, 524, 525, and 562 and JGSM NBA 641

Optimization methods: OR&IE 431, 432, and 435

Applied probability and statistics: OR&IE 462, 475 (2 credits), 476 (2 credits), 561, 563, 575 (2 credits), and 577

Scholastic requirements for the field are a passing grade in every course, a grade of C- or better in ENGRD 211 and 270, OR&IE 310, 321, 350, 360, 361 (applies to Class of 1999 and later), an overall average of at least 2.0 for each term the student is enrolled in the school, an average of 2.0 or better for OR&IE field courses, and satisfactory progress toward the completion of the degree requirements. The student's performance is reviewed at the conclusion of each term.

### Operations Research and Industrial 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 degree, 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 an average of 2.0 or better for OR&IE courses for the OR&IE field program and the typical terms in which they are taken are as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE, or ENGRG 470: Undergraduate Technical Elective</td>
<td>2</td>
</tr>
</tbody>
</table>

### 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 first semester of their junior year. A student must be in the program for at least two semesters before graduation.

### Procedures

Each application to the OR&IE honors program must have a faculty adviser to supervise the honors program. The honors adviser need not be the students faculty adviser. The application to the program shall be a letter from the student describing the specific proposed honors program and including the explicit approval of the honors adviser. Each program must be approved by the associate director, and any changes to the student's program must also be approved by the associate director of undergraduate studies.

### Master of Engineering (OR&IE) Degree Program

This one-year professional degree program stresses applications of operations research and industrial engineering and requires completion of a project. The course work centers on additional study of analytical techniques, with particular emphasis on engineering applications, especially in the design or improvement of man-machine systems, information systems and control systems, and in the financial world.

### General Admission and Degree requirements

Eligibility procedures are described in the introductory "Degree Programs" section. The M.Eng.(OR&IE) program is integrated with the undergraduate Field Program in Operations Research and Industrial Engineering. We also welcome applications from Cornell undergraduates in many other majors, or from qualified non-Cornellians. To ensure completion of the program in one calendar year, the entering student should have completed courses in statistics and in computer programming (Pascal or C). Students interested in the Financial Engineering Option should contact the Financial Engineering Option Office in 201 Frank H. T. Rhodes Hall, 607-255-9128. Information concerning industrial internships can be obtained from the Master of Engineering Program Office, 148 Olin Hall.

### Fall Term

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 516, Case Studies</td>
<td>1</td>
</tr>
<tr>
<td>OR&amp;IE 893, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>M.Eng. Project</td>
<td>1</td>
</tr>
<tr>
<td>Technical electives</td>
<td>12</td>
</tr>
</tbody>
</table>

### Spring Term

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 894, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>M.Eng. Project</td>
<td>minimum of 4</td>
</tr>
<tr>
<td>Technical electives</td>
<td>9</td>
</tr>
</tbody>
</table>
At least 12 credit hours of the electives specified above must be chosen from the list of courses offered by the School of Operations Research and Industrial Engineering. Other restrictions apply. A minimum of 30 credits must be taken to complete the program.

II. For matriculants from other fields who minimally fulfill the prerequisite requirements (students who have the equivalent of ORIE 520, 523, and 560 will take other technical electives in their place):

### Fall term Credits
- ORIE 560, Engineering Probability and Statistics II \[4\]
- ORIE 520, Optimization I \[4\]
- ORIE 522, Topics in Linear Optimization \[1\]
- ORIE 516, Case Studies \[1\]
- ORIE 580, Design and Analysis of Simulated Systems \[4\]
- ORIE 893, Applied OR&IE Colloquium \[1\]
- M. Eng. Project \[1\]

### Spring term Credits
- ORIE 523, Introduction to Stochastic Processes I \[4\]
- ORIE 894, Applied OR&IE Colloquium \[1\]
- M.Eng. Project \[minimum of 4\]
- Technical electives \[6\]

A minimum of 30 credit hours are required to complete this program. Additional program requirements exist and are described in the Master of Engineering Handbook, which is available in Room 201, Frank H. T. Rhodes Hall.

The project requirement can be filled in a variety of ways. Common elements in all project experiences include working as part of a group of three to five students on an engineering design problem, meeting with a faculty member on a regular basis, and oral and written presentation of the results obtained. Most projects address problems that actually exist in manufacturing firms, financial firms, hospitals and other service industries.

**Cooperative Program with the Johnson Graduate School of Management**

Undergraduates majoring in operations research 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.

An advantage for OR&IE majors is that they study, as part of their undergraduate curriculum, 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.) An early start on meeting the business-degree requirements permits students accepted into the cooperative program to earn both the M.Eng.(OR&IE) and M.B.A. degrees in two years rather than the three years such a program would normally take.

The details of planning courses for this program should be discussed with the admissions office of the Johnson Graduate School of Management.

In accordance with this program the candidate would qualify for the B.S. degree at the end of four years, the M.Eng.(OR&IE) degree at the end of five years, and the M.B.A. degree at the end of six years.

Further details and application forms may be obtained at the office of the School of Operations Research and Industrial Engineering, Frank H. T. Rhodes Hall, and at the admissions office of the Johnson Graduate School of Management.

In addition, there are two other programs that combine an M.Eng. (OR&IE) degree and an MBA degree from Cornell. The Twelve-Month MBA Program allows students to obtain both degrees in two academic years plus the intervening summer. The combined M.Eng.-MBA Program allows students to obtain both degrees in a total of five semesters.

### 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 Interdisciplinary Centers, Programs, and Studies section at the front of this catalog.

**THEORETICAL AND APPLIED MECHANICS**


**Undergraduate Study**

The Department of Theoretical and Applied Mechanics is responsible for courses in engineering mechanics and engineering mathematics, some of which are part of the Common Curriculum.

**College Program In Engineering Science**

A student may enroll in the College Program in Engineering Science, which is sponsored by the Department of Theoretical and Applied Mechanics. The College Program is described in the section on undergraduate study in the College of Engineering.

**Master of Engineering (Engineering Mechanics) Degree Program**

Composite materials designed to meet specific requirements of weight, strength, and rigidity are used increasingly in the manufacture of everyday structures and components. The Master of Engineering (Engineering Mechanics) degree program focuses on the mechanical behavior of advanced composite materials and structures and prepares students to play a role in the development of this new technology. Students from diverse engineering backgrounds, such as mechanics, structures, and materials, as well as aerospace and biomedical engineering, can normally complete the requirements for the professional Master of Engineering degree in one year.

The degree program requires satisfactory completion of 30 credits of course work, including 12 credits of courses that involve analysis, computation, design, or laboratory experience. Of these 12 credits, at least 6 must be earned in T&AM. Up to 10 credits will be awarded for an individual project involving composites. The balance of the required credits may be earned in elective courses chosen from those in the course listing below or others approved by the student's adviser.

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.
ENGR 233/433 Topics in Engineering Communications

TBA. 3 credits.
Topics vary as the need and interest arise. Sample topics are: introductory technical communications, graphic presentation of engineering material, desktop publishing, information technologies, advanced problems in engineering communications, technology and the law. Fulfills the college technical writing requirement.

ENGR 234/434 Independent Study in Engineering Communications

TBA. Variable credits (1–3). Credit and course level (234 or 434) determined by the amount and intellectual level of the work. Students work closely with a Communications Program instructor to pursue an aspect of professional communications not available through regular course work. Projects may involve writing technical documentation, creating user manuals, analyzing and producing technical graphics, or reading and writing about problems in engineering practice. Interested students should contact the Engineering Communications Program.

ENGR 301 Writing in Engineering

TBA. 1 credit. Prerequisite: permission of instructor. Can be used to satisfy requirements in expressive arts as a free or approved elective. This course can only be taken in conjunction with a "writing-intensive" engineering class.

Some "writing-intensive" engineering classes may require students to enroll in this supplementary course. Instructors from the Engineering Communications Program work with engineering faculty members to prepare students for writing assignments. Intended to strengthen independent writing of the course content while enhancing communications skills. May be taken more than once, with different engineering courses.

ENGR 350 Engineering Communications

Fall, spring, summer. 3 credits. Limited to 20 students per section.
Emphasizes technical and professional writing; also includes oral and visual presentation. Material from real-life engineering situations is analyzed, with case studies and assignments modeled on professional situations. Students learn to adapt language and formats—letters, memoranda, instructions, definitions, proposals, reports—to audiences having different needs and levels of technical expertise. Students also consider organizational and ethical aspects of the communications they encounter and produce. Taught as a workshop, with ample time for discussion. The goal throughout is clear, well-organized, responsible, and forceful professional communication. Fulfills the college technical writing requirement. Fee will be charged to cover photocopying costs.

ENGR 435 Communications for Engineering Managers

Fall, spring. 3 credits. Limited to 20 students per section.
Guidance and practice in professional writing through a variety of assignments, including case write-ups on management issues. Emphasizes working effectively in teams (topics include listening skills, team roles, and respectful disagreement) and communicating with a variety of audiences, particularly technical and managerial audiences. The course is taught as a workshop and focuses on oral as well as written communication skills. Fulfills the college technical writing requirement. Lab fee will be charged to cover photocopying costs.

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 co-requisites.

ENGRD 201 Introduction to the Physics and Chemistry of the Earth (also GEOL 201)

Spring. 3 credits. Prerequisites: MATH 191 and PHYS 112. L. M. Cathles. 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. 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. 3 credits. Prerequisite: PHYS 112, coregistration in MATH 293 or permission of instructor. Principles of statics, force systems, and equilibrium: frameworks, mechanics of deformable bodies, stress analysis, statically indeterminate problems; mechanical properties of engineering materials; axial force, shear force, bending moment, plane stress; Mohr's circle; bending and torsion of bars; buckling and plastic behavior.

ENGRD 203 Dynamics (also T&AM 203)

Fall, spring. 3 credits. Prerequisite: T&AM 202, coregistration in MATH 294, 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. Rigidity-body kinematics, angular velocity, moment of momentum, the inertia tensor. Euler equations, the gyroscope.

ENGRD 210 Introduction to Electrical Systems (also ELE E 210)

Fall, spring. 3 credits. Corequisites: MATH 293 and PHYS 212. Fundamental circuit elements and laws, circuit analysis techniques, and operational amplifiers circuits. Response of linear systems, with an introduction to complex frequency and phasors, forced response, average power, transfer function, and the frequency spectrum.

ENGRD 211 Computers and Programming (also COM S 211)

Fall, spring, summer. 3 credits. Credit will not be granted for both ENGRD/COM S 211 and 212. Prerequisite: COM S 100 or equivalent programming experience. Intermediate programming in a high-level language and introduction to computer science. Topics include program structure and organization, modules (classes), program development, proofs of program correctness, recursion, data structures and types (lists, stacks, queues, trees), object-oriented and functional programming, and analysis of algorithms. Java is the principal programming language.

ENGRD 212 Structure and Interpretation of Computer Programs (also COM S 212)

Fall, spring. 4 credits. Credit will not be granted for both ENGRD/COM S 211 and 212. Prerequisite: COM S 100 or equivalent programming experience. A challenging introduction to programming languages and computer science that emphasizes alternative modes of algorithmic expression. Topics include recursive and higher-order procedures, performance analysis of algorithms, proofs of program correctness, probabilistic algorithms, symbolic hierarchical data, abstract data types, polymorphic functions, object-oriented programming, infinite data types, simulation, and the interpretation of programs. ENGRD/COM S 212 covers a wide range of topics in computer science and programming using advanced functional and object-oriented programming languages. ENGRD/COM S 211 focuses on strengthening programming skills in a more conventional programming language (Java), while still introducing important topics in computing. Either course is a suitable prerequisite for further study in the field. Appropriate transfers between ENGRD/COM S 211 and 212 (in either direction) are encouraged during the first few weeks of the semester.

ENGRD 219 Mass and Energy Balances (also CHEM E 219)

Fall. 3 credits. Co-requisite: physical or organic chemistry or permission of instructor. P. Clancy. Engineering problems involving material and energy balances. Batch and continuous reactive systems in the steady and unsteady states. Introduction to phase equilibria for multicomponent systems.

ENGRD 221 Thermodynamics (also M&AE 221)

Fall, spring. 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. Thermodynamics relations for simple, compressible substances. Gaseous reactions.

ENGRD 222 Introduction to Scientific Computation (also COM S 222)

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 Mathlab computing environment is used. Vectorization, efficiency, reliability, and
stability are stressed. Special lectures on parallel computation.

ENGRD 231 Introduction to Digital Systems
Fall, spring. 3 credits. Prerequisite: COM S 100.
An introduction to basic principles, design techniques, and methodology for communication, computer, and information systems, which process digital data streams. Includes Boolean algebra, integrated circuit components, switching circuits, and systems which provide computation, data, voice, and video service.

ENGRD 241 Engineering Computation
(also CEE 241)
Spring. 3 credits. Prerequisites: COM S 100 and MATH 293. Co-requisite: MATH 294. J. F. Abel.
This course introduces the discipline of numerical methods while developing 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, interpolation, numerical differentiation and integration, and ordinary differential equations. The context and solution of partial differential equations are broached. Applications are drawn from different areas of engineering.

ENGRD 250 Engineering Applications in Biological Systems (also ABEN 250)
Fall. 3 credits. Prerequisite: enrollment in an engineering curriculum. Recommended for the sophomore year. B. A. Ahnert.
Case studies of engineering problems in agricultural and biological systems, including animal and crop production, environmental problems, energy, biomedicine, and food engineering. Emphasis is on the application of mathematics, physics, and the engineering sciences to energy and mass balances in biological systems.

ENGRD 261 Introduction to Mechanical Properties of Materials (also MAE 261)
Fall. 3 credits. S. L. Suss.
This course examines the relationship of elastic deformation, plastic deformation, and fracture properties to structure and defects on a microscopic scale in metals, ceramics, polymers, and composite materials. Design and processing of materials to achieve high modulus, damping capacity, strength, fracture resistance, creep resistance, or fatigue resistance. Failure-resistance design methods using fracture mechanics.

ENGRD 284 Computerized Instrumentation Design (also A&EE 284)
Fall, spring. 3 credits. Prerequisites: Engr tech 100 or COM S 100. Lec; 1 lab. Fall. T. C. Cook.
This course covers the use of a small computer in an engineering or scientific research laboratory. Various experiments are performed using an IBM-AT style computer (8088 running Windows). The experiments and devices to be investigated include: input and output ports, analog to digital converters (ADC), digital to analog converters (DAC), thermostats, optical sensors, digital temperature control, non-linear least squares curve fitting of experimental data, thermal diffusion, and viscosity of fluids. A second goal of this course is to develop the ability to write effective written communication skills in the context of science and engineering. A number of rhetorical principles will be presented that can produce clarity in communication without oversimplifying scientific issues. Students will prepare progress reports, technical reports, and formal articles based on the experiments.

ENGRD 270 Basic Engineering Probability and Statistics
(also OR&IE 270)
Fall, spring. 3 credits. Pre or co-requisite: MATH 298.
This course should give students a working knowledge of basic probability and statistics and their application to engineering. Computer analysis of data and simulation are emphasized. Topics include random variables, probability distributions, expectation, estimation, testing, experimental design, quality control, and regression.

Courses of General Interest
Courses in this category are of general interest and cover technical, historical, and social issues relevant to the engineering profession. These courses may also include seminar or tutorial type courses.

ENGRG 102 Mechanical Drafting
Fall, spring. 1 credit. Half-term course offered twice each semester. Enrollment limited to thirty-two per half-term. Recommended for students without mechanical drawing experience. S-U grades optional.
Introduction to sketching, drawing, and graphic techniques useful in design, analysis, and presentation of ideas. Computer-aided design is integral to the course-work and final design projects.

ENGRG 150 Engineering Seminar
Fall. 1 credit. First-year students only. S-U grades only.
Engineering freshmen meet regularly with their faculty advisors 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 ELE E 250, S&T S 250, HIS 250)
Fall. 3 credits. Meets humanities distribution requirement.
This course will investigate the history of technology in Europe and the United States from ancient times to the present. Topics include the economic and social aspects of industrialization; the myths of heroic inventors like Morse, Edison, and Ford; the government's regulation of technology, the origins of mass production, and the spread of the automobile and microelectronics cultures in the United States.

ENGRG 298 Inventing the Power and Information Society
(also ELE E 298 and S&T S 292)
Spring. 3 credits. Approved for humanities distribution, not as field electives.
Explores the history of electricity in society from the 1830s to the present by considering the technical and social history of telecommunications, the electric-power industry, radio, television, and computers. Emphasis is placed on the changing relationship between science and technology, the economic aspects of innovation, and the social relations of this technology.

ENGRG 323 Engineering Economics and Management
(also CEE 323)
Fall. 3 credits. Primarily for juniors and seniors. D. P. Loucks.
Introduction to engineering and business economics and to project management. Intended to give students a working knowledge of money management and how to make economic comparisons of alternative engineering designs or projects. The impact of inflation, taxation, depreciation, financial planning, economic optimization, project scheduling, and legal and regulatory issues are introduced and applied to economic investment and project-management problems.

ENGRG 356 Women in Engineering Career Planning Seminar
Spring. 1 credit. Limited to 25 students. S-U grades only. Not offered 1997-98.
Covers aspects of transition to the engineering profession and related issues especially of interest to women. Topics include career and life planning, the job-search process, interviewing strategies, juggling career and family, graduate education, sexual harassment and sexism in the workplace, professionalism, and networking. Corporate professionals and Cornell faculty and staff participate in class discussions.

ENGRG 360 Ethical Issues in Engineering
(also S&T S 360)
Spring. 3 credits. A humanities elective for engineering students. Open to sophomores.
A discussion of ethical issues encountered in engineering practice, such as the rights of engineers in corporations, responsibility for actions, whistleblowing, conflicts of interest, and decision making based on cost-benefit analysis. Codes of ethics and ethical theory will be used to sort out conflicts the engineer may feel toward public safety, professional standards, employers, colleagues, and family. Students will present a case study to the class.

ENGRG 461 Entrepreneurship For Engineers
Fall. 3 credits. See MAE 461 for course description.

ENGRG 470 Undergraduate Engineering Teaching
Spring. 3 credits. Engineering juniors and seniors can now earn graduation credit while helping freshmen learn mathematics, physics, or engineering design. This course introduces apprentice teachers to collaborative learning, pedagogical theory, interpersonal/diversity issues, and practical tools for educational innovation. This course is an approved elective and can be applied toward the Honors Degree in Electrical Engineering. A 3.0 GPA is strongly recommended.
ENGRG 605 Fundamentals of Biomedical Engineering I
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 ABEN 454, CHEM 481, or M&AE 465. S/U grades optional for students not majoring or minoring in biomedical engineering. A series of four-week modules on specialized topics. Coordinator: M. L. Shuler.

605.1 Cellular Dynamics and Cancer

605.2 Physiological Systems

605.3 Biomaterials
1 credit. Lec. T R 1:25–2:40. Nov. 4–Dec. 4. C. C. Chu. 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 and that are currently used in human body repair. After student’s completion of this module, they 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, and 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
1 credit. Organizational Meeting. T 3:35–4:25. Nov. 4-Dec. 4. M. L. Shuler. Students will work in teams on a design problem of their choice related to development of a biomedical device or procedure. Each team will present an oral report and a written report.

ENGRG 606 Fundamentals of Biomedical Engineering II
Spring. 1–2 credits. Prerequisites: Graduate standing in Engineering or Science; PHYS 213 and MATH 294 or equivalent. Undergraduates must have permission of instructor and have completed ABEN 454, CHEM 481, or M&AE 465. S/U grades optional for students not majoring or minoring in biomedical engineering. A series of 1 and 2-credit modules on specialized topics. Coordinator: M. L. Shuler

606.1 Artificial Organs and Tissue Engineering
1 credit. Lec. T R 1:25–2:40. Jan. 20–Feb. 17. W. M. Saltzman. Prerequisite: ENGRG 605, Section 03 (Biomaterials). 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 will discuss the physiological and engineering issues underlying the use of synthetic, extracorporeal systems (e.g., membrane-based dialysis devices), composite implantable materials (e.g., drug-delivery systems and nerve regeneration guides), and hybrid cell-polymer implantable systems (e.g., engineered tissues).

606.2 Biomedical Instrumentation and Diagnostics

606.3 Biomechanics of Musculoskeletal Systems
2 credits. Lec. T R 1:25–4:40. March 31–April 30. D. I. Bartel, C. E. Farnum. Integrated lecture/laboratory experience. The anatomy and function of the canine hindlimb will be explored in dissection laboratories and through demonstration of a non-invasive technique, computed tomography. Methods of approximating functional joint loads will be discussed, and physical testing will be demonstrated. A computer model of the stifile (knee) joint will be created by combining knowledge of the anatomy and the mechanical environment.

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 110 The Laser and Its Applications in Science, Technology, and Medicine (also A&EP 110)
Fall, spring. 3 credits. 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 and a tunable dye laser. Demonstration experiments with several types of lasers illustrate phenomena such as holography, laser processing of materials, and Raman spectroscopy.

ENGR 111 Materials by Design (also MS&E 111)
Fall. 3 credits. E. P. Giannelis. Explores the relationship between atomic structure and macroscopic properties of such diverse materials as metals, ceramics, polymers, and semiconductors. Hands-on project involves dissecting and analyzing various consumer products like a disposable camera or portable cassette player. Emphasis is placed on materials identification and their selection to perform an engineering function.

ENGR 112 Introduction to Chemical Engineering (also CHEM 112)
Fall, spring. 3 credits. Limited to freshmen. T. M. Duncan, C. Cohen. Design and analysis of processes involving chemical change. Strategies for design, such as creative thinking, conceptual blockbusting, and (re)definition of the design goal, in the context of contemporary chemical engineering. 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 Introduction to Environmental Systems (also CEE 113)
Fall. 3 credits. Not open (without instructor’s permission) to upper-division engineering students, who should take CEE 120 instead. C. A. Shoemaker. Introduction to analysis, management, and modeling of environmental systems. Discussion of physical, chemical, and biological processes affecting environmental quality. Use of computers to simulate environmental phenomena. Examples include management of water resources, ecosystems concepts, solid waste management, and water quality in surface and ground waters.

ENGR 114 An Introduction to Electrical Engineering Design
Spring. 3 credits. An introduction to electrical engineering and electronic circuit design. Students work in small groups on a series of electric circuit projects leading to the team design of a working fiber optic transmitter-receiver system. The laboratories and lectures introduce the concepts and principles of electronic circuits and focus upon circuits useful in the design project. Laboratory fee required.

ENGR 115 Engineering Application of Operations Research (also OR&IE 115)
Fall, spring. 3 credits. An introduction to the problems and methods of Operations Research and Industrial Engineering focusing on problem areas (including inventory, network design, and resource allocation) on conditions in which these problems can be found, and several standard solution techniques. In the computer laboratory, students will encounter problem simulations and use some standard software packages.

ENGR 116 Modern Structures (also CEE 116)
Fall, spring. 3 credits. Staff. An introduction to the basic principles of structural engineering and to structural forms. Emphasis is placed on how various types of structures carry loads. Concepts are illustrated by a series of case studies of major structures such as spacecraft, skyscrapers, bridges, shell structures, and dams. The philosophy of engineering design and lessons learned from structural failures are also discussed. A semester project involves the design and construction of a small balsa-wood bridge.

ENGR 117 Introduction to Mechanical Engineering (also MAE 117)
Fall or spring to be determined. 3 credits. An introduction to topics of current interest in mechanical engineering. Specific topics vary
from offering to offering. Students are urged to check in Upson 112 for details.

ENGRI 118 Design Integration: A Portable CD Player (also MS&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 elements of mechanical, electrical, materials, environmental, manufacturing, and computer engineering as related to the CD player. Laboratory sessions and demonstrations are used to illustrate the principles of design.

ENGRI 120 Introduction to Biotechnology (also CHEM 120)
Fall. 3 credits. W. M. Saltzman.
Introduction to the fundamental science and engineering that spawned the biotechnology revolution—technologies of cell cultures, DNA, and antibodies—and the relationship between biomedical science, bioengineering, and the growing biomedical product industry. Case studies of the application of biotechnological processes, from discovery to clinical use, will include processes for vaccines, antibiotics, cancer chemotherapy, protein pharmaceuticals, and organ transplantation.

ENGRI 121 Fission, Fusion, and Radiation (also MS&E 121)
Spring. 3 credits. L. D. Brown.
Lecture-laboratory course on (1) the physical nature and biological effects of nuclear radiation; (2) benefits and hazards of nuclear energy; (3) light-water reactors, breeder reactors, and fusion reactors; and (4) uses of nuclear radiation in research. Laboratory demonstrations involve Cornell's research reactor; detection of nuclear radiation; activation analysis using gamma-ray spectroscopy; and pulsed power generators for fusion research.

ENGRI 122 Earthquake! (also GEOL 122)
Fall. 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 materials; the historical importance of such resources. 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. C. K. Ober.
Introduces the materials, processes and properties of the semiconductors, polymers, ceramics, and metals used in the microelectronics industry to form integrated circuits, electronic devices and displays. This course examines lithographic processing, metallization, diffusion, ion implantation, oxidation and other processes used in fabricating electronic devices and their packages. The technology of displays will be discussed including liquid crystal displays and light emitting devices.

ENGRI 125 Global Environment (also GEOL 125)
Fall. 3 credits. W. M. White, R. W. Kay.
Wise environmental management requires an understanding of natural chemical interactions. Examines natural chemical cycles among atmosphere, biosphere, hydrosphere, and the solid Earth, the impact of man's activity on them, including the greenhouse effect, ozone hole, acid rain, and water pollution. Laboratory sessions include environmental chemical analysis and computer simulation.

ENGRI 126 Introduction to Telecommunications
Fall. 3 credits. L. D. Brown.
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 will include both lectures and laboratory demonstrations. The students will have the opportunity to design communication systems, and to determine their performance through simulations.

ENGRI 185 Art, Archaeology, and Analysis (also ARKEO 285, ART 372, MS&E 285, NSF&E 285, PHYS 200)
Spring. 3 credits. L. D. Brown.
Does not meet liberal studies distribution requirements.

D. Clark.
An interdepartmental course on application of techniques of physical sciences and engineering to cultural research. Archaeological artifacts or objects are discussed with a focus on historical and technical aspects of their creation and on their analysis by modern methods to deduce geographical origins, to date and authenticate objects, etc.

AGRICULTURAL AND BIOLOGICAL ENGINEERING

Courses in agricultural and biological engineering will be found in the section listing the offerings of the College of Agriculture and Life Sciences and at the department web site <http://www.cals.cornell.edu/dept/abem>.

APPLIED AND ENGINEERING PHYSICS

A&EP 110 The Laser and Its Applications in Science, Technology, and Medicine (also ENGRI 110)
Fall, spring. 3 credits. This is a course in the Introduction to Engineering series.
For description, see ENGRI 110.

A&EP 264 Computer-Instrumentation Design (also ENGRD 264)
Fall, spring. 3 credits. Prerequisites: COM $ 100.
For description, see ENGRD 264.

Spring. 3 credits. Prerequisites: freshman and sophomore chemistry, physics, math.
Introduction to biophysics for engineers and students interested in bioengineering.

A&EP 321 Mathematical Physics I
Fall, summer. 3 credits. Prerequisite: MATH 294.
Intended for upper-level undergraduates in the physical sciences. 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 Bukov.

A&EP 322 Mathematical Physics II
Spring. 4 credits. Prerequisite: A&EP 321.
Second of the two-course sequence in mathematical physics intended for upper-level undergraduates in the physical sciences.
Partial differential equations, Bessel functions, spherical harmonics, separation of variables, wave and diffusion equations, Laplace, Helmholtz and Poisson's Equations, transform techniques, Green's functions, integral equations, Fredholm equations, kernels, complex variables, theory, branch points and cuts, Riemann sheets, methods 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 Bukov.

A&EP 330 Modern Experimental Optics (see also PHYS 330)
Fall. 4 credits. Enrollment limited.
Prerequisites: PHYS 214 or equivalent. E. Bodenschatz.

A practical laboratory course in basic and modern optics. The various projects cover a wide range of topics from geometrical optics to 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. The students will also be introduced to digital imaging and image processing techniques.

A&EP 333 Mechanics of Particles and Solid Bodies
Fall. summer. 4 credits. Prerequisites: PHYS 112 or 116 and coregistration in A&EP 321 or equivalent or permission of instructor.

Newton's mechanics; constants of the motion; many-body systems; linear oscillations, variational calculus; Lagrangian and Hamiltonian formalism for generalized coordinates; non-inertial reference systems; central-force motion; motion of rigid bodies; small vibrations in multi-mass systems; nonlinear oscillations; basic introduction to relativistic mechanics. Emphasis on mathematical treatments, physical concepts, and applications. (On the level of Classical Dynamics, by Marion and Thorton.)

A&EP 355 Intermediate Electromagnetism
Fall. summer. 4 credits. Prerequisites: PHYS 214 or 217 and coregistration in A&EP 321 or equivalent, or permission of instructor.

Topics: vector calculus, electrostatics, analytic and numerical solutions to Laplace's equation in various geometries, electric and magnetic multipoles, electric and magnetic materials, energy in fields, quasistatics and magnetic circuit design. Emphasis is on developing proficiency with analytical and numerical solution techniques in order to solve real-world design problems.
A&EP 356 Intermediate Electrodynamics
Spring. 4 credits. Prerequisite: A&EP 355 and coregistration in A&EP 322 or equivalent, or permission of instructor. Topics: electromagnetic waves, waveguides, transmission lines, dispersive media, radiation, special relativity, and advanced topics in quantum mechanics. Emphasis 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 350 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 lec, 2 hrs. Fall: E. Kirkland; spring: J. Alexander. Analyze, design, build and experimentally test circuits used in scientific and engineering instrumentation (with discrete components and integrated circuits). Analog circuits: resistors, capacitors, operational amplifiers (linear amplifiers with feedback, oscillators, comparators 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 403 Introduction to Nuclear Science and Engineering I (also M&AE 458 and NS&E 403)
Fall. 3 credits. Prerequisite: PHYS 214 or MATH 254. For description see NS&E 403.

A&EP 423 Statistical Thermodynamics
Fall. 4 credits. Prerequisite: introductory thermodynamics and quantum mechanics plus one 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, paramagnetic and multiple-state systems. Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein statistics and applications. Introduction to systems of interacting particles. At the level of Thermal Physics by Kittel and Kroemer, and Statistical Physics, by Rossouw.

A&EP 434 Continuum Physics

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; co-registration in 361 permitted. Numerical computation (derivatives, integrals, differential equations, matrices, boundary-value problems, relaxation, Monte Carlo methods, etc.) will be introduced and applied to engineering physics problems that cannot be solved analytically (three-body problem, electrostatic fields, quantum energy levels, etc.). Computer programming required (in C or optionally C++, FORTRAN, or Pascal). Some prior exposure to programming assumed but no previous experience with C assumed.

A&EP 440 Quantum and Nonlinear Optics

A&EP 450 Introductory Solid State Physics (also PHYS 454)
Fall. 4 credits. Prerequisite: A&EP 361 or equivalent, co-enrollment in A&EP 423 or equivalent. An introduction to the physics of crystalline solids. Crystal structures: electronic states; lattice vibrations; metals, insulators and semiconductors. The majority of the course will address the foundations of the subject, but some time will be devoted to modern and/or technologically important topics such as quantum size effects. At the level of Introduction to Solid State Physics by Kittel.

A&EP 484 Introduction to Controlled Fusion: Principles and Technology (also ELE E 484, and NS&E 484)
For description, see NS&E 484.

A&EP 490 Independent Study in Engineering Physics
Fall, spring. Credit to be arranged. Laboratory or tutorial 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 to be arranged with respective faculty member.

Spring. 3 credits. Prerequisites: A&EP 356, 361, 422, 450 (or equivalent) Directed at students who have had an introductory course in solid state physics at the level of Kittel. This course will concentrate on the application of the quantum mechanical theory of solid state physics to semiconductor materials, solid state electronic devices, solid state detectors and generators of electromagnetic radiation, superconducting devices and materials, the nonlinear optical properties of solids, ferromagnetic materials, nanoscale devices and mesoscopic quantum mechanical effects. Emphasis will be on 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 606 Introduction to Plasma Physics (also ELE E 581)
For description, see ELE E 581.

A&EP 607 Basic Plasma Physics (also ELE E 592)
For description, see ELE E 592.

A&EP 609 Nuclear Physics for Applications (also NS&E 509)
For description, see NS&E 509.

A&EP 612 Nuclear Reactor Theory
Fall. 4 credits. Prerequisites: a year of advanced calculus and some nuclear physics. Offered on demand. Physical theory of fission reactors. Fission and neutron interactions with matter; theory of neutron diffusion, slowing down, thermalization; calculations of criticality and neutron-flux distribution in nuclear reactors. Reactor kinetics. At the level of Nuclear Reactor Theory, by Lamarch.

A&EP 633 Nuclear Reactor Engineering
Fall. 4 credits. Prerequisite: introductory course in nuclear engineering. Offered on demand. The fundamentals of nuclear reactor engineering, reactor siting and safety, fluid flow and heat transfer, control, environmental effects, and radiation protection.

A&EP 659 Nuclear Measurements Laboratory
Spring. 2 credits. Prerequisites: A&EP 606 (ELE E 581) or equivalent, or permission of instructor. Offered when demand warrants. Topics include (1) theoretical aspects of intense electron and ion beams, such as equilibria and stability, (2) technology of intense beam production, such as pulsed-power generator principles, and electron and ion diode operation; and (3) applications of intense beams, such as to controlled fusion, microwave generation, and laser pumping. Extensive discussion of experimental results.

A&EP 651 Nuclear Measurements Laboratory
Spring. 4 credits. Prerequisite: A&EP 609 or equivalent. Primarily for graduate students in nuclear fields. A less-intensive related course, NS&E 551, is intended for students in non-nuclear fields in which nuclear methods are used. Offered on demand. Lectures on interaction of radiation with matter, radiation protection, and nuclear instruments. Experience in radiation detection, attenuation, and measurement; activation analysis; neutron radiography; reactor physics. The TRIGA reactor and the Zero Power Reactor are used. At the level of Radiation Detection and Measurement, by Knoll.
CHEMICAL ENGINEERING

CHEM 112 Introduction to Chemical Engineering (also ENGR 112)
Fall. spring. 3 credits. Limited to freshmen. T. M. Dunnan, C. Cohen.
For description, see ENGR 112.

CHEM 120 Introduction to Biotechnology (also ENGR 120)
Fall. 3 credits. W. M. Saltzman.
For description, see ENGR 120.

CHEM 219 Mass and Energy Balances (also ENGRD 219)
Fall. 3 credits. Corequisite: physical or organic chemistry or permission of instructor. P. Clancy.
For description, see ENGRD 219.

CHEM 301 Nonresident Lectures
Spring. 1 credit. P. Clancy.
Lecturers from industry and from selected departments of the university provide information to assist students in their post-graduate plans.

CHEM 313 Chemical Engineering Thermodynamics
Fall. 4 credits. Corequisite: physical chemistry. Z. Panagiotopoulos.

CHEM 323 Fluid Mechanics
Fall. 3 credits. Prerequisites: CHEM 219 and engineering mathematics sequence. P. H. Steen.

CHEM 324 Heat and Mass Transfer
Spring. 3 credits. Prerequisite: CHEM 523. W. L. Olbricht.

CHEM 332 Analysis of Separation Processes
Spring. 4 credits. Prerequisites: CHEM 313 and 332. K. E. Gubbins.
Analysis of separation processes involving phase equilibria and mass transfer. Phase equilibria; binary and multicomponent distillation; liquid-liquid extraction; gas absorption, absorption, membrane separations.

CHEM 390 Reaction Kinetics and Reactor Design
Spring. 3 credits. Prerequisites: CHEM 313 and 332. D. L. Koch.
A study of chemical reaction kinetics and principles of reactor design for chemical processes.

CHEM 391 Physical Chemistry I (also CHEM 391)
For description, see CHEM 301.

CHEM 432 Chemical Engineering Laboratory
Fall. 4 credits. Prerequisites: CHEM 323, 324, 332, and 390. Staff.
Laboratory experiments in fluid dynamics, heat and mass transfer, kinetics, other operations. Correlation and interpretation of data. Technical report writing.

CHEM 462 Chemical Process Design
Spring. 4 credits. Prerequisite: CHEM 452. Staff.
A consideration of process and economic alternatives in selection of chemical processes; design and assessment.

CHEM 472 Process Control
Fall. 3 credits. Prerequisites: CHEM 324 and 390. J. R. Engstrom.
Analysis of the dynamics of chemical processes and design of feedback and feedforward control systems. Laplace transform techniques; stability analysis; frequency-response analysis. An introduction to multivariable control.

CHEM 481 Biomedical Engineering
Spring. 3 credits. Prerequisite: CHEM 324 or equivalent or permission of instructor. W. M. Saltzman.
Special topics in biomedical engineering, including cell separation, 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.

CHEM 490 Undergraduate Projects in Chemical Engineering
Fall. spring. Variable credit. Research or studies on special problems in chemical engineering.

CHEM 491 Undergraduate Teaching in Chemical Engineering
Fall. spring. 1 credit. Methods of instruction in chemical engineering acquired through discussions with faculty and by assisting with the instruction of freshmen and sophomores.

CHEM 520 Chemical, Pharmaceutical, and Food Processing
Spring. Variable to 3 credits. Prerequisite: seniors or M.Eng. students with one term of college chemistry. C. Cohen, M. L. Shuler, and S. Mulvaney.
This course consists of three equal parts, each worth one credit. The chemical part is open to non-chemical engineers only and covers process fundamentals, design, and control of continuous large-scale chemical processes. Pharmaceutical processing covers fermentation, purification, and sterilization. Food processing emphasizes food preservation principles and technology.

CHEM 562 Managing Chemical Process Design
Fall. 1 or 2 credits. Prerequisite: CHEM 462. K. F. Ackley.
Guidance and evaluation of chemical process designs developed by teams of chemical engineers.

CHEM 564 Design of Chemical Reactors
Spring. 3 credits. Prerequisite: CHEM 390 or equivalent. P. Harriott.
Design, scale-up, and optimization of chemical reactors with allowance for heat and mass transfer and nonideal flow patterns. Homework problems feature analysis of published data for gas-solid, gas-liquid, and three-phase reaction systems.
CHEM 565 Design Project
Fall, spring. 3 or 6 credits. Required for students in the M.Eng.(Chemical) program. Design study and economic evaluation of a chemical processing facility, alternative methods of manufacture, raw-material preparation, food processing, waste disposal, or some other aspect of chemical processing.

CHEM 590 Special Projects in Chemical Engineering
Fall, spring. Variable credit. Limited to graduate students. Non-thesis research or studies on special problems in chemical engineering.

CHEM 605 Fundamentals of Biomedical Engineering I (also ENGRG 605)
For description, see ENGRG 605.

CHEM 606 Fundamentals of Biomedical Engineering II (also ENGRG 606)
For description, see ENGRG 606.

CHEM 640 Polymeric Materials

CHEM 643 Introduction to Bioprocess Engineering
Fall. 3 credits. Prerequisite: CHEM 390 or permission of instructor. No prior background in the biological sciences required. M. L. Shuler. A discussion of principles involved in using microorganisms, tissue cultures, and enzymes for processing. Application to food, fermentation, and pharmaceutical industries and to biological waste treatment.

CHEM 645 Advanced Concepts in Biophysical Chemistry
Spring. 3 credits. Prerequisite: CHEM 643 or equivalent or permission of instructor. Not offered 1997-98. Fundamentals of biochemical and biomedical engineering, with added emphasis on cell and membrane biophysics. Topics include cell-surface receptor phenomena, protein diffusion, cell adhesion, membrane biophysics, cell motility and growth, mathematical immunology of living and infection, enzyme catalysis, biosorption, and genetically modified organisms.

CHEM 656 Separations Using Membranes or Porous Solids

CHEM 661 Air Pollution Control

CHEM 675 Synthetic Polymer Chemistry (also MSE 671 and CHEM 771)
Fall. 4 credits. Prerequisites: CHEM 359–360 or equivalent or permission of instructor. For description, see CHEM 671.

CHEM 681 Dynamics of Colloidal Systems
Fall. 3 credits. Prerequisite: basic understanding of thermodynamics and fluid dynamics. Offered alternate years. A. Z. Panagiotopoulos.

Fundamentals of the dynamics of colloidal systems under equilibrium and non-equilibrium conditions. Phase equilibrium of surfactant systems, thermodynamics of micelle formation, forces between colloidal particles, electrokinetics, hydrophobic interaction and aggregation, transport of surfactant in interfacial systems, stability of emulsions, and dynamics of thin films. Open to advanced undergraduates and graduate students from all fields.

CHEM 711 Advanced Chemical Engineering Thermodynamics
Fall. 3 credits. Prerequisite: CHEM 313 or equivalent. K. E. Gubbins. Postulatory approach to thermodynamics. Legendre transformations. Equilibrium and stability of general thermodynamic systems. Applications of thermodynamic methods to advanced problems in chemical engineering. Introduction to statistical mechanical ensembles, phase transitions, Monte Carlo methods, and theory of liquids.

CHEM 713 Chemical Kinetics and Dynamics

CHEM 731 Advanced Fluid Mechanics and Heat Transfer
Fall. 3 credits. Prerequisites: CHEM 323 and 324 or equivalent. D. L. Koch. Derivation of equations of motion for Newtonian fluids. Low Reynolds number fluid dynamics, lubrication theory, inviscid fluid dynamics. Boundary layer theory. Convective and conductive heat transfer.

CHEM 732 Diffusion and Mass Transfer
Spring. 2 credits. Prerequisite: CHEM 731 or equivalent. P. H. Steen. 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.

CHEM 741 Selected Topics in Biochemical Engineering
Fall. 1 credit (may be repeated for credit). Prerequisite: CHEM 643 or permission of instructor. M. L. Shuler and W. M. Saltzman. Discussion of current topics and research in biochemical engineering for graduate students.

CHEM 745 Physical Polymer Science I

CHEM 751 Mathematical Methods of Chemical Engineering Analysis

CHEM 753 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation
Fall. 3 credits. Prerequisite: CHEM 751 or equivalent. Offered alternate years. P. H. Steen. Elements of stability and bifurcation theory. Branch-following techniques. Stability of discrete and continuous systems. Application to elasticity, reaction-diffusion, and hydrodynamic systems using software for continuation problems.

CHEM 772 Theory of Molecular Liquids
Spring. 3 credits. Prerequisite: CHEM 711 or equivalent. Theory of intermolecular forces, and equilibrium and statistical mechanics for nonspherical molecules. Distribution functions. Applications to thermodynamics of such fluids using integral equation and perturbation theory techniques. Mixture properties, phase diagrams for mixtures with polar or quadrupolar components. Surface properties.

CHEM 774 Atomic Simulations of Materials
Spring. 3 credits. Prerequisite: competence in FORTRAN, PASCAL, or C. Prior knowledge of statistical mechanics helpful. Offered alternate years. A. Z. Panagiotopoulos. The statistical mechanical theory behind Monte-Carlo and Molecular-Dynamics computer-simulation techniques. Strong emphasis is placed on students writing their own MC and MD code. Calculation of distribution functions, thermodynamic, kinetic and structural properties. Introduction to the application of computer graphics to simulation. Interparticle force models of interatomic simulation of systems containing metals, semiconductors, and biological materials. Issues of code efficiency and vectorization.

CHEM 790 Seminar
Fall, spring. 1 credit each term. General chemical engineering seminar required of all graduate students in the Field of Chemical Engineering.

CHEM 792 Advanced Seminar in Thermodynamics
Fall, spring. 1 credit. A forum for talks by graduate students and faculty members on topics of current interest in thermodynamics and statistical mechanics.
CHEME 890 Thesis Research
Fall, spring. Variable credit.
Thesis research for the M.S. degree in chemical engineering.

CHEME 990 Thesis Research
Fall, spring. Variable credit.
Thesis research for the Ph.D. degree in chemical engineering.

CIVIL AND ENVIRONMENTAL ENGINEERING

General

CEE 113 Introduction to Environmental Systems (also ENGR 113)
Fall. 3 credits. C. A. Shoemaker.
For description, see ENGR 113.

CEE 116 Modern Structures (also ENGR 116)
Fall, spring. 3 credits. G. G. Deierlein and staff.
For description, see ENGR 116.

CEE 120 Readings on the Environment
Fall. 1 credit. C. A. Shoemaker.
A reading course from an introductory environmental text. Topics include structure and dynamics of ecosystems, water habitats and communities, water resources, toxic-waste pollution of surface and groundwater, international water pollution problems, energy resources, nuclear-waste disposal, hydroelectric power, environmental carcinogens. Not available to students receiving credit for ENGR 113 or Natural Resources 201.

CEE 241 Engineering Computation (also ENGR 241)
Spring. 3 credits. Prerequisites: COM S 100 and MATH 293. Corequisite: MATH 294. J. F. Abel.
For description, see ENGR 241.

CEE 304 Uncertainty Analysis in Engineering
Fall. 4 credits. Prerequisite: first-year calculus. J. R. Sedinger.
An introduction to probability theory and statistical techniques, with examples from civil, environmental, agricultural, and related disciplines. The course covers data presentation, probability theory, commonly used probability distributions describing natural phenomena and material properties, parameter estimation, confidence intervals, hypothesis testing, simple linear regression, and nonparametric statistics. Examples include structural reliability, and models of vehicle arrivals.

CEE 309 Special Topics in Civil and Environmental Engineering
Fall, spring. 1–6 credits. Staff.
Supervised study by individuals or groups of upper-division students on an undergraduate research project or on specialized topics not covered in regular courses.

CEE 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.

CEE 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.

CEE 501 Civil and Environmental Engineering Design Project I
Fall. 3 credits. Required for students in the M.Eng.(Civil) program. Staff.
Design of major civil engineering project. Planning and preliminary design in fall term; final design in January intersession (CEE 502).

CEE 502 Civil and Environmental Engineering Design Project II
Spring. (work required during January intersession). 3 credits. Required for students in the M.Eng.(Civil) program. Prerequisite: CEE 501. Staff.
A continuation of CEE 501.

CEE 503 Professional Practice in Engineering
Spring. 3 credits. Required for and limited to students in the M.Eng.(Civil) program. Staff.
Financial, legal, regulatory, ethical, and business aspects of engineering practice are examined in detail. Students are expected to develop their understanding of the interrelations among the physical, social, economic, and ethical constraints on engineering design.

CEE 504 Environmental Law and Regulation
Spring. 3 credits. W. G. Sell.
The course is designed to provide an overview of environmental law, emphasizing aspects relevant to civil and environmental engineering. The focus is on issues of water supply, water pollution control, waste management and environmental remediation. This course is geared to students participating in the environmental management concentration. Class size will be limited to 25 students.

CEE 601 Water Resources and Environmental Engineering Seminar
Fall. 1 credit.
Presentation of topics of current interest.

Remote Sensing

CEE 411 Remote Sensing: Environmental Applications (also SCAS 461)
Spring. 3 credits. Prerequisite: permission of instructor. Staff.
A survey of how remote sensing and resource inventory methods are 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, invent, and monitor environmental resources.

CEE 611 Remote Sensing Fundamentals (also SCAS 660)
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1997–98.
W. D. Phlipot.
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 aquisition; 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. Not offered 1997–98; next offered 1998–99.
W. D. Phlipot.
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. Assignments will require the use of image-processing software and graphics.

CEE 617 Project—Remote Sensing
On demand. 1–6 credits. W. D. Phlipot.
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. Phlipot.
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 710 Research—Remote Sensing
On demand. 1–6 credits. W. D. Phlipot.
For students who want to work on one particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design procedures.

CEE 810 Thesis—Remote Sensing
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term. W. D. Phlipot.
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.

Environmental and Public Systems

See also CEE 113, CEE 120, CEE 241, CEE 304, and CEE 597.

CEE 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.

CEE 423 Environmental Quality Systems Analysis
Spring. 3 credits. Prerequisites: MATH 294 and systems (CEE 323). Intended for undergraduates who have not taken OR&IE 520 or ARME 475. Most lectures concurrent with CEE 623.
C. A. Shoemaker.
Applications of optimization, simulation methods, and uncertainty analysis to the design and operation of facilities for managing the quality of surface and ground water. See CEE 623 for a description of environmental applications. CEE 423 students do additional work on optimization fundamentals and do not do the CEE 623 main design project.

CEE 528 Public Political Economy (also ECON 539)
Spring. 4 credits. R. E. Schuler.
For description, see ECON 539.
CEE 529 Water and Environmental Resources Problems and Policies
Spring. 3 credits. Intended primarily for graduate engineering and non-engineering students but open to qualified upperclass students. Prerequisite: permission of instructor. J. Allee and L. B. Dworsky.
Evaluation, appraisal, and prospects for problems involving water and environmental resources. Organization and public policies in the federal system.

CEE 620 Water-Resources Systems I
Fall. 3 credits. Prerequisite: CEE 529 or equivalent. D. P. Loucks.
Development and application of deterministic and stochastic optimization and simulation models for water-resources planning and management. 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 Water-Resources Systems II: Stochastic Hydrology
Spring. 3 credits. Prerequisites: CEE 304 and 620 or permission of instructor. Not offered 1997-98 and 1998-99.
Course examines statistical, time series, and stochastic optimization methods used to address water resources problems. Statistical issues include maximum likelihood, and moments estimations, censored datasets and historical information; probability plotting; Bayesian inference, index flood methods; ARMA models; multivariate stochastic flow models; stochastic simulation; and reservoir-operation optimization models.]

CEE 623 Environmental Systems Engineering
Spring. 3 credits. Prerequisites: MATH 294 and optimization (ABEN 475, or ORIE 320/520) and probability and statistics (CEE 304 or ORIE 270), or permission of instructor. C. A. Shoemaker.
Applications of optimization, simulation methods, and uncertainty analysis to the prevention and remediation of pollution. Applications include regional waste and wastewater treatment, restoration of dissolved oxygen levels in rivers, and reclamation of contaminated groundwater. Applications use linear programming, integer, dynamic, nonlinear programming, and sensitivity analysis.

CEE 628 Environmental and Water Resources Systems Analysis Seminar
Spring. 1 credit. Prerequisite: permission of instructor. Staff.
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 729 Special Topics in Environmental or Water Resources Systems Analysis
On demand. 1-6 credits. Staff. Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

CEE 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.

Fluid Mechanics and Hydrology
See also CEE 241 and CEE 655.

CEE 331 Fluid Mechanics
Fall, usually offered in summer for Engineering Co-op Program. 4 credits. Prerequisite: ENGRD 202 (may be taken concurrently). W. H. Brutsaert.
Hydrostatics, the basic equations of fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulent and transitional analyses, open-channel flow. Elements of design in water supply systems, canals, and other hydraulic schemes.

CEE 432 Hydrology
Fall. 3 credits. Prerequisite: CEE 331. M. L. Weber-Shirk.
Application of fluid-mechanical principles to problems of engineering practice and design-hydraulic machinery, water-distribution systems, open-channel design, river engineering, groundwater flow, and pollutant dispersal. Lectures supplemented by laboratory work and a design project.

CEE 431 Geohydrology (also GEO 445 and ABEN 471)
Fall. 3 credits. L. Cathles, W. H. Brutsaert.
Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, ground water hydrodynamics, soil water, and solute transport.

CEE 432 Hydrology
Spring. 3 credits. Prerequisite: CEE 331.
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.

CEE 435 Coastal Engineering
Fall. 3 credits. Prerequisite: CEE 331. P. L. -F. Liu.
Introduction to wave water phenomena, including wave generation, shoaling, refraction, diffraction, and breaking. Applications of wave phenomena to engineering design problems such as forces on coastal structures and beach erosion in coastal zones. Lectures supplemented by four laboratory assignments and a design project.

CEE 630 Advanced Fluid Mechanics
Fall. 3 credits. Prerequisite: CEE 331.
Introduction to tensor analysis; conservation of mass, momentum, and energy. Rigorous treatment includes study of exact solutions of the Navier-Stokes equations. Asymptotic approximations at low and high Reynolds numbers. Similitude and modeling. Laminar diffusion of momentum, mass, and heat.

CEE 631 Flow and Contaminant Transport Modeling in Groundwater
Spring. 3 credits. Prerequisites: MATH 294 or equivalent. D. P. Loucks.

CEE 632 Hydrology
Spring. 3 credits. Prerequisite: CEE 331. 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. Physical and statistical prediction methods for design related to hydrologic processes. Hydro meteorology and evaporation. Infiltration and base flow. Surface runoff and channel routing. Linear and nonlinear hydrologic systems. Storage routing and unit 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, movable displacement; transient seepage in unsaturated materials.

CEE 634 Boundary Layer Meteorology
Fall. 3 credits. Prerequisite: CEE 331 or permission of instructor. Not offered 1997-98. 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
Spring. 3 credits. Prerequisite: CEE 435 or equivalent. 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. Prerequisite: CEE 655 or permission of instructor. Offered alternate years. Not offered 1997-98. Staff.
Mass- and heat-transport processes in the environment and their interaction with pollutant discharges. Mechanics of discretely and continuously stratified fluids, internal

CxEE 638 Hydraulics Seminar
Spring. 1 credit. Open to undergraduates and graduates and required of graduate students majoring in hydraulics or hydraulic engineering. P. L. - F. Liu. Topics of current interest in fluid mechanics, hydraulic engineering, and hydrology.

CxEE 639 Special Topics in Hydraulics
On demand. 1-6 credits. Staff. Special topics in fluid mechanics, hydraulic engineering, or hydrology.

CxEE 732 Computational Hydraulics
Fall. 3 credits. Prerequisite: elementary fluid mechanics or permission of instructor. Offered alternate years. Offered 1997. Staff. Numerical methods for solving hydraulics and fluid-mechanics problems. Solutions for elliptic, parabolic, and hyperbolic equations. Finite-difference, finite-element, and boundary-integral methods.

CxEE 735 Research in Hydraulics
On demand. 1-6 credits. Staff. The student may select an area of investigation in fluid mechanics, hydraulic engineering, or hydrology. The work may be either experimental or theoretical in nature. Results should be submitted to the instructor in charge of the form of a research report.

CxEE 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 eventually independently or in conjunction with others working on the same topic.

Geotechnical Engineering

CxEE 341 Introduction to Geotechnical Engineering

CxEE 640 Foundation Engineering
Fall. 3 credits. Prerequisite: CxEE 341. F. H. Kulhawy. Soil exploration, sampling, and in-situ testing techniques. Bearing capacity, stress distribution, and settlement. Design of shallow and deep foundations. Compaction and site preparation. Seepage and dewatering of foundation excavations.

CxEE 641 Retaining Structures and Slopes
Spring. 3 credits. Prerequisite: CxEE 341. T. D. O'Rourke. Earth pressure theories. Design of rigid, flexible, braced, tied-back, slurry, and reinforced soil structures. Stability of excavations, cut, and open cut. Design problems stressing application of course material under field conditions of engineering practice.

CxEE 643 Pavement Engineering (also ABEN 692)
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: CxEE 341 or equivalent. T. D. O'Rourke. Principles of hydrogeology, contaminant migration, and introduction to technologies related to geotechnical and environmental engineering. Emphasis 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.

CxEE 648 Seminar in Geotechnical Engineering
Fall, spring. 1 credit. Staff. Presentation and discussion of topics in current research and practice in geotechnical engineering.

CxEE 649 Special Topics in Geotechnical Engineering
On demand. 1-6 credits. Staff. Supervised study of special topics not covered in the formal courses.

CxEE 740 Engineering Behavior of Soils
Fall. 3 credits. Prerequisite: CxEE 341. Offered 1997-98 and 1998-99. H. E. Stewart. Detailed study of the physicochemical nature of soil. Stress states due to geostatic loading and stress-history effects. In-depth evaluation of stress-strain-strength, compressibility, and hydraulic conductivity of natural soils. Field-testing methods for determining properties based on laboratory testing. Laboratory sessions include in-situ field testing, simple index tests, and complete laboratory characterization of important soil properties.

CxEE 741 Rock Engineering
Spring. 3 credits. Prerequisite: CxEE 341 or permission of instructor. Recommended: ENGRD 202. Staff. Geological and engineering classifications of intact rock, discontinuities, and rock masses. Laboratory and field evaluation of properties. Stress states and stress analysis. Design of foundations on, and openings in, rock masses. Analysis of the stability of rock slopes.

CxEE 744 Advanced Foundation Engineering
Spring. 2 credits. Prerequisite: CxEE 640. Offered 1997-98, not offered 1998-99. F. H. Kulhawy. A continuation of CxEE 640, with detailed emphasis on special topics in soil-structure interaction. Topics typically include lateral and pullout loading of deep foundations, pile group behavior, foundations for offshore structures, foundations for special structures.

CxEE 745 Soil Dynamics
Spring. 3 credits. Prerequisite: permission of instructor. H. E. Stewart. Study of soil behavior under dynamic loading conditions. Foundation design for vibratory loadings. Introductory earthquake engineering including field and laboratory techniques for determining dynamic soil properties and liquefaction potential. Design of embankments and retaining structures under dynamic loading conditions. Laboratory experiments and demonstrations using resonant column and a range of cyclic testing equipment.

CxEE 746 Embankment Dam Engineering

CxEE 749 Research in Geotechnical Engineering
On demand. 1-6 credits. Staff. For the student who wants to pursue a particular geotechnical topic in considerable depth.

CxEE 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.

Environmental Engineering

CxEE 351 Environmental Quality Engineering
Spring, usually offered in summer for Engineering Co-op Program. 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 water and wastewater treatment.

CxEE 352 Water Supply Engineering

CxEE 453 Laboratory Research in Environmental Engineering
Spring. 3 credits. Prerequisites: CHEM 253, BIOMI 290, 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.

C.E.E. 651 Microbiology for Environmental Engineering
Fall. 2 credits. Prerequisite: one semester of college chemistry. J. M. Gossett.
A self-paced autotutorial introduction to fundamental aspects of microbiology, organic chemistry, and biochemistry pertinent to environmental engineering. Course work consists of assigned readings, study questions, and brief exams.

C.E.E. 652 Water Chemistry for Environmental Engineering
Fall. 3 credits. Prerequisite: one 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.

C.E.E. 654 Aquatic Chemistry
Spring. 3 credits. Prerequisite: CEE 653 or CHEM 287-288 J. J. Bisogni.
Concepts of chemical equilibrium applied to natural aquatic systems. Topics include acid-base reactions, buffer systems, precipitation, coordination and redox reactions, Eh-pH diagrams adsorption phenomena, humic acid chemistry, and chemical-equilibrium computational techniques. In-depth coverage of topics covered in CEE 653.

C.E.E. 655 Pollutant Transport and Transformation in the Environment
Fall. 3 credits. Prerequisite: CEE 331 J. J. Bisogni.
Introduction to the physical transport and chemical and biochemical transformation processes that govern the fate and distribution of pollutants in the environment.

CEE 658 Sludge Treatment, Utilization, and Disposal
Spring. 3 credits. Prerequisite: CEE 352 or permission of instructor. Not offered 1997-98. R. I. Dick.
Analysis of the quantity and quality of residues produced from municipal and industrial water-supply and pollution-control facilities and other residue-producing processes. Alternatives for reclaiming or disposing of hazardous and nonhazardous residues. Performance of treatment processes for altering sludge properties prior to reuse or ultimate disposal. Considerations in selecting and integrating of sludge-management processes.

CEE 659 Environmental Quality Engineering Seminar
Spring. 1 credit. Prerequisite: enrollment as graduate student in environmental engineering. Staff.
Presentation and discussion of current research and design projects in environmental engineering.

C.E.E. 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.E.E. 755 Environmental Engineering Processes I
Fall. 3 credits. Prerequisite: previous or concurrent enrollment in CEE 653 or permission of instructor. J. M. Gossett.
Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in receiving waters. Biokinetic analysis and design of biological treatment processes.

C.E.E. 756 Environmental Engineering Processes II
Spring. 3 credits. Prerequisites: CEE 651 and 755, or permission of instructor. J. M. Gossett.
Theoretical and engineering aspects of biological phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in receiving waters. Analysis and design of treatment processes and systems.

C.E.E. 757 Environmental Engineering Processes Laboratory I
Fall. 2 credits. Prerequisite: concurrent enrollment in CEE 653 and CEE 755. J. J. Bisogni.
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; coagulation.

C.E.E. 758 Environmental Engineering Processes Laboratory II
Spring. 2 credits. Prerequisite: CEE 651 and concurrent enrollment in CEE 756. J. J. Bisogni.
Laboratory studies of microbiological phenomena and environmental engineering processes. Topics include microscopy; biochemical and chemical oxygen demand; biological treatability studies; enumeration of bacteria.

C.E.E. 759 Special Topics in Environmental Engineering
On demand. 1-6 credits. Staff.
Supervised study in special topics not covered in formal courses.

C.E.E. 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.
 Structural Engineering
See also CEE 116, CEE 241, CEE 304, and CEE 595.

CEE 371 Structural Behavior
Spring. 4 credits. Prerequisite: ENGRD 202. Staff.

CEE 372 Structural Analysis
Fall; usually offered in summer for Engineering Co-op Program. 4 credits. Prerequisite: CEE 371. J. Abel.

CEE 473 Design of Concrete Structures
Fall. 4 credits. Prerequisites: CEE 372 or permission of instructor. K. Hover.
Behavior and design of reinforced concrete and prestressed concrete structures. Design project.

CEE 474 Design of Steel Structures
Spring. 4 credits. Prerequisite: CEE 372 or permission of instructor. T. Pekoz.
Behavior and design of steel members, connections, and structures. Discussion of structural systems for buildings and bridges.

CEE 477 Civil Engineering Materials
Spring. 4 credits. Prerequisite: ENGRD 202, ENGRD 261, PHYS 214 and CEE 371 (CEE 371 may be taken concurrently). P. Petrina.
Mechanical properties of concrete, metals, masonry, plastics, wood, and other structural materials. Stress-strain behavior and failure criteria. Nondestructive and destructive testing techniques for the evaluation of structures and the quality control of materials. Laboratory experiments.

CEE 672 Fundamentals of Structural Mechanics
Fall. 3 credits. M. D. Grigoriu.
Theory of elasticity, energy principles, plate flexure, failure theories for structural design, beams on elastic foundation, finite-difference method, plate theory, introduction to finite-element method.

CEE 673 Advanced Structural Analysis
Fall. 3 credits. Prerequisites: CEE 372 and computer programming. G. G. Deierlein.
Matrix analysis of structures, computer programming of displacement (stiffness) method, use of interactive graphical analysis programs, solution methods, errors and accuracy, special analysis procedures, virtual work in matrix analysis, and introduction to nonlinear analysis and finite-element methods.

[CEE 675 Concrete Materials and Construction]
Spring. 3 credits. Prerequisite: CEE 376 or equivalent. Offered alternate years. Not offered 1997–98. K. C. Hover.
Materials science, structural engineering, and construction technology involved in the materials aspects of the use of concrete. Cement chemistry and physics, mix design, admixtures, engineering properties, testing of fresh and hardened concrete, and the effects of construction techniques on material behavior.

CEE 677 Stochastic Mechanics
Fall. 3 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1998–99; offered 1997–98. M. D. Grigoriu.
Review of concepts of probability theory, random processes, and random fields. Analytical and numerical methods for reliability analysis. Methods for solution of random eigenvalue problems, equilibrium of uncertain systems and systems with random imperfections, and propagation problems in stochastic systems. Applications include stochastic finite elements, probabilistic fracture mechanics, and dynamic Daniels systems.

CEE 680 Structural Engineering Seminar
Fall, spring. 1 credit. Limited to qualified seniors and graduate students. M. Grigoriu.
Presentation of topics of current interest in the field of structures.

[CEE 770 Engineering Fracture Mechanics]
Fall. 3 credits. Prerequisite: CEE 772 or permission of instructor. Offered alternate years. Offered 1998–99; not offered 1997–98. A. R. Ingraffea.

CEE 772 Finite Element Analysis for Mechanical, Structural, and Aerospace Applications (also T&M 666 and M&E 680)
Spring. 3 credits. Prerequisite: T&M 665.
For description, see M&E 680.

CEE 774 Advanced Concrete Structures I
Fall. 3 credits. Prerequisite: undergraduate course in concrete structures. S. L. Billington.
Role of material properties in structural performance; design code philosophies; behavior and design of reinforced and prestressed concrete structural sections; deflection prediction and control for RC and PC structures including load balancing for PC structures; continuity effects; serviceability issues; behavior and design of RC and PC slab systems; plastic truss (static failure) approach for torsion and shear; building framing systems.

CEE 775 Advanced Concrete Structures II
Spring. 3 credits. Prerequisite: CEE 774 or equivalent. Not offered 1997–98. Structural walls expressed in plastic truss approach to frame connections, corbels, brackets, and deep beams; anchorage behavior in PC beams; slender columns and biaxial bending; ductility and its enhancement for resisting severe loadings; composite construction, prestress loss calculations; strip method for design of slabs with unusual geometry; bridges and other structures; control of human error in design and construction.

CEE 776 Advanced Design of Metal Structures
Fall. 3 credits. Prerequisite: CEE 374 or equivalent. T. Pekoz.
Preliminary design of structural systems. Design of members and connections. Behavior and computer-aided design of building frames. Design of composite members.

[CEE 777 Advanced Behavior of Metal Structures]
Spring. 3 credits. Prerequisite: CEE 374 or equivalent. Offered 1998–99; not offered 1997–98. T. Pekoz.

CEE 779 Structural Dynamics and Earthquake Engineering
On demand. 1–6 credits. M. D. Grigoriu.
Modal analysis, numerical methods, and frequency-domain analysis. Introduction to earthquake-resistant design.

CEE 783 Civil and Environmental Engineering Materials Project
On demand. 1–3 credits. K. C. Hover.
Individual projects or reading and study assignments involving engineering materials.

CEE 785 Research in Structural Engineering
On demand. 1–6 credits. Staff. Pursuit of a branch of structural engineering beyond what is covered in regular courses. Occasional offering of such special courses as Shell Theory and Design, and Advanced Topics in Finite Element Analysis.

CEE 786 Special Topics in Structural Engineering
On demand. 1–6 credits. Staff. Individually supervised study or independent design or research in specialized topics not covered in regular courses. Theoretical or experimental investigation of suitable problems.

CEE 880 Thesis—Structural Engineering
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term. Staff.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.
Engineering Management

See also CEE 323 and CEE 453.

CEE 590 Project Management
Fall. 3 credits. Prerequisite: permission of instructor. M. A. Turnquist and F. J. Wayno. An introduction to the work and skills of management, especially for the management of projects. Planning, organizing, communicating, scheduling, controlling, and correcting will be covered in combination of lectures, readings, outside assignments, and in-class role-playing exercises.

CEE 591 Engineering Management Project
Fall. 3 credits. Prerequisite: permission of instructor. Staff. An intensive evaluation of the management aspects of a major engineering project or system. Most students will work on a large group project in the area of project management, but students may also work singly or in small groups on an engineering management topic of special interest to them.

CEE 592 Engineering Management Project
Spring. 3 credits. Prerequisite: permission of instructor. Staff. A continuation of CEE 591.

CEE 593 Engineering Management Methods I: Data, Information, and Modeling
Fall. 3 credits. Prerequisites: OR&IE 320 and OR&IE 270 or CEE 304 or equivalent. Staff. Methods for managing data and transforming data into information. Modeling as a means to synthesize information into knowledge that can form the basis for decisions and actions. Application of statistical methods and optimization to managerial problems in project scheduling, quality control, forecasting, and resource allocation.

CEE 594 Engineering Management Methods II: Managing Uncertain Systems
Spring. 3 credits. Prerequisite: CEE 593 or permission of instructor. L. K. Nozick. Modeling and managing systems in which uncertainty is a major determinant of system behavior. Systems which are subject to breakdown, deterioration and queuing. Simulation as a tool for analyzing uncertain systems. Projects and case studies to illustrate application of the methods.

CEE 595 Construction Planning and Operations
Fall. 3 credits. F. L. Bennett. A course on the fundamentals of construction planning: organization of the worksite, 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: CEE 304 or OR&IE 270 or equivalent. J. R. Stedinger. Course develops a working knowledge of risk terminology and reliability engineering, analytic tools used to analyze environmental and technological risks, and social and psychological risk issues. Discussions address life risks in the U.S., transportation risks, waste incineration, air pollution modeling, public health, regulatory policy, risk communication, and risk management.

CEE 692 Special Topics in Engineering Management
On demand. 1-6 credits. Staff. Individually supervised study of one or more specialized topics not covered in regular courses.

CEE 694 Research in Engineering Management
On demand. 1-6 credits. Staff. The student may select an area of investigation in engineering management. Results should be submitted to the instructor in charge in the form of a research report.

COMPUTER SCIENCE

The Department of Computer Science is part of both the College of Arts and Sciences and the College of Engineering.

COM S 099 Fundamental Programming Concepts
Fall, summer. 2 credits. No prerequisites. S-U grades only. Credit cannot be applied toward the Engineering degree. 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. The programming language used is Java. Students with previous programming experience 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. The subject of the course is programming, not a particular programming language. The principal programming language is Java. COM S 100 also includes a brief introduction to Matlab. The course does not presume previous programming experience. Programming assignments are tested and run on interactive, stand-alone microcomputers. During the fall semester, two versions of COM S 100 are available as described below.

COM S 100a Introduction to Computer Programming
Standard version of COM S 100. No college-level mathematics is assumed. Register for COM S 100.

COM S 100b Introduction to Computer Programming
Prerequisite: MATH 111, 191 or equivalent. Offered fall only. Alternative version of COM S 100, emphasizing examples and applications involving continuous mathematics, including trigonometry and calculus. Register for COM S 100. COM S 100b is not always available at all COM S 100 lecture hours.

COM S 101 Introduction to Cognitive Science (also COGST 101, LING 170, and ENGRD 102)
Fall. 3 credits. This course surveys the study of how the mind/brain works. We will examine how intelligent information processing can arise from biological and artificial systems. The course draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology, neuroscience, linguistics, and computer science. The first part of the course will introduce the roles played by these disciplines in cognitive science. The second part of the course will focus on how each of these disciplines contributes to the study of five topics in cognitive science: language, categorization, memory, vision, and action.

COM S 113 Introduction to C
Fall, spring. 1 credit. Weeks 5-8. Prerequisite: COM S 100 or equivalent programming experience. Credit is granted for both COM S 113 and 215 only if 113 is taken first. S-U grades only. A brief introduction to the C programming language and standard libraries. Unix accounts will be 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, spring. 1 credit. Weeks 1-4. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only. An introduction to Unix, including shell commands, emacs, the file system, and software tools like grep, find, make, awk, and perl. Knowledge of some programming language like Java, C, C++, Pascal, or Fortran is expected, but projects will not assume expertise in any particular language.

COM S 130 Creating Web Documents
Fall. 3 credits. Interactive on-line media such as the World Wide Web are revolutionizing the way we communicate. This course introduces students with little or no computer background to tools and techniques for creating interactive documents. Topics covered will include HTML authoring, scripting languages, interaction techniques, data mining, and incorporating sound, video, and images in documents.

COM S 211 Computers and Programming (also ENGRD 211)
Fall, spring, summer. 3 credits. Credit will not be granted for both ENGRD/COM S 211 and 212. Prerequisite: COM S 100 or equivalent programming experience. Intermediate programming in a high-level language and introduction to computer science. Topics include program structure and organization, modules (classes), program development, proofs of program correctness, recursion, data structures and types (lists, stacks, queues, trees), object-oriented and functional programming, and analysis of algorithms. Java is the principal programming language.

COM S 212 Structure and Interpretation of Computer Programs (also ENGRD 212)
Fall, spring. 4 credits. Credit will not be granted for both ENGRD/COM S 211 and 212. Prerequisite: COM S 100 or equivalent programming experience. A challenging introduction to programming languages and computer science that emphasizes alternative modes of algorithmic expression. Topics include recursive and
higher-order procedures, performance analysis of algorithms, proofs of program correctness, probabilistic algorithms, symbolic hierarchical data, abstract data types, polymorphic functions, object-oriented programming, infinite data types, simulation, and the interpretation of programs.

ENGRD/COM S 212 covers a wide range of topics in computer science and programming using advanced functional and object-oriented programming languages. ENGRD/COM S 211 focuses on strengthening programming skills in a more conventional programming language (Java), while still introducing important topics in computing. Either course is a suitable prerequisite for further study in the field. Appropriate transfers between ENGRD/COM S 211 and 212 (in either direction) are encouraged during the first few weeks of the semester.

**COM S 213 C++ Programming**
Fall, spring. 2 credits. Prerequisite: COM S 211 or 212 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++ 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 222 Introduction to Scientific Computation (also ENGRD 222)**
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 numerical solution of differential equations. The Matlab computing environment is used. Vectorization, efficiency, reliability, and stability are stressed. Special lectures on parallel computation.

**COM S 280 Discrete Structures**
Fall, spring. 4 credits. Prerequisite: COM S 211 or 212 or permission of instructor.

Covers mathematical aspects of programming and computing. Topics will be chosen from the following: mathematical induction; logical proof; propositional and predicate calculus; combinators and discrete mathematics; 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 314 Introduction to Digital Systems and Computer Organization**
Fall, spring. 4 credits. Prerequisite: COM S 211 or 212, or equivalent.

Introduction to computer organization. Topics include representation of information, machine code, instructions, processor organization, input/output devices, memory hierarchies, combinatorial and sequential circuits, data path and control unit design, and RISC pipelining. The course features several major projects, including a full RISC processor design.

**COM S 381 Introduction to Theory of Computing**
Fall, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.

Credit will 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 modern theory of computing: automata theory, formal languages, and effective computability.

**COM S 400 The Science of Programming**
Spring. 4 credits. Prerequisite: COM S 280 or equivalent. Not offered every year; next offered spring 1998.

The practical development of correct programs based on the conscious application of principles that are derived from a mathematical notion of program correctness. Besides dealing with conventional sequential programs, the course covers implementations of abstract data types and introduction to problems with concurrency. Issues in programming-language design that arise from program correctness are discussed. Programs are written but not run on a computer.

**COM S 410 Data Structures**
Fall, spring, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.

Lists, trees, graphs, arrays, and other forms of data structure and their implementation. Relationship between language and data structure, emphasizing abstract data types. Dynamic storage allocation and memory management. Detailed study of searching and sorting methods. Analysis to determine the more efficient algorithm in a given situation.

**COM S 411 Programming Languages and Logics**
Fall. 4 credits. Prerequisite: COM S 410 or permission of instructor. Not offered every year; semester to be announced.

The major concepts of programming languages, with emphasis on synthesis and interpretation. Language-based programming methodologies, including object-oriented, functional, and logic programming. Design and criticism of programming languages. Type theory and typed lambda-calculus. Exercises in several unusual programming languages.

**COM S 412 Introduction to Compilers and Translators**
Spring. 3 credits. Prerequisites: COM S 314, 381, 410. Corequisite: COM S 413.

Overview of the internal structure of modern compilers, with emphasis on implementation techniques. Topics covered include lexical scanning, simple parsing techniques, symbol-table manipulation, type-checking routines, code generation, and simple optimizations. The course entails a compiler implementation project.

**COM S 413 Practicum in Compilers and Translators**
Spring. 2 credits. Prerequisites: COM S 314, 381, 410. Corequisite: COM S 412.

A compiler implementation project related to COM S 412.

**COM S 414 Systems Programming and Operating Systems**
Fall, summer. 3 credits. Prerequisite: data. COM S 314 or permission of instructor.

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. 2 credits. Prerequisite: COM S 410. 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 417 Computer Graphics and Visualization (also ARCH 374)**
Spring. 3 credits. Prerequisite: COM S 211 or 212.

An introduction to the principles of interactive computer graphics and scientific visualization. Topics include surface modeling, animation, perspective transformations, hidden-line and hidden-surface algorithms, lighting models, image synthesis, and application to scientific data analysis.

**COM S 418 Practicum in Computer Graphics (also ARCH 375)**

Programming assignments dealing with interactive computer graphics and visualization of scientific data.

**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 432 Introduction to Database Systems**
Fall. 3 credits. Prerequisites: (ENGRD/COM S 211 or 212) and COM S 410. Recommended: COM S 213.

Introduction to modern relational database systems. Concepts covered include database design theory, query languages, storage structures, access methods, query processing and optimization.

The course primarily covers the internals of database systems, and includes an implementation project.

**COM S 433 Practicum in Database Systems**
Fall. 2 credits. Corequisite: COM S 432.

Students will implement a simple relational database system with coding assignments ranging from disk management to high-level query processing. This provides a thorough understanding of database system internals.
COM S 444 Distributed Systems and Algorithms
Fall. 4 credits. Prereq. or co-requisite: COM S 414 or permission of instructor. Not offered every year; next offered fall 1997.

The fundamentals of distributed systems and algorithms. Topics include the problems, methodologies and paradigms necessary for understanding and designing distributed applications, with an emphasis on fault-tolerant computing. Theoretical concepts will be complemented with practical examples of their application in current distributed systems.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: (COM S 211 or COM S 212) 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. Prerequisite: (COM S 211 or COM S 212) and COM S 280 or equivalent. Corequisite: COM S 472. Project portion of COM S 472. Topics include Common LISP programming, representation systems, deductive retrieval, databases and frame languages, and truth-maintenance-system implementations.

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 410 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 488 Applied Logic (also MATH 488)
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: Technology and Technique
Fall. 4 credits. Prerequisite: COM S 410 and knowledge of the C programming language.

An introduction to the problems of building large, reliable software systems and the methods, languages, and tools used in modern software development. Topics include software life-cycle models, software analysis and design, verification and validation, reliability, engineering ethics and professionalism. Programming topics include modularity, data abstraction, object-oriented programming, and effective use of C++. General techniques will be complemented with programming experience using industrial-strength languages and tools.

COM S 514 Distributed Systems
Fall or spring. 4 credits. Prerequisites: COM S 414 or permission of instructor. Practical issues in designing and implementing distributed software. Topics include local and wide-area network protocols, replicated data, dynamic reconfiguration, monitoring for and reacting to failures or recoveries, distributed computation, synchronization, and techniques for expressing coarse-grained parallelism at the application level.

COM S 515 Practicum in Distributed Systems
Fall or spring. 1-2 credits. Co-requisite: COM S 514.

The practical aspects of distributed systems are studied through the design and implementation of a significant system. Students may work alone or in teams. The project varies from year to year, at the discretion of the instructor.

COM S 516 High-performance Computer Architecture
Spring. 4 credits. Prerequisite: COM S 314 required; COM S 412 or 414 highly recommended.

Introduces techniques used in high-performance computer architecture. Covers pipelining of instruction execution to superscalar, superpipelined, and speculative architectures; memory system design, including caches, operating system support in the form of naming and protection schemes; introduction to parallel architectures.

COM S 519 Engineering Computer Networks
Fall. 4 credits. Prerequisites: COM S 214, 314, and 410, or permission of instructor.

Introduction to telephone, IP, and ATM networks. Techniques for system design and protocol layers. Detailed introduction to networking protocols in the areas of multiple access, switching, scheduling, routing, naming and addressing, error control, flow control, and traffic management. Overview of important protocols in the Internet and telephone networks. Protocol implementation techniques. The course is project-oriented and requires familiarity with C programming.

COM S 522 Software Tools for Computational Science
Spring. 4 credits. Prerequisites: a numerical analysis course such as COM S 222 or 421) or PHYS 480; willingness to work in Matlab and C or Fortran; interest in mathematics and the natural sciences. Not offered every year; semester to be announced.

Hands-on exploration of some of the principal software tools of computational science in use today. The course is divided into two-week segments: problem-solving environments, symbolic computing, software libraries, visualization, parallel computing, program transformations, and Web-based computing. Scientific themes are emphasized throughout, so that the ideas explored in the course may be of lasting value even if some of the particular tools used are destined to be short-lived.

COM S 572 Introduction to Automated Reasoning
Spring. 3 credits.

This course teaches the use of a modern theorem proving system such as Nuprl or PVS or HOL. It covers the underlying logic as well as system operation and style of use. Assignments and projects require the use of these systems on typical problems in software or hardware engineering and on the issues arising in creating a database of formalized mathematics.

COM S 601 System Concepts
Fall. 3 credits. Prerequisites: Open to students enrolled in the COM S Ph.D. program.

This course teaches broadly applicable principles of computing system design and analysis. For example, the principle of locality of reference used in caching, virtual memory, and network service hints. Such broadly applicable abstractions will be discussed along with their implementations in a variety of settings. Case studies from the systems literature will be employed throughout.

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.


COM S 613 Concurrent Programming
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.

Not offered every year; semester to be announced.

Advanced techniques in, and models of, concurrent systems. Synchronization of
concurrent processes; parallel programming languages; deadlock; verification.

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 mechanisms, consistency in distributed systems, fault-tolerance, knowledge and knowledge-based protocols, performance, scheduling, concurrency control, and authentication and security issues.

COM S 618 Principles of Distributed Computing Message-Passing
Fall. 4 credits. Prerequisite: COM S 444 or permission of instructor.
This course focuses on research in message-passing distributed computing. It covers the fundamental problems and presents some of the latest results and open questions in message-passing systems. Problems will be viewed from a theoretical standpoint with an emphasis on precise specifications, proofs of correctness, upper and lower bounds on various complexity measures and impossibility results.

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 in odd-numbered years. Not offered 1997-98.
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. Previous exposure to numerical analysis, mathematical analysis including Fourier methods, and differential equations. Offered in even-numbered years.
Finite difference and spectral methods for the solution of 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, the treatment of boundary conditions, and modified methods. This course combines theory and programming (in Matlab), emphasizing fundamental principles more than applications.

COM S 631 Multimedia Systems
Fall. 4 credits. Prerequisites: COM S 414 or permission of instructor.
Hardware and software issues involved in computer manipulation of audio, video, and images. Topics include media capture, representation, compression, editing, processing, storage, and transportation.
Introduction of the personal computer as a laboratory aid. Technical report writing and communication skills.

ELE E 232 Practicum in Digital Systems
Fall and spring. 1 credit. Pre- or co-require: ENGRD 231. Laboratory projects in the design and implementation of combinational and sequential digital systems for computations, communications, and information distribution.

ELE E 250 Technology in Society (also ENGRG 250 and S&T S 250)
Fall. 3 credits. Approved for humanities distribution. For description, see ENGRG 250.

ELE E 291–292 Sophomore Electrical Engineering Project
291, fall; 292, spring. 1–8 credits. Limited to sophomores 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.

ELE E 298 Inventing the Power and Information Society (also ENGRG 298)
Spring. 3 credits. Approved for humanities distribution. For description, see ENGRG 298.

ELE E 301 Electrical Signals and Systems I
Fall. 3 credits. Prerequisites: a grade of at least C+ in ENGRD 210 and C in MATH 293 and 294. Continuous- and discrete-time signals and systems; Fourier series and transforms; bilateral Laplace and z transforms; convolution; FFTs and DFTs; applications to modulation, filtering, and sampling.

ELE E 302 Introduction to Digital Signal Processing
Spring. 4 credits. Prerequisite: ELE E 301. The use of digital technology to store, change, and create sounds and pictures, digital signal processing (DSP), one of the most significant technological developments in the last half-century. This course presents the mathematical concepts necessary to develop a clear and intuitive understanding of the key concepts in DSP. These include sampling, quantization, Fourier analysis, and digital filtering.

ELE E 303 Electromagnetic Fields and Waves
Fall. 3 credits. Prerequisites: grades of C or better in PHY 213, 214 and MATH 294; Maxwell’s equations in integral and differential form; wave equation; plane electromagnetic waves; phase and group velocities; Poynting’s theorem, complex dielectric constant, dispersive media, wave reflection and transmission; dielectric and conducting interfaces, guided waves on transmission lines; transient pulse propagation; elementary dipole antenna.

ELE E 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits. Prerequisites: PHYS 214 and MATH 284. 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.

ELE E 308 Fundamentals of Computer Engineering
Spring. 4 credits. Prerequisite: ENGRD 231, ELE E 232 and ENGRG/COM S 211. This course provides a fundamental understanding of computer systems, including their integration into embedded systems. Topics covered include assembly language programming, machine code generated by compilers, high-level language data structures, computer organization, CISC and RISC computer architectures, floating point arithmetic, I/O, and memory hierarchy.

ELE E 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. It can then also meet a field breadth requirement if 3 additional credits of field approved or out-of-field elective are taken. 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. Applications will be given in such areas as communications, and device modeling, probability, characteristic functions; nonlinear transformations of data; expectation, correlation, and the central limit theorem.

ELE E 311 Electrical Engineering Honors Seminar
Spring. 2 credits variable. Students registered for this course are required to attend all of the colloquia lectures. Concise summary papers, (maximum of three pages) are required. Honors students who take the seminar for letter grade are required to write two summary papers. Those non-honors students who take the seminar pass/fail are only required to write one summary paper. Each paper may review any of the topics presented during the term.

ELE E 315 Electronic Circuit Design
Fall. 4 credits. Prerequisites ELE E 210 and ELE E 215. Design of electronic circuits for computers, signal processing, communication, microelectronics, optoelectronics, measurements and control. Analog, digital, and mixed signals Design of building blocks and design with building blocks. Methodology based on estimation, hand calculation, and circuit simulation. PC based on data acquisition, analysis and simulation. Weekly laboratory sessions.

ELE E 360 Ethical Issues in Engineering (also ENGRG 360 and S&T S 360)
Spring. 3 credits. A social science elective for engineering students. For description, see ENGRG 360.

ELE E 391–392 Junior Electrical Engineering Project
391; fall; 392, spring. 1–8 credits. Limited to juniors in Engineering. Individual study and project work, 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.

**ELE E 411 Random Signals in Communications and Signal Processing**

Fall. 3 credits. Prerequisite: ELE E 301 and 310 or equivalent.

Introduction to models for random signals in discrete and continuous time. Markov chains, Poisson process, queuing processes, power spectral densities, Gaussian random process. Response of linear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems.

**ELE E 416 Global Position System Theory and Design**

Spring. 4 credits. Prerequisites: ELE E 301 and ELE E 303 or permission of the instructor. 4 design credits.

A laboratory course using the Global Positioning System as a model for examining space-based engineering systems. The course consists of lectures, laboratories, and a design project. The laboratory is based on a GPS engine development system and covers the navigation solution, receiver design and function, and differential GPS.

**ELE E 423 Computer Methods in Digital Signal Processing**

Fall. 4 credits. Prerequisite: ELE E 302.

Satisfies undergraduate computer-applications requirement.


**ELE E 425 Digital Signal Processing**

Fall. 4 credits. Prerequisite: ELE E 301 and ELE E 302.


**ELE E 426 Applications of Signal Processing**

Spring. 3 or 4 credits. Prerequisite: ELE E 425.

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.

**ELE E 430 Lasers and Optical Electronics**

Fall. 4 credits with lab; may be taken for 3 credits without lab. Prerequisite: ELE E 303 or equivalent.

An introduction to the operation of lasers and devices based nonlinear and linear optics. Material covered includes diffraction-limited optics, Gaussian beams, optical resonators, interaction of radiation with matter, physics of laser operation, laser design. Applications of coherent radiation to nonlinear optics, communication, and research will be discussed.

**ELE E 433 Microwave Integrated Circuits**

Fall. 4 credits; may be taken for 3 credits without laboratory. Prerequisites: ELE E 303 and ELE E 306.

An introduction to the design and testing of high-speed circuits (frequencies above 1 GHz). Topics include: computer-aided design, automated microwave measurement techniques, optoelectronic applications, and GaAs monolithic microwave integrated circuits. Six two-week labs cover the basics of designing, fabricating, and testing microwave integrated circuits.

**ELE E 439 VLSI Digital System Design**

Fall. 4 credits. Prerequisites: ENGRD 231, ELE E 232 and ELE 315, (See ELE E 539)

Custom CMOS VLSI design as seen by a system designer. Design and structured design methodologies for digital VLSI systems. Topics include MOS transistors, design rules for MOS integrated circuits, implementation of common digital components, clocking disciplines for VLSI, tools for computer-aided design, system design for performance, and novel architectures for VLSI systems.

**ELE E 445 Computer Networks and Telecommunications**

Fall. 3 credits. Prerequisites: ELE E 308 (or COM S 314) and a course in probability.

Design, analysis, and implementation of local area networks, wide area networks, and telecommunications systems; circuit switching, packet switching; broad band switching; protocols, asynchronous transfer mode systems.

**ELE E 451-452 Electric Power Systems I and II**

Fall '97; Spring. 3 credits each term. Prerequisite: ELE E 301.

The objective is to acquaint the student with modern electric power system operation and control. Aspects of the restructuring of the industry and its implications for planning and operation objectives and methods will be explored. Topics include unit commitment, economic dispatch, optimal power flow, control of generation, system security and reliability, state-estimation, analysis of system dynamics and system protection.

**ELE E 455-456 Integrated Circuit Design**

Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 315 or equivalent. ELE E 457 recommended as a corequisite.


**ELE E 457 Silicon Semiconductor Electronics**

Fall. 4 credits with lab. Prerequisites: ELE E 315 and ELE E 306 or equivalent.


**ELE E 467 Communication Systems I**

Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 310. Suggested co-requisite: ELE E 411.

An introduction to analog and digital modulation and demodulation techniques. Topics include: analog signal representation and filtering; analog amplitude modulation (AM) and frequency modulation (FM); digital pulse amplitude modulation (PAM), digital transmission via carrier modulation; amplitude-shift keying (ASK), phase-shift keying (PSK), quadrature amplitude modulation (QAM); fundamentals of random processes, white Gaussian noise; error probabilities of analog modulation techniques; error probabilities for digital transmission through additive white Gaussian noise (AWGN) channels.

**ELE E 468 Communication Systems II**

Spring. 4 credits. Prerequisite: ELE E 467 or permission of instructor. Suggested prerequisite: ELE E 411.

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 capacity and error control coding, digital transmission through bandlimited AWGN channels, inter-symbol interference (ISI), equalization techniques; phase-locked loops (PLL), trellis-coded modulation (TCM); spread-spectrum communication systems.

**ELE E 471 Feedback Control Systems (also M & AE 471)**

Fall. 4 credits. Prerequisite: ELE E 301 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 major mathematical tools. Design techniques include root-locus and frequency response methods. Computer-aided design laboratory examines modeling and control of a computer-simulated dynamic process.

**ELE E 472 Digital Control Systems**

Spring. 4 credits. Prerequisite: ELE E 471 or permission of instructor.

Analysis and design of feedback control systems using digital devices to implement compensation. Z-transforms and linear algebra are the major mathematical tools. Topics include: state realizations, digitizations of analog systems, least-squares system identification, state feedback control, observers, combined observer-controller, and algebraic-control design. Assignments will consist of reports on computer-aided controller design and digitally simulated evaluation.
ELE E 475 Computer Structures
Fall. 4 credits. Prerequisites: ELE E 308 or COS M 314, ENGRD 231 and ELE E 235 or permission of instructor.
Methods of designing digital computers and the hardware-software interface to the systems they function with. Topics include control sequencer and data path design, memory and I/O organization, interfacing, and interrupt hardware design. Laboratory groups will design and build a small digital computer. User-programmable logic devices will be employed for circuit implementation.

ELE E 476 Digital Systems Design Using Microcontrollers
Spring. 4 credits. Prerequisite: ELE E 308 or COS M 511 or ELE E 475 strongly recommended.
Design of real-time digital systems using microprocessor-based embedded controllers. Students working in pairs will 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 being 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. The laboratory environment is that of ELE E 475 enhanced with the integrated single-board computer based on the 80C196KB microcontroller chip. Programming is in assembly language and (optionally) C.

[ELE E 482 Plasma Processing of Electronic Materials
Spring. 3 credits. Prerequisite: ELE E 303 or its equivalent. Not offered 1997–98
Fundamentals of plasma processes govern partially ionized, chemically reactive plasma discharges and their applications to processing electronic materials. Topics include simple models of low pressure, partially ionized plasmas, collision phenomena, diffusive processes, plasma chemistry and surface processes. Examples and their applications to electronic materials processing will be discussed in detail.]

ELE E 484 Introduction to Controlled Fusion: Principles and Technology (also ASTRO 485)
Fall. 3 credits. Prerequisites: Physics through 214 or equivalent, introductory chemistry, introductory differential equations.
The structure and dynamics of the middle atmosphere and the ionosphere are surveyed. Topics include energy balance and thermal structure, global circulation patterns, ionization, production and loss of charged particles, coupling of the neutral atmosphere with electromagnetic fields, charged particle transports, and observation techniques.

ELE E 486 Electromagnetic Waves and Communication
Spring. 4 credits. Prerequisite: ELE E 303.
This course is recommended for students who wish to obtain a greater understanding of E & M aspects of the fundamentals of guided waves, high data rate electronics and wireless communication. Topics to be covered will include: Vector and scalar potentials, transmission lines, waveguides, fiber optics, antenna arrays, propagation in different environments including interference and diffraction.

ELE E 487 Introduction to Antennas and Radar
Fall. 3 credits. Prerequisites: ELE E 301 and ELE E 364 or a grade of B or better in ELE E 363.
Fundamentals of antenna theory, including gain and effective area, near and far fields, phased arrays, aperture antennas and aperture synthesis. Fundamentals of radar, including detection, tracking, Doppler shifts, sampling, range and frequency aliasing. Synthetic aperture radars and remote sensing from aircraft and satellites; over-the-horizon (OTH) radars and ionospheric propagation effects; radar astronomy techniques.

ELE E 488 RF Circuits and Systems
Spring. 3 credits. Prerequisites: ELE E 315 or equivalent. 2 design credits. Lab credit.
Basic RF circuits and applications. Receivers, transmitters, modulators, filters, detectors, transmission lines, oscillators, frequency synthesizers, low-noise amplifiers. Applications include communication systems, radio and television broadcasting, radar, radio and radar astronomy. Computer-aided circuit analysis. Five laboratory sessions.

ELE E 490 Practicum in Systems Engineering
Fall only. 3 credits. Group II Electrical Engineering Lab + 1 credit of Engineering Design.
This course is designed for seniors and graduate students. May not be offered 1997–98.
For description, see NS&IE 484.

ELE E 485 Atmospheric and Ionospheric Physics (also ASTRO 485)
Fall. 3 credits. Prerequisites: Physics through 214 or equivalent, introductory chemistry, introductory differential equations.
The structure and dynamics of the middle atmosphere and the ionosphere are surveyed. Topics include energy balance and thermal structure, global circulation patterns, ionization, production and loss of charged particles, coupling of the neutral atmosphere with electromagnetic fields, charged particle transports, and observation techniques.

ELE E 486 Electromagnetic Waves and Communication
Spring. 4 credits. Prerequisite: ELE E 303.
This course is recommended for students who wish to obtain a greater understanding of E & M aspects of the fundamentals of guided waves, high data rate electronics and wireless mechanical systems to the micrometer/nanometer scale, material issues, and the integration of microelectronic structures and actuators with simple electronics. This is an interdisciplinary course on the fundamentals of microelectronics, materials, structures, electronic systems, and the disciplines of physics and chemistry.

ELE E 494 Distribution Automation and Control for Electric Power Networks
Spring. 4 credits.
Distribution automation is a system that enables an operator to monitor, control, and operate distribution systems in a real-time mode from remote locations. This course will cover modeling of distribution networks, three-phase unbalanced power flow analysis and short circuit calculations, state estimation, operation and control strategies, communication systems, and computer systems for distribution automation.

ELE E 495-499 Special Topics in Electrical Engineering
1–4 credits.
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 515-516 Applied Signal Processing Systems Design
515, fall; 516, spring. Variable credits. Project-level design of systems in the area of signal processing and general instrumentation, including digital signal processing hardware, audio, speech, and analog interfacing. Students pursue individual projects and coordinate ideas and resources with other students with related interest.

ELE E 521 Theory of Linear Systems
Fall. 4 credits. Prerequisite: ELE E 302 or permission of instructor. Recommended: a good background in linear algebra and real linear differential equations.
State-space and multi-input-multi-output linear systems in discrete and continuous time. The state transition matrix, the matrix exponential, and the Cayley-Hamilton theorem. Controllability, observability, stability, realization theory. At the level of Linear Systems, by T. Kailath.

ELE E 522 Nonlinear Systems: Analysis, Stability, Control, and Applications
Spring. 4 credits. Prerequisites: ELE E 521 or a solid background in linear algebra and real analysis strongly recommended but not required.
A fairly rigorous introduction to nonlinear systems, including nonlinear differential equations, flows, phase-plane analysis, fundamentals of Lyapunov theory, LaSalle’s Theorem, regions of attraction, slowly varying systems, advanced stability theory, Lyapunov redesign, applied nonlinear control, describing functions, averaging and singular perturbations, bifurcation analysis and control and application to physical systems.

ELE E 525 Adaptive Filtering in Communication Systems
Fall. 4 credits. Prerequisite: ELE E 468.
Fundamentals of an adaptive filter theory intended for digital communication systems applications. Traditional problem, e.g., channel equalization for systems with interference removal, is used to motivate adaptive filter design and to raise issues of current interest. Assignments will consist of reports on adoptive digital filter and simulated evaluation.
ELE E 526 Advanced Signal Processing  

ELE E 530 Fiber and Integrated Optics  
Spring. 4 credits with lab. Prerequisite: ELE E 303 or equivalent. Physical principles of optical waveguides, optical sources and detectors, noise, modulators, and sensing. Wave equation solutions to the mode structure in waveguides, mode coupling, bandwidth limitation, optical sources based on semiconductors, detectors and noise, modulation techniques, nonlinear effects in optical waveguides, and optical sensors.  

ELE E 531 Quantum Electronics I  
Fall. 4 credits. Prerequisites: ELE E 306 and 407, or PHYS 443. A detailed treatment of the physical principles underlying lasers, related fields, and applications. Topics include the interaction of radiation and matter, including emission, absorption, scattering, and basic spectroscopic properties of key laser media; theory of the laser, including methods of achieving population inversions, dispersive effects, and laser oscillation spectrum.  

ELE E 532 Quantum Electronics II  
Spring. 4 credits. Prerequisite: ELE E 531 or permission of instructor. Not offered 1997–98. A continuation of ELE E 531. Topics include density matrix; nonlinear optical processes; properties of nonlinear optical materials; optical parametric oscillators; spontaneous and stimulated Raman and Brillouin processes; theory of coherence; pico- and femto-second optics; ultrafast processes in semiconductors and molecules; optical properties of semiconductor-doped glasses, quantum-well structures, and superlattices.)  

ELE E 533 Semiconductor Lasers  
Spring. 3 credits. Prerequisites: ELE E 430, ELE E 457, or permission of instructor. Study of principles and characteristics of semiconductor lasers. Topics cover laser dynamics, noise, quantum confined structures, single-frequency lasers, traveling-wave lasers, surface-emitting lasers, reliability, and emerging research subjects. A term project and paper will be required.  

ELE E 534 Microwave Solid State Devices  
Spring. 4 credits. Prerequisites: ELE E 433 and ELE E 457. May be taken for 3 credits without lab. Prerequisites: ELE E 433 and ELE E 457. Basic theory of operation of solid-state microwave and millimeter wave devices: field effect transistor (FET), high electron mobility transistor (HEMT), Schotky, IMPATT, Gunn, PIN, and tunnel devices. Emphasis on how to integrate these devices into practical circuits. Oscillators, amplifiers, and mixers will be fabricated and measured in the laboratory.  

ELE E 535 Semiconductor Physics  
Fall. 4 credits. Prerequisites: ELE E 457 and 407, or permission of instructor. Physics of materials and structures useful in semiconductor electronics and photonics: 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, surface and interface effects. On the level of Compound Semiconductor Device Physics by S. Tiwari.  

ELE E 536 VLSI Technology  
Spring. 4 credits. Prerequisites: ELE E 455 or ELE E 457 or ELE E 439 or permission of instructor. Microfabrication for silicon very large scale integrated circuits (VLSI), microelectromechanics (MEMS), compound semiconductor (CS), and optoelectronics. Lithography, diffusion, ion implantation, thin film deposition, and etching. Process integration for CMOS, BiCMOS, ELE E 447, ELE E 457, MEMS, CS, and optoelectronics. Hands-on MOS/MEMS fabrication, characterization, and simulation laboratory.  

ELE E 537 Computer System Packaging  
Spring. 4 credits. Prerequisites: ELE E 455 or ELE E 457 or ELE E 439, or permission of instructor. Physical integration of circuits, packages, boards, and full electronic systems. Computer (portable, desktop, cabinet levels) and telecommunication (cellular telephone, base station, switch level) system applications. Packaging architecture: electrical, optical signal distribution; power distribution; signal integrity; power, thermal management, mixed signals, manufacturing, measurements, and simulation. Case studies. Lectures include industry experts.  

ELE E 539 Practicum in VLSI Design  
Fall and spring (year-long course). 2 credits each semester. Prerequisites: ELE E 475 or consent of instructor. Corequisite: ELE E 439. A year-long implementation project related to ELE E 439. Students will design a chip and have it fabricated in the fall semester and test it for functionality and performance in the spring semester. Students are required to take the course both fall and spring.  

ELE E 541 Advanced Computer Architectures  
Fall. 3 credits. Prerequisite: ELE E 308 (or COM S 280 and 314). May not be offered 1997–98. Design and evaluation of processor architectures are examined in the light of actual implementations. Topics include parallel and pipelined architectures, interleaved memories, cache and virtual memories, L/O processors, vector and array processors, protection mechanisms, and RISC architectures.  

ELE E 542 Parallel Processing  
Spring. 3 credits. Prerequisite: ELE E 541. Not offered 1997–98. Parallel computer systems that are designed to provide a high computation rate for large specific problems are studied. Topics include computer architecture, interconnection networks, performance characterization, basic algorithms, and parallel programming techniques. Recent multiprocessors and massively parallel processors are also discussed.  

ELE E 546 Broad Band Information Networks  
Spring. 3 credits. Prerequisite: ELE E 445 or consent of the instructor. 3 lecs. Evolution of network architectures for integrated voice, data, and video services; advances in switching with an emphasis on asynchronous transfer mode (ATM); performance modeling; traffic and network management.  

ELE E 547 Computer Vision  
Fall. 4 credits. Prerequisites: ELE E 308 (or COM S 280 and 314) or consent of instructor. Not offered 1997–98. Computer acquisition and analysis of images with emphasis on techniques for robot vision. This course will concentrate on descriptions of objects at three levels of abstraction: segmented images (images organized into subimages that are likely to correspond to interesting objects), geometric structures (quantitative models of image and world structures), and relational structures (complex symbolic descriptions of images and world structures). The programming of several computer-vision algorithms will be required.  

ELE E 548 Digital Image Processing  
Spring. 3 credits. Prerequisites: ELE E 431, ELE E 445, familiarity with linear algebra. Introduction to image processing through seven major topics: perception, statistical modeling, transforms, enhancement, analysis, compression, and restoration. Special attention is allocated to compression. Equal emphasis will be placed on gaining a mathematical and an intuitive understanding of algorithms through actual image manipulation and viewing.  

ELE E 549 Visual Motion Seminar  
Spring. 1 credit. This seminar will provide an overview of motion as used in both coding and analysis of digital video, through examination of motion estimation and motion segmentation techniques. Topics include an introduction to digital video, techniques for computing motion, both block-based and pixel-based motion estimation, MPEG motion coding, Huasdoll-based motion estimation, motion-based tracking, and various techniques for motion segmentation. An emphasis will be placed on recent research results.  

ELE E 554 Advanced VLSI Circuit Design  

ELE E 555 Advanced Power Systems Analysis I  
Fall. 3 credits. Prerequisites: ELE E 451, ELE E 471. A course in numerical methods would be helpful. The course is designed for first-year graduate students. Not offered 1997–98. Topics include electromagnetic transients, synchronous machine modeling, synchronous machine control models, single-machine dynamic models, multimachine dynamic models, multimachine simulation using a differential-algebraic model, small-signal analysis of power systems, direct methods for stability analysis including potential energy boundary surface methods, regions of
attraction, exit point method and voltage stability using energy functions.]

ELE E 556 Advanced Power Systems Analysis II
Spring. 3 credits. Prerequisite: ELE E 451. Advanced topics in power system analysis. These include advanced control and analysis methods for dynamic contingencies such as voltage collapse and loss of synchronism, simulation methods for large-scale nonlinear analysis, methods for system protection with emphasis on digital relaying.

ELE E 558 Compound Semiconductor Electronics
Spring. 4 credits with lab. Prerequisites: ELE E 457 or equivalent. Electronic properties of advanced semiconductor device 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 field effect transistors (MOSFETs) and heterojunction bipolar transistors (HBTs). High-frequency operation of compound semiconductor devices. Six two-week labs, which include low-temperature carrier transport, optical excitation and emission, and electrical characterization of compound semiconductor devices.

ELE E 561 Error-Control Codes
Fall. 4 credits. Prerequisite: ELE E 301 or ELE E 521 or equivalent. A strong familiarity with linear algebra is assumed. An introduction to the theory of algebraic error-control codes. Topics include: Hamming codes, group codes, the standard array, minimum-distance decoding, cyclic codes, and the dual of a linear block code. Hamming and Singleton bounds for error-correcting codes. The construction and decoding of Bose-Chaudhuri-Hocquenghem (BCH) and Reed-Solomon (RS) codes. Computer methods for the study of the structure and algorithms for error-control are used.

ELE E 562 Fundamental Information Theory
Fall. 4 credits. Prerequisite: ELE E 310 or equivalent. Fundamental results of information theory with application to storage, compression, and transmission of data. Entropy and other information measures. Block and variable-length codes. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multiterminal configurations. Gaussian sources and channels.

ELE E 563 Communication Networks
Spring. 4 credits. Prerequisite: ELE E 411 or permission of instructor. 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. Flow control and capacity assignment algorithms for wideband circuit-switched and ATM networks. An introduction to those methods of making rational decisions and inferences and of forming estimates that are central to problems of communications, detection, pattern recognition, and statistical signal processing. Topics include Bayes, minimax, and Neyman-Pearson decision theories; Bayes and maximum likelihood point estimation; Cramer-Rao bound, efficient, and consistent estimation; spectral estimation; and robust models for signal extraction.

ELE E 566 Wireless Networks
Spring. 4 credits. Prerequisites: ELE E 445 and ELE E 451. An introductory course in mobile and wireless networks. The course is targeted at the graduate level, but is open to undergraduates. The course covers fundamental techniques in design and operation of first and second generation wireless networks: cellular systems, medium access techniques, control of a mobile session and a mobile call, signaling in mobile networks, mobility management techniques, common air protocols (AMPS, IS-136, IS-95, GSM), wireless data networks (CDPD, Mobitex, Internet mobility, Personal Communication Services (PCS), etc.

ELE E 567 Topics in Digital Communications
Spring. Offered as 2 or 4 credits. Prerequisites: ELE E 562. Fundamental results in modern digital communication. Analytical and computational tools required to understand modern data communication, transmission, and storage systems. Possible topics include: PCM, DPCM, PAM, PSK, FSK, matched filtering, equalization, line codes, trellis codes, Viterbi decoding, applications to audio, video, and magnetic recording. Vector quantization and universal data compression including LZ, LZW, and arithmetic coding, applied to files, speech, images, and video.

ELE E 567 Artificial Neural Networks
Fall. 4 credits. Prerequisites: ELE E 510; ELE E 411 recommended. Artificial neural networks are brainlike in being formed out of many highly interconnected nonlinear memoryless elements. Probability theory will provide our primary analytical approach to design and analysis of neural networks. The course will cover mathematical and computer-based design capabilities of feed-forward nets (multilayer perceptrons) that can serve as pattern classifiers.

ELE E 581 Introduction to Plasma Physics (also A&EP 606)
Fall. 4 credits. Prerequisites: ELE E 303 and ELE E 304 or equivalent. First-year graduate-level course; open to exceptional seniors with permission of instructor. Plasma sustained particles in fields; drift-orbit theory; coulomb scattering, collisions; ambipolar diffusion; elementary transport theory; two-fluid and hydromagnetic equations; plasma oscillations and waves, GMA diagram; hydromagnetic stability, elementary applications to space physics, plasma technology, and controlled fusion.

ELE E 582 Basic Plasma Physics (also A&EP 607)
Spring. 4 credits. Prerequisites: ELE E 581 or A&EP 606. Boltzmann and Vlasov Equations; dielectric tensor; waves in magnetized plasma; Landau and cyclotron damping; microinstabilities; drift waves, low-frequency stability; test particles, Cerenkov emission; fluctuations; collisional effects; applications.

ELE E 583 Electrodynamics
Fall. 4 credits. Prerequisite: ELE E 301 and ELE E 304 or equivalent. 3 lects. Maxwell's equations, electromagnetic potentials, integral representations of the electromagnetic field, Green's functions. Special theory of relativity, Lienard-Wiechert potentials, radiation from accelerated charges, Cerenkov radiation, Electrodynamics of dispersive dielectric and magnetic media. At the level of Classical Electrodynamics, by Jackson.

ELE E 584 Microwave Theory
Spring. 4 credits. Prerequisites: ELE E 301 and 304 or equivalent. 3 lects, 1 rec. Theory of passive microwave devices. Modal analysis of inhomogeneous waveguides and cavities. Waveguide excitation, perturbation theory. Nonreciprocal waveguide devices. Scattering matrix analysis of multiport junctions, resonant cavities, directional couplers, circulators. Periodic waveguides, coupled-mode theory.

ELE E 585 Upper Atmosphere Physics II
(also ASTRO 576)
Spring. 3 credits. High-latitude ionosphere; electric fields in the polar cap and auroral zone; particle precipitation and the aurora; magnetic and ionospheric storms; plasma instabilities in the ionosphere and magnetosphere; structure and physical processes in the sun, solar corona, and solar wind; interactions between the solar wind and the earth's magnetosphere; trapping, acceleration, and drift of energetic particles in the magnetosphere.

ELE E 587 Energy Seminar (also NS&E 545 and M&AE 545)
Fall and spring. 1 credit each semester. Students may take this seminar both fall and spring for credit. 1lec. Not offered 1997-98.
Energy resources, their conversion to electricity or mechanical work, and the environmental consequences of the energy cycle will be discussed by faculty members from several departments in the University, and by outside experts. Examples of topics to be surveyed are energy resources, and economics, coal-based electricity generation; nuclear reactors; fossil fuels; energy conservation by users; and air-pollution control.

ELE E 588 Advanced Electromagnetic Wave Propagation and Scattering
Spring. 3 credits. Prerequisite: ELE E 487 and 581 or permission of instructor. Offered alternate years. Not offered 1997-98.
WK band and low-wave solutions of the wave equations; interactions between particles and waves, scattering of radio waves from random fluctuations in refractive index, scatter propagation, incoherent scatter from the ionosphere and its use as a diagnostic tool, scattering from unstable plasma waves, pulse compression and other radar probing techniques.

ELE E 593 Bioelectric Signal Analysis and Processing
Fall. 3 credits with lab. Prerequisites: ELE E 301, ELE E 315, and a knowledge of C programming and MATLAB. ELE E 425 helpful.
Measurement and computer-aided analysis of low-level biological signals in the presence of background noise. Electrocardiography, A/D conversion, filtering, signal conditioning, and
data compression techniques will be investigated using the human surface ECG as signal source. Pattern classification and microcontroller instrumentation design will be introduced. Final team design projects are required.

ELE E 594 Mobile Communication Systems
Spring. 4 credits. Prerequisite: ELE E 411; Corequisite: ELE E 468. 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. Some lectures will be given by industry researchers.

ELE E 595-599 Graduate Topics in Electrical Engineering
1-4 credits. Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 633 Radiation Effects in Microelectronics (also NS&E 621)
For description, see NS&E 621.

ELE E 681-692 Electrical Engineering Colloquium
691, fall; 692, spring. 1 credit each term. For students enrolled in the graduate Field of Electrical Engineering. 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.

ELE E 693-694 Master of Engineering Design
693, fall; 694, spring. 1-10 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 6-digit course ID numbers.

ELE E 695-699 Graduate Topics in Electrical Engineering
1-6 credits. Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned. See M.Eng. office for course registration procedure.

ELE E 781-792 Thesis Research
791, fall; 792, spring. 1-15 credits. For students enrolled in the master's or doctoral program.

GEOLOGICAL SCIENCES

Courses
For complete course descriptions, see the Geological Sciences listing in the College of Arts and Sciences section.

GEOL 101 Introductory Geological Sciences
Fall, spring, summer. 3 credits.

GEOL 102 Evolution of the Earth and Life
(Bio G 170)
Spring, summer. 3 credits.

GEOL 104 The Sea: An Introduction to Oceanography (BIO ES 154)
Spring, summer. 3 or 4 credits (4 credits with lab section).

GEOL 105 Writing on Rocks (Freshman Seminar)
Fall. 3 credits. See Freshman Seminar handbook for description.

GEOL 106 Vertebrate Fossil Preparation
Spring. 1 credit. Prerequisites: one introductory geology course or concurrent enrollment; class size is limited.

GEOL 107 How the Earth Works
Fall. 1 credit.

[GEOL 108 Geology and Society
Spring. 1 credit. May be taken concurrently with or after GEOL 101, 102, 104, 111, 201, or 206.]

GEOL 109 Dinosaurs
Fall. 1 credit.

GEOL 111 To Know the Earth and Build a Habitable Planet
Fall. 3 credits.

GEOL 122 Earthquake! (also ENGR 122)
Fall. 5 credits. For course description, see ENGR 122.

GEOL 123-124 Science of Earth Systems Colloquium (also ABEN 120-121, SCAS 101-102 and SES 101-102)
Fall. 3 credits. For course description, see ENGR 125.

GEOL 125 Global Environment (also ENGR 125)
Fall. 3 credits. For course description, see ENGR 125.

GEOL 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)
Spring. 3 credits. Prerequisites: MATH 191 and PHYS 112. For course description, see ENGRD 201.

GEOL 203 Natural Hazards and the Science of Complexity
Fall. 3 credits. 1 course in calculus.

GEOL 210 Introduction to Field Methods in Geological Sciences
Fall. 3 credits. Prerequisite: GEOL 101 or 201, or permission of instructor. Weekly field sessions. A weekend field trip.

GEOL 212 Special January Field Trip
Fall. 2 credits. Prerequisites: GEOL 101 or 201 or equivalent, and permission of instructor. Travel and subsistence expenses to be announced.

GEOL 213 Marine and Coastal Geology
Summer. 2 credits. Prerequisites: an introductory course in geology or permission of instructor.

GEOL 214 Western Adirondack Field Course
Spring. 1 credit. Prerequisite: GEOL 210 or equivalent, or permission of instructor.

Junior, Senior, and Graduate Courses
Of the following, the core courses GEOL 326, 355, 356, 375, and 388 may be taken by B.S. candidates who have successfully completed GEOL 201 or the equivalent and by B.A. candidates who have completed GEOL 101 or the equivalent, or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

GEOL 302 Evolution of the Earth System (also SES 332 and SCAS 302)
For course description, see the Science of Earth Systems section in "Interdisciplinary Centers, Programs, and Studies." in the front part of the catalog.

GEOL 321 Introduction to Biochemistry (also SES 321, NTRES 321)
Fall. 4 credits. Prerequisites: college-level chemistry, plus a course in biology and/or geology.

GEOL 326 Structural Geology
Spring. 4 credits. Prerequisite: GEOL 101 or 201, or permission of instructor.

GEOL 355 Mineralogy
Fall. 4 credits. Prerequisite: GEOL 101 or 201 and CHEM 207 or permission of instructor.

GEOL 356 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: GEOL 355.

GEOL 375 Sedimentology and Stratigraphy
Fall. 4 credits. Prerequisite: GEOL 101, 102, or 201.

GEOL 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: MATH 192 and PHYS 208, 213, or equivalent.

GEOL 411 Satellite Remote Sensing of Glaciers, Earthquakes, and Erosion
Fall. 3 credits.

GEOL 417 Field Mapping in Argentina
Summer. 3 credits. Prerequisites: GEOL 210 and GEOL 326; Spanish desirable, but not required.

GEOL 423 Petroleum Geology
Fall. 3 credits. Recommended: GEOL 326. Offered alternate years.

GEOL 434 Reflection Seismology
Spring. 4 credits. Prerequisites: MATH 192 and PHYS 208, 213, or equivalent.

GEOL 437 Geophysical Field Methods
Fall. 3 credits. Prerequisites: PHYS 213 and MATH 192 or equivalents, or permission of instructor.

GEOL 445 Geohydrology (also ABEN 471 and CEE 431)
Fall. 3 credits. Prerequisites: MATH 294 and ENGRD 202. For description, see CEE 431.

GEOL 452 X-ray Diffraction Techniques
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years.

[GEOL 453 Advanced Petrology
Fall. 3 credits. Prerequisite: GEOL 356. Offered alternate years. Not offered 1997-98.]

[GEOL 454 Advanced Mineralogy
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years. Not offered 1997-98.]
GEOL 455 Geochemistry
Fall. 4 credits. Prerequisites: CHEM 207 and MATH 102, or equivalent. Recommended: GEOL 356. Offered alternate years.

[GEOL 458 Volcanology
Spring. 3 credits. Corequisite: GEOL 356 or equivalent. Offered alternate years. Not offered 1997-98.]

GEOL 475 Special Topics in Oceanography
Spring, summer. 2-5 var. credits. Prerequisites: GEOL 104 or BIO ES 154 and permission of instructor.

[GEOL 476 Sedimentary Basins: Tectonics and Mechanics
Spring. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years. Not offered 1997-98.]

[GEOL 477 Advanced Stratigraphy
Spring. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years. Not offered 1997-98.]

GEOL 479 Paleobiology (also BIO ES 479)
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and either BIO ES 274, 373, GEOL 375, or permission of instructor. Offered alternate years.

GEOL 481 Senior Survey of Earth Systems
Fall. 3 credits. Limited to seniors majoring in geological sciences.

GEOL 491-492 Undergraduate Research
Fall, spring. 1 or 2 credits variable.

GEOL 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 two or more semesters.

GEOL 502 Case Histories in Groundwater Analysis
Spring. 4 credits.

[GEOL 622 Advanced Structural Geology
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. Not offered 1997-98.]

[GEOL 624 Advanced Structural Geology II
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. Not offered 1997-98.]

GEOL 628 Geology of Orogenic Belts
Spring. 3 credits. Prerequisite: permission of instructor.

[GEOL 634 Advanced Geophysics I: Fractals and Chaos in Geology and Geophysics
Spring. 3 credits. Prerequisite: GEOL 388 or permission of instructor. Offered alternate years. Not offered 1997-98.]

[GEOL 636 Advanced Geophysics II: Quantitative Geodynamics
Spring. 3 credits. Prerequisite: GEOL 388 or permission of instructor. Offered alternate years. Not offered 1997-98.]

GEOL 651 Analysis of Biogeochemical Systems
Spring. 3 credits. Prerequisite: MATH 293 or permission of instructor. Offered alternate years.

GEOL 656 Isotope Geochemistry
Spring 3 credits. Open to undergraduates. Prerequisites: GEOL 455 or permission of instructor. Offered alternate years.

GEOL 681 Geotectonics
Fall. 3 credits. Prerequisites: permission of instructor.

GEOL 695 Computer Methods in Geoscientific Studies
Fall, spring. 3 credits.

GEOL 700-799 Seminars and Special Work
Fall, spring. 1–3 credits. Prerequisite: permission of instructor. Advanced work on original investigations in geological sciences. Topics change from term to term. Contact appropriate professor for more information.

[GEOL 722 Advanced Topics in Structural Geology
Not offered 1997–98.]

GEOL 731 Plate Tectonics and Geology
GEOL 733 Fractals and Chaos—Independent Studies
GEOL 751 Petrology and Geochemistry
GEOL 753 Advanced Topics in Mineral Physics
GEOL 755 Advanced Topics in Petrology and Tectonics
GEOL 757 Current Research in Petrology
GEOL 762 Advanced Topics in Petroleum Exploration
Fall.

[GEOL 771 Advanced Topics in Sedimentology and Stratigraphy
Not offered 1997–98.]

GEOL 773 Paleobiology
GEOL 775 Advanced Topics in Oceanography
Spring.

GEOL 780 Earthquake Record Reading
Fall.

GEOL 781 Geophysics, Exploration Seismology
GEOL 783 Advanced Topics in Geophysics
GEOL 789 Lithospheric Seismology (COCORP Seminar)
GEOL 793 Andes-Himalaya Seminar
GEOL 795 Low-Temperature Geochemistry
GEOL 796 Geochemistry of the Solid Earth
GEOL 797 Fluid-Rock Interactions
GEOL 799 Soil, Water, and Geology Seminar

MATERIALS SCIENCE AND ENGINEERING

Undergraduate Courses

MS&E 111 Materials by Design (also ENGR 111)
Fall. 3 credits. E. P. Giannelis. For description, see ENGR 111.

MS&E 118 Design Integration: A Portable CD Player (also ENGR 118)
Spring. 3 credits. W. Sachse. For description, see ENGR 118.

MS&E 124 Designing Materials for the Computer
Spring. 3 credits. Lectures. C. K. Ober. For description, see ENGR 124.

MS&E 222 Materials Chemistry
Spring. 3 credits. E. P. Giannelis. This course is designed to show how materials chemistry has enabled modern technology. Topics will include conducting polymers, organic LEDs, self-assembling materials, contact lithography, nanophase and nanocrystalline materials, catalysis, smart gels, dendrimers, buckytubes, aerogels, chemistry of surfaces, molecular magnets, biomimetic materials, and light harvesting polymers, inorganic polymers.

MS&E 261 Introduction to Mechanical Properties of Materials (also ENGR 261)
Fall. 3 credits. S. L. Sass. For description, see ENGR 261.

MS&E 265 Biological Materials and Their Synthetic Replacements
Fall. 3 credits. D. T. Grubb. 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 will consider a number of biological systems and describe the properties and structure of the natural materials. Requirements for candidate replacement materials will be 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, will also be considered.

MS&E 277 The Substance of Civilization—Materials through the Ages
Spring. 3 credits. 2 lecs, 1 lab. Not offered 1997–98. 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 Western industrial civilization by putting technology into a historical context and examining the advances made possible by innovations with materials, starting with the Stone Age. Interconnections between critical developments are identified and explored—for example, the relationship between materials, agriculture, and written languages in the fourth millennium B.C., and between the Exodus of the Hebrews, the general tumult in the Eastern Mediterranean, and the onset of the Iron Age, at the end of the second
millennium B.C. Early technologies will be illustrated with beautiful works of art. Lectures, demonstrations, and hands-on laboratory experiments, will 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 285 Art, Archaeology, and Analysis (also AR&EO 286, ART 372, ENGR 185 and NS&E 285 and PHYS 200)**

Spring: 3 credits.

For description, see ENGR 185.

**MS&E 331/531 Structure of Materials**


**MS&E 332/532 Electrical and Magnetic Properties of Materials**


**MS&E 333 Research Involvement I**

Fall: 3 credits. Prerequisite: approval of course coordinator. Staff. Supervised independent research project in association with faculty members and faculty research group of the department. Students design experiments, set up the necessary equipment, and evaluate the results. Creativity and synthesis are emphasized.

**MS&E 334 Research Involvement II**

Spring: 3 credits. Prerequisite: approval of department. Staff. See MS&E 333 for description. May be a continuation of MS&E 333 or a one-semester affiliation with a research group.

**MS&E 335/535 Thermodynamics of Condensed Systems**

Fall: 4 credits. Prerequisites: MATH 293 and 294. M. O. Thompson. The three laws of thermodynamics are introduced as a basis for understanding phase equilibria, heterogeneous reactions, solutions, electrochemical processes, surfaces, and defects. Statistical mechanics is introduced and applied to the calculation of entropy and specific heat of ideal gases and solids. Examples of design and control of processes.

**MS&E 336/536 Kinetics, Diffusion, and Phase Transformations**

Spring: 3 credits. Prerequisite: MS&E 335 or permission of instructor. R. Dieckmann. Introduction to electrochemistry, atomic motion, and diffusion. Applications and design involving nucleation and growth of new phases in vapors, liquids, and solids; solidification, crystal growth, corrosion, recrystallization and gas-metal reactions, and thermomechanical processing to produce desired microstructures and properties. One-third of course involves examples of design and control of processes.

**MS&E 345 Mechanical Properties and Processing of Engineering Materials (also MS&E 212)**

Spring: 3 credits. Prerequisite: ENGRD 202. N. Zabaras. For description, see MS&E 212.

**MS&E 414/514 Chemical Processing of Ceramics**


**MS&E 435 Senior Thesis I & II**

Fall and spring. 2-semester course. 8 credits. Staff. Open to advanced undergraduates in lieu of the senior materials laboratory. Proposals for thesis topics should be approved by the supervising faculty prior to beginning the senior year. Approved thesis topics will normally involve original experimental research in direct collaboration with an ongoing research program. Periodic oral and written presentations are required. This course is required for graduation with honors.

**MS&E 441/448 Materials Design Concepts I & II**

447, fall; 448, spring. 2 credits each term. C. K. Ober, Y. Suzuki. Defines design in the field of materials science using Dieter's *Engineering Design*, Ashby's *Materials Selection in Engineering Design*, and other sources. Innovation, patent searching, and ANSYS standards. Speakers from industry and other institutions lecture on case studies of design problems. Students give short oral and written presentations. Proposal for design-study project in the fall semester. Completion of extensive design-study project in the spring semester. Study includes prior art literature, materials selection, and some modeling, as well as discussion of broader economic, regulatory, environmental, and liability concerns that may arise.

**MS&E 449 Introduction to Ceramics**

Fall. 3 credits. Prerequisite: MS&E 331 or permission of instructor. R. Dieckmann. Ceramic processes and products, crystal structures, structure of glasses, point defects (point-defect chemistry and relation to nonstoichiometry), line defects, grain boundaries, diffusion in ionic materials (emphasis on the relationships between diffusion and point-defect structure), phase diagrams, phase transformations, kinetics of solid-state reactions (reactions with and between solids: heterogeneous reactions, reactions between different solids, point-defect relaxation, internal reactions), grain growth and sintering. Physico-chemical aspects are emphasized.

**MS&E 452 Properties of Solid Polymers**

**MS&E 454 Processing of Glass, Ceramic, and Glass-Ceramic Materials**

Spring. 3 credits. Offered alternate years. Recommended prerequisite: MS&E 449. R. Dieckmann.

Conventional and unconventional techniques for processing glass, glass-ceramic, and ceramic materials. Case studies illustrate the design, engineering, and scientific aspects of such processes. Vapor processes for high-purity optical fibers, hot-processing of ceramic turbine blades, photosemitive materials, and powder processing and sintering of ceramics will be discussed. This course is team taught with scientists from the research and development laboratory of Corning Glass Works.

**MS&E 455 Introduction to Composite Materials (also MS&E 455 and T&AM 455)**

Spring. 4 credits. For description, see T&AM 455.

**MS&E 459 Physics of Modern Materials Analysis**

Spring. 3 credits. M. O. Thompson.

The interaction of ions, electrons, and photons with solids will be discussed. This course will be particularly important for students who are planning to use the electron microscope for their undergraduate or graduate research projects. The course will cover the characteristics of the emergent radiation in relation to the structure and composition of materials. Aspects of atomic physics that are relevant to understanding techniques of modern materials analysis. Principles of analysis techniques such as Auger electron spectroscopy, ion scattering, and secondary ion-mass spectroscopy. Design of experiments for near-surface analysis.

**MS&E 463 Principles of Electronic Packaging**

Spring. 3 credits. C. Y. Li.

Design, materials, and manufacturing needs for packaging technology, from chip to board. Principles involved in key areas of materials science, and other engineering disciplines. Packaging materials to be discussed include metals, ceramics, and polymers.

**MS&E 468 Undergraduate Teaching Involvement**

Fall and spring. Variable credit. MS&E faculty.

This course will give credit to students who help in the laboratory portions of ENGRI 111 or 124, ENGRD 261 or MS&E 277. The number of credits earned will be determined by the teaching load and will typically be 1 to 3 credits.

**MS&E 490 Independent Study**

Fall and spring. Variable credit. Individual faculty.

This course is meant for students who are not yet seniors and who have already taken MS&E 333 and MS&E 334, Research Involvement, and who want to do an intense research project.

**MS&E 495 Introduction to Group Theory with Applications**

Fall. 2 credits. Homework only. S-U only. R. L. Liboff.


Crystallographic space groups. Ligand field theory. Perlmutter’s theory, and Young diagrams. Oc3 and Su2(2) groups. Tensor representations and the Wigner-Eckart theorem. Application to degeneracy, selection rules, and band structure.


**[MS&E 501] Introduction to Electron Microscopy**


This course is for undergraduates and graduate students who are interested in getting a basic foundation in transmission electron microscopy and electron diffraction techniques. This course will be particularly important for students who are planning to use the electron microscope for their undergraduate or graduate research projects. Included will be electron optics, kinematical theory of diffraction, image contrast from crystal defects, high resolution lattice imaging, and the interpretation of electron diffraction patterns. Both theoretical and practical aspects of electron microscopy are discussed.

**Graduate-Level Professional Courses**

**[MS&E 516 Thin-Film Materials Science**

Fall. 3 credits. Offered alternate years. Not offered 1997–98. Staff.

This course is a fundamental approach to thin-film science that will cover deposition of films, growth of epitaxial layers, formation of multilayered structures such as superlattices and quantum wells, and interdiffusion and reaction in thin films. The course will begin with the structure and thermodynamics of surfaces and ultrathin films. The conditions for epitaxial growth, such as used in semiconductor heterostructures, will be contrasted with those for amorphous or polycrystalline films. The course will cover reactive thin films involving the formation of surface oxides, metallic silicides, and amalminides will be presented.

**[MS&E 518 Introduction to Electron Microscopy**

Fall. 3 credits. Prerequisite: MS&E 511 or permission of instructor. Offered alternate years. Not offered 1997–98. Staff. Basic optics and operation of scanning and transmission electron microscopes. Image formation, modes of contrast, and resolution in SEM and TEM. Electron diffraction. Images of perfect crystal and defects in two-beam diffraction contrast. Analytical microscopy; comparison of energy dispersive spectroscopy, wavelength dispersive spectroscopy and electron energy laser spectroscopy. Overview of specimen preparation and in-situ microscopy.

**[MS&E 520 Practical Electron Microscopy**

Fall. 3 credits. Corequisite: MS&E 518. Limited to 12 students. A fee will be charged for instrument usage. Offered alternate years. Not offered 1997–98. Staff.

Students will be instructed in the proper use of a scanning and a transmission electron microscope. All stages from initial alignment of the instrument to presentation of the results will be covered. Three or four projects will be completed, including obtaining atomic lattice fringe images and X-ray microanalysis.

**[MS&E 553-554 Special Project**

553, Fall; 554, spring. 6 credits each term. Master of Engineering research project.

**Graduate Core Courses**

**[MS&E 601 Thermodynamics of Materials**

Fall. 3 credits. Prerequisite: previous course in thermodynamics at level of MS&E 355. Staff.


**[MS&E 602 Elasticity, Plastic Flow, and Fractures**

Fall. 3 credits. Staff.

Micromechanical modeling of mechanical behavior. A materials-science approach to modeling combines concepts from continuum mechanics, thermodynamics, and atomic structure. Topics include: elastic properties of crystals, deformation mechanisms from ambient temperature to very high temperatures over a wide range of strain rates, fracture in brittle materials, fracture in ductile materials, fracture at elevated temperatures, crack tip phenomena, and composite materials.

**[MS&E 603 Analytical Techniques for Materials Science**

Spring. 4 credits. Lab. M. O. Thompson.

Survey of atomic and structural analysis techniques as applied to surfaces and bulk materials. Physical processes involved in the interaction of ions, electrons, and photons with solids; characteristics of the emergent radiation in relation to the structure and composition. Techniques covered include Auger electron spectroscopy, ion scattering, nuclear activation, secondary ion mass spectroscopy, UV and X-ray photoelectron spectroscopy, X-ray diffraction and related techniques, etc. Selection and design of experiments for near-surface analysis.

**[MS&E 604 Diffusion and Phase Transformation: Kinetics in Condensed Matter**

Spring. 3 credits. Staff.

Phenomenology and microscopic aspects of diffusion in fluids, both simple and polymeric, and in solids, metallic and ionic. Phase stability and transformation; nucleation and growth, spinodal decomposition and displacive transformations. Phase coarsening processes, recrystallization and grain growth. Diffusion-controlled growth, interfacial reactions, moving-boundary problems. Grain-boundary migration controlled kinetics. At the level of *Diffusion in the Condensed State*, by Kirkaldy and Young.
Further Graduate Courses


MS&E 611 Modern Polymer Physics  Spring. 3 credits. Prerequisites: MS&E 452, CHEM 711, or equivalent. Offered alternate years. Not offered 1997–98. Modern engineering plastics and polymeric matrices for fiber-reinforced composite materials often demand more detailed knowledge of polymer structure and properties in the melt or solid state than is afforded by beginning courses that emphasize polymer solutions. This course is a fundamental approach to the structure and physical properties of polymers, copolymers, and polymer mixtures, including thermodynamics, phase equilibria, diffusion, kinetics of phase separation, and interfaces. At the level of Scaling Concepts in Polymer Physics by de Gennes.

MS&E 612 Solid-State Reactions  Fall. 3 credits. Offered alternate year. R. Dieckmann. Not offered 1997–98. Next offered 1998–99. 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 coefficient) are examined. 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-reaction controlled), interdiffusion, solid-state reactions involving compound formation (oxidation of metals, reactions between solids), demixing of materials in potential gradients, selected solid-state processes (internal reactions, etc.).

MS&E 614 Transmission Electron Microscopy  Spring. 3 credits. Prerequisite: MS&E 331 or equivalent level of knowledge of crystallography and diffraction. S. L. Sass. This course covers the theory and practice of obtaining and interpreting TEM data from crystalline materials. Topics include specimen preparation, adjustment and calibration of the TEM, and 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, including Bloch waves and anomalous absorption, the contrast transfer function theory of phase contrast, and image modeling and analysis techniques for quantitative interpretation of data. Current texts are Loretto Electron Beam Analysis of Materials, 2nd ed., and Riemen Transmission Electron Microscopy, Physics of Image Formation.

MS&E 617 Solid State Electrochemistry  Fall. 3 credits. Prerequisite: MS&E 612 or permission of instructor. Offered alternate years. Not offered 1997–98; next offered 1999–2000. R. Dieckmann. Disorder in solids, thermodynamic quantities or quasi-free electrons 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, technical applications of solid electrolytes. At the level of Electrochemistry of Solids by H. Rickett.

MS&E 619 Superhard Materials  Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1997–98. A. L. Ruoff. The superhard materials include diamond, cubic boron nitride (possibly the new C₃N₃), and borderline, B₄C. The origin of their extreme hardness and their technological significance will be described. Commercial methods of synthesis of large crystals, powders, thin films and polycrystalline aggregates (by sintering at pressure) will be examined. Their chemical, optical and mechanical properties will be studied. Moreover, there is substantial potential for radiation-hard semi-conducting devices and the status of this area will be covered. At the level of Field, The Properties of Natural and Synthetic Diamonds, plus recent papers.

MS&E 524/624 Synthesis of Polymeric Materials  Spring. 3 credits. 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 will include liquid crystalline polymers, photoreactive materials, and supramolecular chemistry. At the level of Principles of Polymerization, by Odian.

MS&E 628 Advanced Inorganic Chemistry III: Solid-State Chemistry (also CHEM 607)  Spring. 4 credits. Prerequisite: CHEM 605 or permission of instructor. F. DiSalvo. This course covers the third of a three-termed sequence. Interdisciplinary approach to solids. Topics include solid-state structure and x-ray diffraction, synthesis methods, defects in solids, phase diagrams, electronic structure, and chemical and physical properties of solid-state systems. Text: Solid State Chemistry and Its Applications, by West. Readings from inorganic chemistry and solid-state physics texts.

MS&E 671 Synthetic Polymer Chemistry (also CHEM 675 and CHEM 671)  Spring. 4 credits. Chemistry faculty. For description, see CHEM 671.

Specialty Courses

MS&E 552 Introduction to Photonic Materials and Devices  Spring. 1 credit. M. Gupta. Introduces students to important subject material of great practical importance: (1) Optical thin film materials and devices (optical dielectric coatings, thickness measurements, high reflectance coatings and practical examples, etc.), (2) Compound semiconductor materials and devices (GaAs, GaN and ZnSe light emitting and detecting materials, quantum well design of high reflectance and antireflection coatings and practical examples, etc.), (3) Ferroelectric materials and devices (GaAs, GaN and ZnSe light emitting and detecting materials (electro-optic, piezoelectric, pyroelectric, acousto-optic properties and devices), (4) Guided wave materials and devices (fibers, waveguides, nonlinear effects and devices), (5) Optical information storage (optical storage, holographic storage, and optical communication (attenuation, dispersion, essential components, optical amplifiers, switching, etc.).

MS&E 703 Surfaces and Interfaces in Materials  Spring. 3 credits. J. M. Blakely. 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 will be 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 states, adsorption and segregation, atomic transport and growth processes at surfaces, oxidation and other surface reactions.

MS&E 779 Special Studies in Materials Science  Fall, spring. Variable credit. Offered on demand. Staff. Supervised studies of special topics in materials science.

MS&E 798 Materials Science and Engineering Colloquium  Fall, 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.

M&AE 799 Materials Science Research Seminars
Fall, spring, 2 credits each term. For graduate students involved in research projects. Staff. Short presentations on research in progress by students and staff.

M&AE 800/801 Research in Materials Science
800, fall; 801, spring. Credit to be arranged. Staff. Independent research in materials science under the guidance of a member of the staff.

MECHANICAL AND AEROSPACE ENGINEERING

General and Required Courses

M&AE 101 Naval Ship Systems
For description, see NAV S 202.

M&AE 102 Drawing and Engineering Design (also ENGRG 102)
Fall, spring, 1 credit. Half-term course offered twice each semester. Enrollment limited to thirty-two students each half term. Recommended for students without previous mechanical drawing experience. Staff. For description, see ENGRG 102.

M&AE 117 Introduction to Mechanical Engineering (also ENGR 117)
Fall or spring, to be determined. 3 credits. For description, see ENGR 117.

M&AE 212 Mechanical Properties and Processing of Engineering Materials (also MS&E 345)
Spring. 4 credits. Prerequisite: ENGRD 202. Introduction to the broad range of mechanical behavior of materials and their processing. The mechanical properties of metals, ceramics, and composite materials are covered together with structural features and processing. Ideal work methods are introduced for the analysis of bulk deformation processes. Heat treatment of metals and alloys, phase diagrams, casting and quenching processes.

M&AE 221 Thermodynamics (also ENGRG 221)
Fall, spring, may be offered summer. 3 credits. Prerequisites: MATH 192 and PHYS 112. For description, see ENGRG 221.

M&AE 225 Mechanical Design and Synthesis
Spring. 3 credits. Prerequisite: ENGRD 202. Lab fee. A hands-on laboratory, the use of machine tools, mechanical dissection, and a number of design projects provide direct experience of creative design synthesis.

M&AE 323 Introductory Fluid Mechanics
Fall. Usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: ENGRD 202 and 203 and coregistration in 221, or permission of instructor.

Hydrostatics, conservation laws using control volume analysis and using differential analyses, Bernoulli's equation, potential flows, simple viscous flows (solved with Navier-Stokes equations), dimensional analysis, pipe flows, boundary layers, compressible flow.

M&AE 324 Heat Transfer
Spring, may also be offered in Engineering Cooperative Program. 3 credits. Prerequisite: M&AE 323 or permission of instructor. Conduction of heat in steady and unsteady situations. Surfaces with fins and systems with heat sources. Forced and natural convection of heat arising from flow around bodies and through ducts. Heat exchangers. Emission and absorption of radiation; radiative transfer between surfaces.

M&AE 325 Mechanical Design and Analysis
Fall, usually offered in Engineering Cooperative Program. 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 multidegree-of-freedom systems; feedback control systems, stability and nonlinear simulation and experimental studies of vibration and control systems.

M&AE 427 Fluids/Heat Transfer Laboratory
Fall. 3 credits. Prerequisites: M&AE 323, 324. Fulfills the technical writing requirement. Laboratory exercises in methods, techniques, and instrumentation used in fluid mechanics and the thermal sciences. Measurements of temperature, heat transfer, viscosity, drag, fluid-flow rate, effects of turbulence, air foil stall, two-phase flows and engine performance. Biweekly written assignments.

M&AE 428 Engineering Design
Fall. 2 credits. Prerequisite: completion of six semesters in mechanical engineering or equivalent. Survey of design principles used in industry. Examples taken from all areas of mechanical engineering. Special emphasis on the design process as used in industry to solve practical problems. Case studies presented by engineers employed in industry and government. Students also participate in a design project.

M&AE 429 Mechanical Systems, Design, Materials Processing, and Precision Engineering
Spring. 3 credits. Prerequisites: M&AE 325 or permission of instructor. Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis on automobiles, trucks, and related vehicles. Power plant, drive line, brakes, aerodynamics, suspension, and structure. Other types of vehicles may be considered.

M&AE 389 Computer-Aided Design
Fall. 3 credits. Limited to juniors and seniors. May be offered in Engineering Cooperative Program. Fulfills computer applications requirement. Course emphasizes the application of computers to the solution of mechanical engineering design problems. Topics include: geometry (space curves, splines, patches, solid modelling), computer graphics, and product rendering; analytical methods such as simulation, optimization, and curve fitting; and collaborative technologies such as the Web and computer supported collaborative work.

M&AE 412 Smash and Crash: Mechanics of Large Deformations
Prerequisites: M&AE 212, T&AM 455.
Severe loading is a defining feature of both materials processing and crashworthiness. Materials intentionally are stressed beyond their elastic limits, resulting in deformations that are not recoverable. In materials processing, the desire is to change the shape to manufacture components; in crashworthiness, it is to absorb the vehicle energy. 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 localization, primary and secondary forming operations, and plastic buckling. Laboratory experiments deal with these topics and conclude with the individual design, construction, and testing of a crush cage.

M&AE 417 Control of Robot Manipulators
Spring. 3 credits. Not offered 1997-98. Introductory course in the analysis and control of mechanical manipulators. Topics include spatial descriptions and transformations, manipulator kinematics, inverse manipulator kinematics, differential relationships and static forces, manipulator dynamics, trajectory generation, sensors and actuators for manipulators, trajectory control, and compliant motion control. Various control strategies will be explored and analyzed, both graphically and mathematically, on a computer model of a simple manipulator.

M&AE 455 Introduction to Composite Materials (also MS&E 455 and T&AM 455)
Spring. 4 credits. For description, see T&AM 455.

M&AE 461 Entrepreneurship for Engineers (also ENGRG 461)
Spring. 3 credits. Enrollment open to seniors; others with permission of instructor. Enrollment may be limited. Course will examine issues and skills necessary to identify, evaluate, and start new business ventures. Topics include: competitive analysis, competitive strategy; business formation, bookkeeping; technology protection; human resource management; negotiation; business valuation; and manufacturing issues. Guest speakers will provide a real-life perspective on critical issues facing the entrepreneur. A term project will be the team development of a business plan for an innovative new venture and will require detail of manufacturing, support, and information systems as well as staffing and cost data.
M&A 464 Design for Manufacture
Spring. 3 credits. Prerequisites: M&A 212 and M&A 225. Fulfills field design requirement. Readings and class discussion will provide a context for the importance of design for manufacture and assembly in product development, manufacturing, and marketing. Lecture topics include DFMA design rules and applications; net present value analysis applied to product development; determination of manufacturing capability using statistical process control, and Taguchi design for experiment methodology to evaluate product/process improvements. A team design project will evaluate the manufacturability of a new or existing product.

M&A 465 Biomechanical Systems—Analysis and Design
Spring. 3 credits. Prerequisites: ENGRG 202 and 203. Enrollment limited. Selected topics from the study of the human body as a mechanical system. Emphasis on the modeling, analysis, and design of biomechanical systems frequently encountered in orthopaedic engineering and rehabilitation engineering.

M&A 467 Advanced Mechanical Analysis and Design
Fall. 3 or 4 credits. Evening examinations. Prerequisite: M&A 325 and M&A 326 or permission of instructor. Further application of the principles of mechanics and materials to problems of analysis and design of mechanical components and systems. Diverse examples from aerospace, automotive, and biomechanical fields, with emphasis on current machinery applications. Students have access to general-purpose software tools (such as MATLAB) as well as specialized computational codes (such as ANSYS) for analysis of stress and deformation. Term project.

M&A 469 Stress Analysis for Mechanical and Aerospace Design
Fall. 3 credits. Prerequisites: T&M 202 and M&A 325 or permission of instructor. Evening examinations. Study of advanced topics in the analysis of stress and deformation of elastic bodies, with applications to analysis and design of mechanical and aerospace systems and components. Review of mechanics fundamentals and their application to classical problems. Introduction to modern computational methods (such as the finite element method) for analysis of stress and deformation. Term project.

M&A 478 Feedback Control Systems
For description, see ELF E 471.

M&A 486 Automotive Engineering Design
Spring. 4 credits. Prerequisite: M&A 428 and senior standing. Fulfills field design requirement.

M&A 489 Computer-Aided Design Project
Fall. 4 credits. Limited to seniors in mechanical engineering. Fulfills both field design and computer applications requirements. Requires extensive project in addition to course assignments. For description, see M&A 389.

M&A 511 Survey of Manufacturing Processes
Fall or spring, to be determined, may be offered in summer program. 3 credits. Prerequisites: graduate standing or permission of instructor. Not for M&A majors. Yield criteria and plastic flow: Manufacturing processes for engineering materials, including metals, polymers, ceramics and composites. Casting, forming, material removal and joining processes. Intended for non-mechanical engineers.

M&A 514 Introduction to Precision Engineering
Fall. 3 credits or 4 with laboratory. Prerequisites: ENGRG 102 and M&A 212, or 412, or permission of instructor. Variability in mechanical products arises primarily from the processes used to make and assemble parts; it must be accommodated in design and controlled in manufacturing. This course addresses form variability through studies of ideal-form modeling, form tolerancing, form measurement, and manufacturing process modeling (sources of form error). Central principles, practices, and limitations are summarized.

M&A 570 Intermediate Dynamics
Fall. 3 credits. Prerequisites: graduate standing or permission of instructor. 2 lecs. Introduction to analytical mechanics, virtual work, Lagrangian mechanics. Small vibration and stability theory. Newtonian-Eulerian mechanics of rigid bodies.

M&A 577 Vibrations and Waves in Elastic Systems (also T&M 574)
Not offered 1997–98.

M&A 578 Feedback Control Systems Design and Implementation
Spring. 3 credits. Prerequisite: M&A 478 or ELE E 471, graduate standing, or permission of instructor. Fulfills the computer application requirement. Not offered 1997–98.

M&A 612 Materials Processing: Theory and Applications

M&A 613 Computational Methods in Materials Processing

M&A 615 Experiments in Materials Processing
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. This course will focus on experiments related to the mechanical properties of materials and experiments using various materials processing apparatus and will include a general introduction to sensors and instrumentation for engineering measurements. Testing for mechanical properties/model parameter characterization: inelastic deformation, fatigue, and fracture, including rate and temperature effects. Process simulation experiments including forging, extrusion, rolling, and ironing. Formability experiments. Determination of heat transfer coefficients associated with quenching and solidification process. Fluidity measurements. Specimen design and fabrication. Although the focus is on metals and alloys attention is also given to polymers and ceramic materials.

M&A 625 Product Development
Spring. 4 credits. Prerequisite: graduate standing. Emphasis will be placed on the Product Realization Process for products based on advanced technologies and requiring concurrent engineering. Covers a wide range of methods and techniques used in the product development process: concurrent engineering, team organization, technologies to support collaboration, cognitive models of design, generation of product specifications, quality function deployment, conceptual design, configuration design, FAST/FMEA, and parametric design.

M&A 655 Composite Materials (also MS&E 655 and T&M 655)
Spring or fall. 4 credits. Prerequisite: M&A 511 and M&A 612.

M&A 665 Advanced Topics in Orthopaedic Biomechanics
On demand. 4 credits. Prerequisites: graduate standing, senior or concurrent registration in advanced courses in strength of materials or elasticity, and intermediate dynamics. Not offered 1997–98.

Advanced treatment of topics in the biomechanics of the musculoskeletal system. Force analysis of the musculoskeletal system under static and dynamic conditions, compact and trabecular bone as structural materials, structural analysis of bone-implant systems, remodeling of bone.
M&AE 670 Finite Element Analysis for Mechanical and Aerospace Design
Spring. 4 credits. Prerequisite: graduate standing, or permission of instructor.
Evening examinations.
Introduction to the finite-element method for static and dynamic analysis of mechanical and aerospace structures (and related nonstructural applications such as heat conduction). Primary emphasis on underlying mechanics and numerical methods. Secondary consideration of inherent capabilities and limitations of large-scale, general-purpose structural mechanics programs (such as ANSYS). Introduction to computational aspects through study of small, special-purpose programs and application of available general-purpose programs. Term project.

M&AE 677 Advanced Topics in Systems and Control
Spring. 4 credits. Prerequisite: M&AE 478 (ELE 471), ELE 521, graduate standing, or permission of instructor.
Modern topics in model based control pertaining to multi-input, multi-output systems. Emphasis on design techniques which result in closed loop systems that are insensitive to modeling errors. Topics include \( H \)-infinity and \( H_2 \) optimization, explicit models of uncertainty, gain scheduling, and the analysis of uncertain systems. Computer-aided design laboratory will include aerospace applications such as flight control, control of flexible space structures, and other topics depending on class interest.

M&AE 678 Optimal Control and Estimation
Fall, on demand. 3 credits. Prerequisite: M&AE 478, ELE 471, graduate standing, or permission of instructor; programming ability in FORTRAN, Pascal, or C.
Develops the theory of the design of modern multi-input–multi-output feedback control systems using optimal control techniques. Topics covered include trajectory optimization and the minimum principle, bang-bang optimal control solutions, Kalman filtering, LQR/LQG controller design, suboptimal control and estimation, and applications to regulator and tracking problems. Both linear and nonlinear systems, and continuous-time and discrete-time control, and considered.

M&AE 679 Modeling and Simulation of Dynamic Systems
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor.
Selected applications from diverse fields. Representation of continuous dynamic systems by state-variable models. Simulation by numerical integration using general-purpose languages (such as MATLAB) and simulation packages. Special topics in linear and nonlinear dynamics. Term project.

M&AE 680 Finite Element Analysis for Mechanical, Structural, and Aerospace Applications (also CEE 772 and T&M 666)
Spring. 4 credits. Prerequisite: T&M 663 Conceptual, theoretical, and practical bases for finite element analysis in solid and structural mechanics, such as the bending of beams, torsion of shafts, and two-dimensional elasticity. Topics include the methodology for obtaining a discretized system of equations from differential equations via weighted residuals, consistent application of boundary conditions, various types of elements including isoparametric elements, numerical integration of elemental quantities, error estimation, and (adaptive) mesh generation. Programming assignments using MATLAB and C codes provided by the instructor.

M&AE 715 Finite-Deformation Plasticity and Rheology and Their Applications in Materials Processing
Fall. 4 credits. Prerequisites: advanced graduate students. Introduction to Continuum Mechanics and Plasticity. Offered alternate years. Not offered 1997–98.

M&AE 305 Introduction to Aeronautics
Fall. 3 credits. Limited to upperclass engineers; others with permission of instructor.
Introduction to the concept of aircraft design. Principles of incompressible and compressible aerodynamics, boundary layers, and wing theory. Description and performance of propeller-driven and jet propulsion engines. Design studies focus on transonic passenger airplanes and small supersonic jets.

M&AE 306 Spacecraft Engineering
Spring. 3 credits. Upperclass engineering students.
Introduction to spacecraft design from launch, through orbital operation, to reentry. Topics covered include space missions, space environment, orbital mechanics, rocket theory, and reentry. Emphasis on satellites orbiting the Earth. Series of guest lectures on current problems and trends in spacecraft operation and development.

M&AE 400 Components and Systems: Engineering in a Social Context (also S&T 400)
Spring. 3 credits. Prerequisites: upperclass standing, two years of college physics. Serves as an approved elective but not as a field elective in mechanical engineering. Offered alternate years. 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), supersonic transport, and the automobile and its environment, we investigate interactions between the scientific, technical, political, economic, and social forces that are involved in the development of engineering systems.

M&AE 401 Components and Systems: Engineering in a Social Context
Spring. 4 credits. Prerequisites: senior standing, two years of college physics. Fulfills field design requirement. Offered alternate years. For description, see M&AE 400.

M&AE 423 Intermediate Fluid Dynamics
Spring. 3 credits. Prerequisite: M&AE 323.
This course builds on the foundation of M&AE 323. Emphasis will be on the calculation of real flows (both engineering and environmental) and fundamental principles. Topics covered will include some exact solutions to the Navier-Stokes equations, boundary layers, wakes and jets, separation, convection, stratified and rotating flows, fluid instabilities, turbulence and chaos.

M&AE 449 Combustion Engines
Spring. 3 credits. Prerequisites: ENGRD 221 and M&AE 323.
Introduction to combustion engines, with emphasis on the application of thermodynamic and fluid-dynamic principles affecting their performance. Air-standard analyses, chemical equilibrium, ideal-cycle analyses, deviations from ideal processes, combustion knock. Formation and control of undesirable exhaust emissions.

M&AE 458 Introduction to Nuclear Science and Engineering I (also A&EP 303, and NS&E 403)
For description, see NS&E 403.

M&AE 459 Introduction to Controlled Fusion: Principles and Technology (also ELE E 484)
For description, see NS&E 484.

M&AE 506 Aerospace Propulsion Systems
Spring. 3 credits. Prerequisite: M&AE 323 or permission of instructor. Offered alternate years. Offered 1997–98. Application of thermodynamic and fluid-mechanic principles to design and performance of aerospace systems. Jet propulsion principles, including rockets. Electric propulsion. Future possibilities for improved performance.

M&AE 507 Dynamics of Flight Vehicles
Spring. 3 credits. Prerequisites: M&AE 305 and M&AE 523 or permission of instructor. Offered alternate years. Not offered 1997–98.
M&AE 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. Aspects of kinetic theory as it applies to the 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. Viscous flows, boundary layers, potential flows, vorticity dynamics.

M&AE 602 Fluid Dynamics at High Reynolds Numbers
Spring. 4 credits. Prerequisite: M&AE 601. Navier-Stokes and Euler equations, integral formulas for fluid forces and moments on immersed bodies in compressible and incompressible viscous flows. Vorticity dynamics in compressible flows, Kelvin's theorem. Hjorth's theorem, Helmholtz decomposition of vector fields. Singularities, vortex filaments, vortex sheets, Biot-Savart relations. Image representations in terms of velocity or vector potentials. Topology of flows, general results in potential theory.

M&AE 603 Compressible Gas Dynamics
Fall. 4 credits. Graduate standing or permission of instructor. Fundamentals of compressible gas dynamics are described using the thermodynamics and fluid properties of the ideal gas. Ideal flow theory. Normal shock waves including Rankine-Hugoniot relations. Duct flows including effects of area, friction, and heat interaction. Oblique shock waves and Prandtl-Meyer expansion fans. Applications include high-speed aerodynamics, combustor design, and jet engines for materials processing.

M&AE 608 Physics of Fluids
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. 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 rotator, harmonic oscillator, one-electron atom. Statistical mechanics: partition functions, relation to thermodynamics, calculations of thermodynamic properties. Chemical rate processes.

M&AE 636 Elements of Computational Aerodynamics
Spring. 4 credits. Prerequisites: graduate standing and a graduate-level course in fluid mechanics. 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 consists of lectures with M&AE 756, but is more applications oriented and uses commercial software for all computational exercises.

M&AE 651 Advanced Heat Transfer
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Advanced treatment of conductive and convective heat transfer. Basic equations reasoned in detail. Integral and differential formulations. Exact and approximate solutions. Forced convection. Natural convection. Laminar and turbulent flows. Effects of viscous dissipation and mass transfer.

M&AE 654 Radiation Heat Transfer

M&AE 732 Analysis of Turbulent Flows

M&AE 733 Stability of Fluid Flow

M&AE 734 Turbulence and Turbulent Flow
Fall. 4 credits. Prerequisite: M&AE 601, graduate standing, or permission of instructor. Not offered 1997-98. 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 736 Theory of Computational Aerodynamics
Spring. 4 credits. Prerequisites: graduate standing, an advanced course in continuum mechanics or fluid mechanics, and some FORTRAN programming experience. Numerical methods to solve inviscid and high-Reynolds-number fluid-dynamics problems, including finite-difference, finite-volume, and surface-singularity methods. Accuracy, convergence, and stability; treatment of boundary conditions and grid generation. Focus on hyperbolic (unsteady flow with shock waves) and mixed hyperbolic-elliptic (steady transonic flow) problems. Assignments require programming a digital computer.

M&AE 737 Computational Fluid Mechanics and Heat Transfer

Special Offerings

M&AE 490 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to undergraduate students. Prerequisite: permission of instructor. Intended for an individual student or a small group of students who want to pursue a particular analytical or experimental investigation outside of regular courses or for informal instruction supplementing that given in regular courses.

M&AE 491 Design Projects in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Prerequisite or corequisite: M&AE 428. Fulfills field design requirement. Intended for individual students or small groups of students who want to pursue a particular design project outside of regular courses.

M&AE 545 Energy Seminar
For description, see ELE E 587.

M&AE 592 Seminar and Design Project in Aerospace Engineering
Fall, spring. 2 credits each term. Prerequisite: graduate standing or permission of instructor. Intended for students in M Eng (Aerospace) program. Introduction to topics of current research interest in aerospace engineering by Aerospace faculty and invited speakers. Individual design projects supervised by separate faculty members after introductory sessions.

M&AE 594 Manufacturing Seminar
For description, see ORIE E 693.

M&AE 690 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to graduate students.

M&AE 695 Special Topics in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Graduate standing and permission of instructor.
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 involved 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 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 to be arranged. 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 to be arranged. 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

A number of courses in nuclear science and engineering are offered through the School of Applied and Engineering Physics (see A& E, 609, 612, 635, 688, and 651).

NS&E & 121  Fission, Fusion, and Radiation (also ENGR 121)
Spring. 3 credits. This is a course in the Introduction to Engineering series. For description, see ENGR 121.

NS&E & 285  Art, Archaeology, and Analysis (also ARKEO 285, ART 372, ENGR 185, M&E & 285 and PHYS 200)
For description, see ENGR 185.

NS&E & 403  Introduction to Nuclear Science and Engineering (also A& E, 403, and M&E & 485)
Fall. 3 credits. Prerequisite: Physics 214 and Mathematics 294. 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 reactors. Topics include an overview of the field of nuclear engineering; nuclear structure, radioactivity, and reactions; interaction of radiation and matter; and neutron moderation, neutron diffusion, the steady-state chain reaction, and reactor kinetics. At the level of Introduction to Nuclear Engineering, by Lamash.

NS&E & 484  Introduction to Controlled Fusion: Principles and Technology (also ELE & 484, and A& E & 484)
Spring. 3 credits. Prerequisites: PHYS 112, 213, and 221, or equivalent background in electricity and magnetism and mechanics, and permission of instructor. Intended for seniors and graduate students. Introduction to the physical principles and various engineering aspects underlying power generation by controlled fusion. Topics include: (i) fuels and conditions required for fusion power, and basic fusion-reactor concepts; (ii) fundamental aspects of plasma physics relevant to fusion plasmas, and basic engineering problems for a fusion reactor; and (iii) an engineering analysis of proposed magnetic and/or intertial confinement fusion-reactor designs.

NS&E & 509  Nuclear Physics for Applications (also A& E & 609)
Fall. 3 credits. Prerequisites: sophomore physics and math, or permission of instructor; some upper-division physics desirable. Primarily for graduate students, especially those with a major or minor in Nuclear Science and Engineering; also open to qualified undergraduates. Offered on demand. 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 Ehmann and Vanc.

[NS&E & 545  Energy Seminar (also M&E & 545 and ELE & 507)
Not offered 1997–98. For description, see ELE E 587]

NS&E & 551  Nuclear Methods in Non-Nuclear Research Fields
Spring. 3 credits. Prerequisites: PHYS 214 or 218, or permission of instructor; some upper-division physics desirable. Primarily for graduate students in archaeology, geology, chemistry, biology, materials science, and other non-nuclear fields in which nuclear methods are used. Open to qualified undergraduates. A more intensive related course, A& E 551, is intended for nuclear specialists. Offered on demand. Lectures on interaction of radiation with matter, radiation protection, and nuclear instruments. Experiments on radiation detection and measurement; electronic instrumentation, including computerized systems; activation analysis; and emerging applications such as prompt gamma analysis and neutron radiography. The TRIGA reactor is used. Emphasis is on methods used in non-nuclear fields. At the level of Radiochemistry and Nuclear Methods of Analysis, by Ehmann and Vance.

NS&E & 590  Independent Study
Fall, spring. 1–4 credits. Grade option letter or S-U. Independent study or project under guidance of a faculty member.

NS&E & 591  Project
Fall, spring. 1–6 credits. Master of Engineering or other project under guidance of a faculty member.

NS&E & 621  Radiation Effects in Microelectronics (also ELE & 633)
Fall. 1 to 3 credits. Prerequisite: ELE E 435 or permission of instructor. A seminar offered in alternate years intended for seniors and graduate students in engineering or applied physics. S-U or letter grade option. An introduction to the physical processes that underlie the malfunction and failure of microelectronic circuitry resulting from exposure to ionizing radiation. The roles testing and modeling play in improving circuit and device designs are included.

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

OR&IE & 115  Engineering Application of Operations Research (also ENGR 115)
Fall, spring. 3 credits. Enrollment not open to OR&IE upperclass majors. For description see ENGR 115.

OR&IE & 270  Basic Engineering Probability and Statistics (also ENGRD 270)
Fall, spring, summer. 3 credits. Pre- or co-requisite: MATH 293. For description see ENGRD 270.

OR&IE & 310  Industrial Systems Analysis
Spring. 4 credits. Pre or co-requisite: ENGRD 270. Design of production facilities, including engineering economy, taxation effects, materials handling process design, and facility layout. Operations analysis, including process scheduling, process evaluation, procedural analysis, process mapping, methods analysis and design, work measurement, inventory control, job evaluation, and quality engineering and control. Formerly listed as OR&IE 410.

OR&IE & 320  Optimization I
Fall. 4 credits. Prerequisite: MATH 221 or 294. Formulation of linear programming problems and solution by the simplex method. Related topics such as sensitivity analysis, duality, and network programming. Applications include such models as resource allocation and production planning.

OR&IE & 321  Optimization II
Spring. 4 credits. Prerequisite: OR&IE 320 or equivalent. A variety of optimization methods stressing extensions of linear programming and its applications but also including topics drawn from integer, dynamic, and nonlinear programming. Formulation and modeling are stressed as well as numerous applications.

OR&IE & 350  Financial and Managerial Accounting
Fall. 4 credits. Principles of accounting, financial reports, financial-transactions analysis, financial-statement analysis, budgeting, job-order and process-cost systems, standard costing and variance analysis, economic analysis of short-term decisions.
OR&IE 360 Engineering Probability and Statistics II
Fall. 4 credits. Prerequisite: ENGRD 270 or equivalent.
This second course in probability and statistics provides a rigorous foundation in theory combined with the methods for modeling, analyzing, and controlling randomness in engineering problems. Probabilistic ideas are used to construct models for engineering problems, and statistical methods are used to test and estimate parameters for these models. Specific topics include random variables, probability distributions, density functions, expectation and variance, multidimensional random variables, and important distributions including normal, Poisson, exponential, hypothesis testing, confidence intervals, and point estimation using maximum likelihood and the method of moments.

OR&IE 361 Introductory Engineering Stochastic Processes I
Spring. 4 credits. Prerequisite: OR&IE 360 or equivalent.
Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queuing and reliability.

OR&IE 416 Design of Manufacturing Systems
Fall. 4 credits. Senior OR&IE students only. Others by permission of instructor.
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 will be presented in lectures. Lab fee $15.

OR&IE 417 Material Handling Systems
Fall. 4 credits.
Design of the layout of processes and storage areas and the material-handling system for movement of items. Typical equipment used. Material flow analysis. The functions of identification control, storage, movement, batching, merging, and dispersion.

OR&IE 431 Discrete Models
Fall. 4 credits. Prerequisites: OR&IE 320 and COM S 211, or permission of instructor. Not offered 1997–98, next offered 1998–99.
Basic concepts of graphs, networks, and discrete optimization. Fundamental models and applications, and algorithmic techniques for their analysis. Specific optimization models studied include flows in networks, the traveling salesman problem, and network design.

OR&IE 432 Nonlinear Optimization
Spring. 4 credits. Prerequisite: OR&IE 320.
Introduction to the practical and theoretical aspects of nonlinear optimization. Attention 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 introduced as needed.

OR&IE 435 Introduction to Game Theory
Spring. 3 credits.
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; games in extensive, normal, and characteristic function form. Economic market games. Applications to weighted voting and cost allocation.

OR&IE 451 Economic Analysis of Engineering Systems
Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 350.
Financial planning, including cash-flow analysis and inventory flow models. Engineering economic analysis, including discounted cash flows and taxation effects. Application of optimization techniques, as in equipment replacement or capacity expansion models. Issues in designing manufacturing systems. Student group project.

OR&IE 462 Introductory Engineering Stochastic Processes II
Spring. 4 credits. Prerequisite: OR&IE 361 or equivalent. Not offered 1997–98, next offered 1999–00.
Stationary processes, martingales, random walks, and gambler's ruin problems, processes with stationary independent increments, Brownian motion and other cases, branching processes, renewal and Markov-renewal processes, reliability theory, Markov decision processes, optimal stopping, statistical inference from stochastic models, and stochastic comparison methods for probability models. Applications to population growth, spread of epidemics, and other models.

OR&IE 475 Regression
Spring. First half of term. 2 credits.
Linear models; estimation and testing; confidence sets; diagnostics and residual analysis; variable selection and modeling.

OR&IE 476 Experimental Design I
Spring. Second half of term. 2 credits.
Prerequisite: OR&IE 475.

OR&IE 490 Teaching in OR&IE
Fall, spring. Credit to be arranged.
Prerequisite: permission of instructor.
This course involves working as a TA in an OR&IE course. The course instructor will assign 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. Credit to be arranged.
Prerequisite: permission of instructor.
Project-type work, under faculty supervision, on a real problem existing in some firm or institution, usually an organization. Opportunities in the course may be discussed with the associate director.

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. Lab fee $15.

OR&IE 516 Case Studies
Fall. 1 credit. Limited to M.Eng. students in OR&IE.
Students are presented with unstructured problems that resemble real-world situations. 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 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. Corequisite: OR&IE 320. Students who have already taken OR&IE 321 or 521 should not enroll. Limited to M.Eng. students in OR&IE.
An extension of OR&IE 520 that deals with applications and methodologies of dynamic programming, integer programming, and large-scale linear programming.

OR&IE 523 Operations Research II: Introduction to Stochastic Processes I
For description, see OR&IE 361.

OR&IE 525 Production Planning and Scheduling Theory and Practice
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 on setup time as a determinant of plans and schedules.

OR&IE 526-529 Selected Topics in Applied Operations Research
Fall, spring. Credit to be arranged.
Prerequisite: permission of instructor.
Current topics dealing with applications of operations research.

OR&IE 535 Economic Analysis of Engineering Systems
Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 350.
Lectures concurrent with OR&IE 451. For description see OR&IE 451.

OR&IE 550 Engineering Probability and Statistics II
For description, see OR&IE 360.

OR&IE 561 Queuing Theory and Its Applications
Fall. 3 credits. Prerequisite: OR&IE 361 or permission of instructor.

OR&IE 562 Inventory Theory
Spring. 4 credits. Prerequisite: OR&IE 321, 361, 416 or permission of instructor.
The first portion of this course is devoted to the analysis of several deterministic and probabilistic models for the control of single and multiple items at one of many locations. The second portion 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.

[ORIE 563 Applied Time-Series Analysis]
Fall. 3 credits. Prerequisites: ORIE 361 and ORIE 270, or permission of instructor. Not offered 1997-98, next offered 1998-99.
The first part of this course treats regression methods to model seasonal and non-seasonal data. After that, Box-Jenkins models, which are versatile, widely used, and applicable to nonstationary and seasonal time series, are covered in detail. The various stages of model identification, estimation, diagnostic checking, and forecasting are treated. Analysis of real data is carried out. Assignments require computer work with a time-series package.

[ORIE 564 Introductory Engineering Stochastic Processes II]
Spring. 4 credits. Prerequisite: ORIE 361 or equivalent. Lectures concurrent with ORIE 462. Not offered 1997-98; next offered 1998-99.
For description, see ORIE 462.

[ORIE 565 Applied Financial Engineering]
Spring. 4 credits. Limited to M.Eng. students.
This course has two components: a sequence of lectures and a project. The course will be co-listed with the Johnson School and will be co-taught by one faculty member from each school. The lectures will be given by the faculty for the course and by invited speakers from the financial industry. The project will satisfy the M.Eng. project requirement.

[ORIE 567 Semester in Manufacturing Management (also NBA 660)]
Spring. 15 credits. Enrollment limited. Permission of instructor required. For description, see NBA 650.

[ORIE 567 Experimental Design II]

[ORIE 577 Quality Control]

[ORIE 580 Design and Analysis of Simulated Systems]
Fall. 4 credits. Prerequisites: programming experience and ORIE 360/560, or permission of instructor. Note: ORIE 360/560 may be taken concurrently.
Digital computer programs to simulate the operation of complex discrete systems in time. Modeling, program organization, pseudo-random-variable generation, simulation language, statistical considerations; applications to a variety of problem areas.

[ORIE 599 Project]
Fall, 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.

[ORIE 625 Scheduling Theory]
Scheduling and sequencing problems, including single-machine problems, parallel-machine scheduling, and flow shops. The emphasis is on the design and analysis of polynomial time optimization and approximation algorithms and on related complexity issues.

[ORIE 626 Advanced Production and Inventory Planning]
Introduction to a variety of production and inventory control problems; the development of mathematical models corresponding to these problems; a study of approaches for finding solutions.

[ORIE 630 Mathematical Programming I]
Fall. 4 credits. Prerequisites: advanced calculus and elementary linear algebra.

[ORIE 631 Mathematical Programming II]
A continuation of ORIE 630. Introduction to nonlinear programming, interior-point methods for linear programming, complexity theory, and integer programming. Some discussion of dynamic programming, and elementary polyhedral theory.

[ORIE 632 Nonlinear Programming]
Fall. 3 credits. Prerequisite: ORIE 630. Not offered 1997-98; next offered 1998-99.
Necessary and sufficient conditions for unconstrained and constrained optima. Duality theory. Computational methods for constrained (e.g., quasi-Newton) problems, linearly constrained (e.g., active set) problems, and nonlinearly constrained (e.g., successive quadratic programming) problems.

[ORIE 633 Graph Theory and Network Flows]
Spring. 3 credits. Prerequisite: permission of instructor.

[ORIE 634 Combinatorial Optimization]
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1997-98; next offered 1998-99.
Topics in combinatorics, graphs, and networks, including matching, matroids, polyhedral combinatorics, and optimization algorithms. Topics change each semester. This course may be taken more than once for credit.

[ORIE 635 Interior-Point Methods for Mathematical Programming]
Spring. 3 credits. Prerequisites: MATH 411 and ORIE 630, or permission of instructor.

[ORIE 636 Integer Programming]
Fall. 3 credits. Prerequisite: ORIE 630. Discrete optimization. Linear programming in which the variables must assume integral values. Theory, algorithms, and applications. Cutting-plane and enumerative methods, with additional topics drawn from recent research in this area.

[ORIE 639 Polyhedral Convexity]
Spring. 3 credits. Prerequisite: basic knowledge of linear algebra. Not offered 1997-98; next offered 1998-99.

[ORIE 650 Applied Stochastic Processes]
Fall. 4 credits. Prerequisite: a one-semester calculus-based probability course. 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 one-semester course in calculus-based probability.
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, conditioning.

[ORIE 662 Advanced Stochastic Processes]
Fall. 3 credits. Prerequisite: ORIE 651 or equivalent. Not offered 1997-98; next offered 1998-99.
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.]
OR&IE 663 Time-Series Analysis
Fall. 3 credits. Prerequisite: OR&IE 650 or equivalent. Not offered 1997–98; next offered 1998–99.

OR&IE 670 Statistical Principles
Fall. 4 credits. Co-requisite: OR&IE 650 or equivalent.
Review of distribution theory of special interest in statistics: normal, chi-square, binomial, Poisson. Point, and interval estimation; introduction to statistical decision theory; sufficient statistics; theory of minimum variance unbiased point estimation; maximum likelihood and Bayesian estimation; basic principles of hypothesis testing, including Neyman-Pearson Lemma and likelihood ratio principle; confidence interval construction, introduction to linear models.

OR&IE 671 Intermediate Applied Statistics
Spring. 3 credits. Prerequisite: OR&IE 670 or equivalent.
Statistical inference based on the general linear model; least-squares estimators and their optimality properties; likelihood ratio tests and corresponding confidence regions; simultaneous inference. Applications in regression analysis and ANOVA models. Variance components and mixed models. Use of the computer as a tool for statistics is stressed.

OR&IE 672 Selected Topics in Environmental Statistics (also BTRY 672)
Fall, spring. 2 credits. Prerequisite: ENGRI 270 or equivalent.
For description, see BTRY 672.

OR&IE 676 Statistical Analysis of Life Data
Fall. 3 credits. Prerequisite: OR&IE 671 or equivalent. Not offered 1997–98; next offered 1998–99.

OR&IE 678 Asymptotic Methods in Statistics
Fall. 3 credits. Prerequisite: OR&IE 670 or equivalent. Not offered 1997–98; next offered 1998–99.
Topics chosen from: large-sample behavior of MLEs and other estimates; chi-square, likelihood ration, and related tests; Pitman and Bahadur efficiency; LAN families and LAM estimates; statistical applications of Edgeworth expansions; adaptive estimation and semiparametric inference, rank statistics, EDF expansions; adaptive estimation and sample quantiles, nonparametric estimation, and smoothing.

OR&IE 680 Simulation
An advanced version of OR&IE 580, intended for Ph.D.-level students.

OR&IE 728-729 Selected Topics in Applied Operations Research
Fall, spring. Credit to be arranged.
Current research topics dealing with applications of operations research.

OR&IE 738-739 Selected Topics in Mathematical Programming
Fall, spring. Credit to be arranged.
Current research topics in mathematical programming.

OR&IE 768-769 Selected Topics in Applied Probability
Fall, spring. Credit to be arranged.
Topics chosen from current literature and research areas of the staff.

OR&IE 778-779 Selected Topics in Applied Statistics
Fall, spring. Credit to be arranged.
Topics chosen from current literature and research of the staff.

OR&IE 790 Special Investigations
Fall, spring. Credit to be arranged.
For individuals or small groups. Study of special topics or problems.

OR&IE 799 Thesis Research
Fall, spring. Credit to be arranged.
For individuals doing thesis research for master's or doctoral degrees.

OR&IE 891 Operations Research Graduate Colloquium
Fall, spring. 1 credit each term. A weekly 1-1/2 hour meeting devoted to presentations by distinguished visitors, by faculty members, and by advanced graduate students on topics of current research in the field of operations research.

OR&IE 893-894 Applied OR&IE Colloquium (also M&E 594)
Fall, spring. 1 credit each term. A weekly meeting for Master of Engineering students. Discussion of various topics on manufacturing with faculty members and outside speakers.

T&AM 118 Design Integration: A Portable CD Player (also MS&E and ENGR 118)
Spring. 3 credits.
For description, see ENGR 118.

T&AM 202 Mechanisms of Solids (also ENGRD 202)
Fall, spring. 3 credits. Prerequisite: PHYS 112, coregistration in MATH 293 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 294, or permission of instructor.
For description, see ENGRD 203.

THEORETICAL AND APPLIED MECHANICS

Basics in Engineering Mathematics and Mechanics

T&AM 191 Calculus for Engineers (also MATH 193)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry.
For description, see MATH 191.

T&AM 192 Calculus for Engineers (also MATH 192)
Fall, spring, or summer. 4 credits. Prerequisite: MATH/T&AM 191/193.
For description, see MATH 192.

T&AM 193 Calculus for Engineers (also MATH 193)
Fall. 4 credits. Prerequisite: 3 years of high school mathematics, including trigonometry.
For description, see MATH 193.

T&AM 293 Engineering Mathematics (also MATH 293)
Fall, spring. 4 credits. Prerequisite: MATH/T&AM 192 plus a knowledge of computer programming equivalent to that taught in COM S 100.
For description, see MATH 293.

T&AM 294 Engineering Mathematics (also MATH 294)
Fall, spring. 4 credits. Prerequisite: MATH/T&AM 293.
For description, see MATH 294.

T&AM 310 Advanced Engineering Analysis I
Fall, spring. 3 credits. Prerequisite: MATH/T&AM 294 or equivalent.
Initial value, boundary value, and eigenvalue problems in linear ordinary differential equations. Special functions, linear partial differential equations. Introduction to probability and statistics. Use of computers to solve problems.

T&AM 311 Advanced Engineering Analysis II
Spring. 3 credits. Prerequisite: MATH/T&AM 294 or equivalent (T&AM 311 can be taken without T&AM 310).
Introduction to complex variable theory. Cauchy's Integral theorem, Laurent series, Classification of singularities, Method of Residues. Applications include conformal mapping (Laplace equation), Laplace transform, Fourier transform, Fourier series, Transfer function, Solution and stability of Linear Systems. Examples are drawn from fluid mechanics, heat transfer, electromagnetics, and elasticity.

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. Linear algebra, calculus of several variables, vector analysis, series, ordinary differential equations, complex variables.

T&AM 611 Methods of Applied Mathematics II
Spring. 3 credits. Prerequisite: T&AM 610 or equivalent.
Emphasis on applications. Partial differential equations, transform techniques, tensor analysis, calculus of variations.
T&AM 612 Methods of Applied Mathematics III
Fall. 3 credits. Prerequisite: T&AM 610 and 611 or equivalent.

T&AM 613 Methods of Applied Mathematics IV
Spring. 3 credits. Prerequisite: T&AM 610 and 611 or equivalent.
Topics include asymptotic behavior of solutions of linear and nonlinear ODE (e.g., the WKB boundary layer and multiple-scale methods), asymptotic expansion of integrals (method of steepest descent, stationary phase and Laplace methods). 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, Stokes phenomenon. The course may also include computer exercises at the option of the instructor.

Continuum Mechanics

T&AM 455 Introduction to Composite Materials (also M&AE 455 and MS&E 455)
Spring. 4 credits.
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; 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. 3–6 credits.
M. Eng. (Mechanics) project related to the mechanics of advanced composites and structures.

T&AM 592 Master of Engineering Design Project II
Spring. 5–15 credits.
M. Eng. (Mechanics) project related to the mechanics of advanced composites and structures.

T&AM 655 Composite Materials (also M&AE 655 and MS&E 655)
Spring. 4 credits.
Taught jointly with T&AM 455 using same lecture material, but also includes more advanced material and homeworks 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; compressive strength of composites. Laboratory on effects of holes and notches in composites.

T&AM 663 Solid Mechanics I
Fall. 4 credits.
Rigorous introduction to solid mechanics emphasizing linear elasticity: tensors, deformations, rotations and strains; balance principles; stress; small-strain theory; linear elasticity, anisotropic and isotropic; basic theorems of elastostatics; 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. Singular solutions in linear elasticity; plane stress, plane strain, anti-plane shear, Airy stress functions; linear viscoelasticity; cracks and dislocations; classical plasticity; thermoelasticity; three-dimensional elasticity.

T&AM 666 Finite Element Analysis for Mechanical, Structural, and Aerospace Applications (also CEE 772 and M&AE 690)
Spring. 3 credits. Prerequisite: T&AM 663.
For description, see M&AE 680.

T&AM 751 Continuum Mechanics and Thermodynamics
Fall. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents.
Kinematics; conservation laws; the entropy inequality; constitutive relations; frame indifference, material symmetry; 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. Not offered 1997–98.
Review of governing equations. 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.

T&AM 757 Inelasticity
Spring. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents. Offered alternate years.
Plasticity: dislocation slip systems; early experimental observations; general principles; limit analysis; solution of boundary-value problems, plastic waves, one- and three-dimensional. Visco-elasticity: 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. Offered alternate years. Not offered 1997–98.
Introduction to boundary element methods. Solutions for potential theory, linear elasticity, diffusion, material and/or geometric nonlinearities. Modern developments: hypersingular integrals, the boundary boundary methods, sensitivity analysis.

T&AM 768 Elastic Waves
Fall. 3 credits. Prerequisites: T&AM 610 or 611; and 633 and 574 or equivalents. Offered alternate years. Not offered 1997–98.
An advanced course on dynamic stress analysis and wave propagation in elastic solids. Theory of elastodynamics, waves in isotropic and anisotropic medium; reflection and refraction; surface waves and waves in layered media, transient waves and methods of Lamb-Cagniard-Palmer; thick plate theories; vibrations of spheres; scattering of waves and dynamic stress concentrations.

Dynamics and Space Mechanics

T&AM 570 Intermediate Dynamics
Fall. 3 credits.

T&AM 574 Vibrations and Waves in Elastic Systems (also M&AE 577)
Spring. 4 credits. Prerequisites: T&AM 570 and 610. 3 lectures, one lab. Not offered 1997–98.

T&AM 578 Nonlinear Dynamics and Chaos
Spring. 3 credits. Prerequisite: Mathemati- cals/T&AM 293 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. Lorenz equations, chaos, strange attractors, fractals, iterated mappings, period doubling, renormalization.

T&AM 671 Advanced Dynamics
Spring. 3 credits. Prerequisite: T&AM 570 or equivalent. Offered alternate years.
Not offered 1997–98.
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; Melnikov’s method.

THEORETICAL AND APPLIED MECHANICS 219
FACULTY ROSTER

Abel, John F., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering
Ahner, Beth A., Ph.D., Massachusetts Institute of Technology. Ass't Prof., Agricultural and Biological Engineering
Allbright, Louis D., Ph.D., Cornell U. Prof., Agricultural and Biological Engineering
Allmendinger, Richard, Ph.D., Stanford U. Prof., Geological Sciences
Anghel, Daniel J., Ph.D., Cornell U. Assoc. Prof., Agricultural and Biological Engineering
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Hover, Kenneth C., Ph.D., Cornell University.
Hopcroft, John E., Ph.D., Stanford University.
Hjort, Kurt, Ph.D., Stanford University.
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<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Institution</th>
<th>Department</th>
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<tbody>
<tr>
<td>Pope, Stephen B.</td>
<td>Ph.D.</td>
<td>Imperial College of Science and Technology</td>
<td>Mechanical and Aerospace Engineering</td>
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<tr>
<td>Pottle, Christopher</td>
<td>Ph.D.</td>
<td>University of Illinois</td>
<td>Electrical Engineering</td>
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<td>Psaki, Mark L., M.A.</td>
<td></td>
<td>Princeton University</td>
<td>Engineering Research and Industrial Engineering</td>
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<td>Rand, Richard H., Sc.D.</td>
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<td>Engineering</td>
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<td>Reeves, Timothy F., Ph.D.</td>
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<td>Kent University</td>
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<td>Resnick, Sidney, Ph.D.</td>
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<td>Rhodes, Frank H. T., Ph.D.</td>
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<td>Geological Sciences</td>
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<td>Rodriguez, Ferdinand</td>
<td>Ph.D.</td>
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<td>Mechanical and Aerospace Engineering</td>
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<td>Rosakos, Phoebeus, Ph.D.</td>
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<td>California Institute of Technology</td>
<td>Chemical Engineering</td>
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<td>Roundy, Robin, Ph.D.</td>
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<td>Rubinfeld, Ronitt, Ph.D.</td>
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<td>Ruina, Andy L., Ph.D.</td>
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<td>Northwestern University</td>
<td>Mechanical and Aerospace Engineering</td>
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<td>Ruoff, Arthur L., Ph.D.</td>
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<td>Ruppert, David, Ph.D.</td>
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<td>Sachse, Wolfgang H., Ph.D.</td>
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<td>Johns Hopkins University</td>
<td>Mechanical and Aerospace Engineering</td>
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<td>Saier, George, Ph.D.</td>
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<td>Mechanical and Aerospace Engineering</td>
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<td>Samorodintsky, Gennady, D.S.</td>
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<td>Technion-Israel Inst. of Technology</td>
<td>Chemical Engineering</td>
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<td>Saltzman, W. Mark, Ph.D.</td>
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<td>Massachusetts Inst. of Technology</td>
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<td>Samuels, B.</td>
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<td>University of California Berkeley</td>
<td>Geological Sciences</td>
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<td>Sansalone, Mary J., Ph.D.</td>
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<td>Cornell University</td>
<td>Materials Science and Engineering</td>
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<td>Schneider, Fred B., Ph.D.</td>
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<td>SUNY at Stony Brook</td>
<td>Civil and Environmental Engineering</td>
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<td>Schrader, Brian, Ph.D.</td>
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<td>University of Wisconsin</td>
<td>Agricultural and Biological Engineering</td>
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<td>Schuberti, Praveen, Ph.D.</td>
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<td>Wisconsin University</td>
<td>Agricultural and Biological Engineering</td>
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<td>Schuler, Richard E., Ph.D.</td>
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<td>Brown University</td>
<td>Materials Science and Engineering</td>
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<td>Scott, Norman R., Ph.D.</td>
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<td>Cornell University</td>
<td>Operations Research and Industrial Engineering</td>
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<td>Seyler, Charles E., Ph.D.</td>
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<td>Iowa University</td>
<td>Operations Research and Industrial Engineering</td>
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<td>Shacham-Diamand, Yoav, D.Sc.</td>
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<td>Israel Institute of Technology</td>
<td>Computer Science</td>
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<td>Shemesh, David, Ph.D.</td>
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<td>University of California Berkeley</td>
<td>Electrical Engineering</td>
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<td>Shoemaker, Christine A., Ph.D.</td>
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<td>Southern California</td>
<td>Civil and Environmental Engineering</td>
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<td>Shuler, Michael L., Ph.D.</td>
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<td>University of Minnesota</td>
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<td>Sileo, John, Ph.D.</td>
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<td>Cambridge University</td>
<td>Operations Research and Industrial Engineering</td>
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<td>Smith, Brian D., U.</td>
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<td>California at Berkeley</td>
<td>Mechanical and Aerospace Engineering</td>
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<td>Steen, Paul H., Ph.D.</td>
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<td>Johns Hopkins University</td>
<td>Mechanical and Aerospace Engineering</td>
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<td>Suzuki, Yuri, Ph.D.</td>
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<td>Stanford University</td>
<td>Electrical Engineering</td>
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<td>Tang, Chung L., Ph.D.</td>
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<td>Harvard University</td>
<td>Aerospace Engineering</td>
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<td>Taylor, Dean L., Ph.D.</td>
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<td>Stanford University</td>
<td>Mechanical and Aerospace Engineering</td>
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<td>Teitelbaum, R., Tim., Ph.D.</td>
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<td>Carnegie-Mellon University</td>
<td>Computer Science</td>
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<td>Thomas, Robert J., Ph.D.</td>
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<td>Wayne State University</td>
<td>Civil and Environmental Engineering</td>
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<td>Thompson, Michael O., Ph.D.</td>
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<td>Cornell University</td>
<td>Aerospace Engineering</td>
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<td>Thorp, J., Ph.D.</td>
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<td>Aerospace Engineering</td>
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<td>White, Richard N., Ph.D.</td>
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<td>Wisconsin University</td>
<td>Operations Research and Industrial Engineering</td>
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<td>Wicker, Stephen B., Ph.D.</td>
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<td>So. California</td>
<td>Operations Research and Industrial Engineering</td>
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<td>Wiser, Frank W., Ph.D.</td>
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<td>Cornell University</td>
<td>Aerospace Engineering</td>
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<td>Zabih, Ramin, Ph.D.</td>
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<td>van der Muelin, Marjorie, Ph.D.</td>
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<td>Van Loan, Charles F., Ph.D.</td>
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<td>Visweswaran, Venugopalan, Ph.D.</td>
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<td>Viswanathan, W., Ph.D.</td>
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<td>Voelcker, Herbert B., Ph.D.</td>
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<td>Walker, Larry P., Ph.D.</td>
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<td>Warkentin, Richard, Ph.D.</td>
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<td>Wase, Frank W., Ph.D.</td>
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<td>Zabaras, Nicholas, Ph.D.</td>
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<td>Zehnder, Alan, Ph.D.</td>
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<td>California Inst. of Technology</td>
<td>Operations Research and Industrial Engineering</td>
</tr>
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</table>
GRADUATE SCHOOL

Walter Cohen, dean
Christine Ranney, associate dean
Eleanor S. Reynolds, associate dean
Hilary Ford, assistant dean

Graduate study at Cornell is pursued through the Graduate School, which administers the many graduate fields of study, or through the various graduate professional schools and colleges.

GRADUATE SCHOOL

The graduate program at Cornell permits an unusual degree of accommodation to the needs and interests of the individual student. Degree requirements are kept to a minimum. There are no specific course or credit requirements for the advanced general degrees of Master of Arts, Master of Science, and Doctor of Philosophy, but only such general requirements that 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 who usually has the primary responsibility for directing the student's thesis or dissertation research.

Students who want to use the university's facilities for intensive specialized training only and who do not want to become degree candidates may apply for admission as non-degree students.

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 for those fields that require the GREs.

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 Test of English as a Foreign Language (TOEFL) score of 550 or higher (600 for some fields);
2) a degree from a college or university in a country where the native language is English; or
3) two or more years of study in an undergraduate or graduate program in a country where the native language is 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, New Jersey 08541, U.S.A.

Applications for fall admission for most fields in the Graduate School should be received by early January. Many fields, however, have different deadlines. Consult the Graduate School's application booklet for the closing date for each field.

Inquiries regarding admission and fellowships should be addressed to the Graduate School Admissions Office, Cornell University, Caldwell Hall, Ithaca, New York 14853-2602.

Inquiries regarding facilities for advanced study and research in a given field, special requirements for such study and research, and opportunities for 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 the application and the Catalog may be obtained by contacting the individual graduate field offices or through the Graduate School, Caldwell Hall, Cornell University, Ithaca, New York 14853-2606. Both the application and the Catalog are available for viewing on the World Wide Web <http://www.gradschool.comell.edu/>.

Note: Programs leading to the degrees of Doctor of Law (J.D.), 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 Medical College (New York City), the College of Veterinary Medicine, and the Johnson Graduate School of Management respectively.
ADMINISTRATION

David A. Dittman, dean
A. Neal Geller, associate dean for academic affairs
Judi Brownell, Richard J. and Monene P. Bradley director for graduate studies
Timothy Hinkin, director of undergraduate studies
Donald C. Bishop, associate dean of students and enrollment management
David W. Butler, associate dean for executive education
Margaret Haley Ferguson, director of financial services
James E. Hisle, managing director of the Statler Hotel and J. Willard Marriott Executive Education Center
Cheryl S. Farrell, director of minority programs and lecturer
Sandra K. Boothe, director of the professional master’s program
Katherine S. Margolis, director of academic information resources and training
Richard S. MacDonald, director of administrative services
Philippus Miller III, director of alumni affairs
Preston Clark, director of instructional support and visiting lecturer
Millie Reed, director of career services
Glenn Withiam, director of publications
Fred Conner, senior editor of the Cornell Hotel and Restaurant Administration Quarterly
Mark Adams, director of communications

DEGREE PROGRAMS

Hotel and Restaurant Administration

Degree
B.S.
M.M.H.
M.S.
Ph.D.

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 25,000 books, 1,000 videotapes, numerous ephemera and memorabilia (such as photographs, menus, and rare books), and more than 800 journal, magazine, newsletter, and newspaper subscriptions. Materials on lodging, foodservice, travel and tourism, and general business topics comprise the core of the library’s collections. Among the library’s special features are numerous computerized information resources, including NEXIS, Dow Jones, ABI/Inform, and The International Hospitality and Tourism Database, an extensive and unique index to hospitality articles. Information resources and services for the hospitality industry are available for a fee through the library’s HOSTLINE service. In addition to offering an excellent collection of materials and a dignified and refined study space, the Hotel School library extends quality service to every student. Please visit us and benefit from our collections and services.

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 Cornell 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 management, human resources, financial management, food and beverage operations, marketing, tourism, property asset management, communications, 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 174 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 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 121 and 122 (9 credits) or the equivalent, and attain a minimum grade of at least C- 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 prior to the last term of residence, as defined on the following page;

5) completion of the university requirement in physical education.

Suggested course programs appear on the following pages. The core courses account for 69 of the 120 credits needed for graduation, the selected concentration accounts for 12 credits, and 18 credits are allotted for distributive electives. The remaining 21 credits may be earned in courses chosen from the offerings of any college of the university, provided that the customary requirements for admission to such courses are met.

Students in the School of Hotel Administration who plan to attend summer school at Cornell or any other four-year college or university, with the expectation that the credit earned will be counted toward the Cornell degree in hotel administration, must obtain the approval of the school in advance. Without advance approval, such credit may not count toward the degree.

Credit earned in military science, aerospace studies, or naval-science courses may be counted in the 21-credit group of free-electives.

Transfer Credit Policy

Transfer students are required to complete all degree requirements with at least seventy-five (75) credits at Cornell University, of which a minimum of sixty (60) must be in courses offered by the Hotel School, and nine (9) must be in distributive electives taken outside the Hotel School. Thus, a maximum of forty-five (45) hours in transfer credit may be allowed from other accredited colleges or universities, as follows:
In the core, transfer credit may be allowed against basic courses only (for example, HA 121, HA 136, Economics). Others (including HA 243 and HA 174) generally are waived, and an upper-level course in the area substituted. For instance, if HA 243 were waived, another marketing course would be required in its place. The communication courses (HA 165 and HA 365) are tailored specifically to the School of Hotel Administration, and, thus, communication courses taken elsewhere generally are not accepted against core courses.

Concentration courses may not transfer without the express written consent of the faculty in the area concerned. While such consent is rare, it is not impossible.

Distributive electives ensure that Hotel students are exposed to other courses at Cornell, and, thus, only nine (9) credits may transfer. The remaining nine (9) must be taken at Cornell but may be distributed in any combination of humanities, social sciences, or natural sciences provided at least three (3) credits are taken at Cornell or transferred from elsewhere in each area.

Twenty-one (21) credits in free electives may transfer.

**Concentration**

While completing the required courses leading to the bachelor's degree, undergraduates in the school also must select a concentration: 12 elective credits in a major area of the core curriculum or, with the support of a faculty member, in a self-directed course of study.

When students select a field of concentration, they 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.

**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 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 degree requirements, undergraduates enrolled in the School of Hotel Administration must fulfill the practice-credit requirement and submit verification thereof prior to registering for the last semester. 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 academic credits, 1 practice credit, and may petition on an ad-hoc basis to have a portion of the academic credits applied toward their concentration. While on the internship, tuition is reduced and students receive a salary from the sponsoring organization. Positions are available in the U.S. and internationally. Sponsors include, but are not limited to, hotels, restaurants, casinos, corporate offices, consulting firms, and clubs. Application should be made one semester in advance. Information meetings are held at the beginning of each semester and are open to all students. See H Adm 493 and 494 for more details. More information about the management intern program also is available in the Career Services Office, 255 Statler Hall.

**Study Abroad**

All students planning to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of Course of Study. Programs providing an opportunity to study in a foreign country and develop an awareness of the international component of the hospitality industry can contribute to each student's total educational experience. Students in recent years have studied in Italy, Spain, France, England, 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 study-abroad faculty representative and the director of student services so that petition 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 174 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 must maintain a minimum average of 2.0. Of the free-elective courses, a maximum of 4 credits each term may be taken on a "satisfactory-unsatisfactory" (S-U) basis.

Students should be aware that a satisfactory grade equals "C" or above and an unsatisfactory grade equals "D+" or lower. Courses taken S-U may be counted only as free electives.

Students whose term averages are at least 3.3 and who took at least 12 credits of letter grades with no unsatisfactory or incomplete grades are honored by being placed on the Dean's List.

**Course Requirements for Graduation**

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Operation</td>
<td>Hotel Administration 105, 301</td>
</tr>
<tr>
<td>Human-Resources Management</td>
<td>Hotel Administration 115, 211</td>
</tr>
<tr>
<td>Financial Management</td>
<td>Hotel Administration 121, 221, 222, 321</td>
</tr>
<tr>
<td>Food and Beverage Management</td>
<td>Hotel Administration 136, 236, 335</td>
</tr>
<tr>
<td>Marketing and Tourism</td>
<td>Hotel Administration 243, elective</td>
</tr>
<tr>
<td>Property Asset Management</td>
<td>Hotel Administration 255, 355</td>
</tr>
<tr>
<td>Communication</td>
<td>Hotel Administration 165, 365</td>
</tr>
<tr>
<td>Operations Management and Information Technology</td>
<td>Hotel Administration 174, 175</td>
</tr>
<tr>
<td>Law</td>
<td>Hotel Administration 387</td>
</tr>
<tr>
<td>Economics</td>
<td>Micro and Macro</td>
</tr>
<tr>
<td>Specifically required credits</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
</tr>
<tr>
<td>Distributive electives</td>
<td></td>
</tr>
<tr>
<td>Free electives</td>
<td></td>
</tr>
</tbody>
</table>

| Total credits required for graduation | 120 |

**Typical Course Sequences**

The following arrangements of courses tend to be more fixed in the freshman and sophomore years, with a greater degree of flexibility characterizing the upperclass years.

**Freshman Year**

Typically, a freshman schedule will consist of 15 to 16 credits each term, to include the following:

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>H Adm 105, Rooms Division Management</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 136, Food and Beverage Management</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 175, Quantitative Methods</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 191, Microeconomics for the Service Industries</td>
<td>3</td>
</tr>
<tr>
<td>Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Distributive or free electives</td>
<td>3</td>
</tr>
</tbody>
</table>

| Total credits | 31 |
GRADUATE CURRICULUM

The school’s programs for advanced degrees include those of Master of Management in Hospitality, Master of Science, and Doctor of Philosophy. For further information on graduate programs, consult the school’s graduate catalog available in room 172 Statler Hall; contact Professor Judi Brownell, the school’s Bradley director for graduate studies at 255-7245, Sandra K. Boothe, director of the Master of Management in Hospitality program at 255-7246, or see the university’s Announcement from the Graduate School.

Required Program for Professional Master’s Students

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>H Adm 701, Competitive Strategies for the Hospitality Industry</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 702, Human Behavior in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 711, Human Resources Management</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 721, Financial Economics</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 722, Hospitality Financial Management</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 731, Food and Beverage Management</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 741, Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 751, Properties Development and Planning</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 761, Communication Modules</td>
<td>0</td>
</tr>
<tr>
<td>H Adm 771, Quantitative Methods</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 772, Information Technology</td>
<td></td>
</tr>
<tr>
<td>H Adm 791, Creating and Managing for Service Excellence</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 793, Industry Mentorship Program</td>
<td>0</td>
</tr>
<tr>
<td>H Adm 794, Management Development</td>
<td></td>
</tr>
<tr>
<td>Component I, II, and III</td>
<td>0</td>
</tr>
</tbody>
</table>

Balance of courses are electives.

Total credits required for the Master of Management in Hospitality program: 64

COURSE SCHEDULE INFORMATION

For up-to-date information about course scheduling, and to obtain a course supplement, contact the hotel school student services office in room 178 Statler Hall, telephone 255-5076.

MANAGEMENT OPERATION COURSES

H ADM 100 Principles of Management
Fall and spring. 3 credits. Limited to non-hotel school students. Elective. R. Chase. An introductory survey course in management with orientation to the hospitality industry. The course is organized around the traditional management functions of planning, organizing, commanding, coordinating and controlling.

H ADM 102 Distinguished Management Lectures
Fall. 1 credit. Limited to hotel school students except by written permission. Elective. D. Dittman.
A series of lectures given by non-resident speakers prominent in the hotel and restaurant industries or allied fields. Topics include career ladders, company profiles, and business-policy formulation.

H ADM 105 Rooms-Division Management
Fall and spring. 3 credits. Limited to hotel school students without permission. Elective. R. Rainsford.
Provides students with a comprehensive, well-rounded, fundamental understanding of rooms division operations and management in hotels. Operational areas include housekeeping, reservations, front desk (including check-in, check-out, Bellstand, operator and night audit). Managerial areas include yield management, human resource management, basic marketing and management principles, and organizational objectives.

H ADM 301 Strategic Management
Fall and spring. 3 credits. Limited to 45 juniors and seniors by permission. Prerequisites: H Adm 105, 115, 211, and 321, or equivalents. Required. R. Chase, C. Enz, P. Rainford.
Provides students with a comprehensive understanding of strategic management, emphasizing the value of analyzing environments and formulating strategies linked to environmental conditions, building on organizational strengths, and defending against organizational weaknesses. Emphasis also on handling ambiguous facts and analysis. Because of the group project nature of the course, the absolute drop deadline for all students is September 4 in the fall and January 23 in the spring.

H ADM 303 Club Management
Fall and spring. Fall, second week only; spring, first week only. 2 credits. Fall, limited to 35 hotel school juniors and seniors; spring, open enrollment. Prerequisite for hotel students: H Adm 105, or equivalent. Elective. R. James.
The study of private membership clubs and club management. The application of current management principles in a not-for-profit environment is discussed and club management is compared to other areas of the hospitality industry. Topical coverage includes: tournament, facility, and recreation management; legal, financial, and legislative issues; human relations and resource, consideration, marketing, pricing policies, and quality standards. The deadline to drop is the mid-point of the course.

H ADM 305 Resort and Condominium Management
Fall. 3 credits. Not open to freshmen. Elective. M. Noden.
A lecture course in the operation of various types of resort hotels and condominiums. Emphasis is on the promotion of business, the provision of facilities, services, and guest entertainment. Contract and non-contract relationships with the travel industry, terminology, rental-pool agreements, S.E.C. regulations, state statutory requirements, developer-management-owner contracts, and relationships in condominiums are reviewed.

H ADM 306 Franchising in the Hospitality Industry
Fall. 2 credits. Not open to freshmen. Elective. M. Noden.
A lecture course in the operation of various types of resort hotels and condominiums. Emphasis is on the promotion of business, the provision of facilities, services, and guest entertainment. Contract and non-contract relationships with the travel industry, terminology, rental-pool agreements, S.E.C. regulations, state statutory requirements, developer-management-owner contracts, and relationships in condominiums are reviewed.

H ADM 401 Negotiations in the Hospitality Industry
Spring. 3 credits. Limited to 30 juniors, seniors, and graduate students, with preference given to hotel school seniors and second-year graduate students. Prerequisites: H Adm 115, 702, or equivalents. Elective. T. Simons.
Provides experience and coaching in a variety of settings in face-to-face negotiations. Students will develop skills and understanding through extensive role-play exercises and discussions, supported by conceptual and practical readings.

H ADM 402 Hospitality Management Seminar
Fall. 1 credit. Limited to 30 juniors and graduate students by permission. Students will be expected to register for H Adm 102. Elective. D. Dittman.
A weekly seminar with the H Adm 102 speaker of the week. The subject matter varies from week to week, depending on the speaker’s area of expertise. The class is
relatively unstructured, and students are expected to participate in discussions.

H ADM 404 Entrepreneurship and Small Business Management
Fall and spring. 3 credits. Limited to 20 juniors, seniors, and graduate students. Prerequisite: H Adm 321 or equivalent. Elective. P. Rainsford. Focuses on the entrepreneur and the decisions made in planning, financing, developing, and operating a new business venture. Case studies and guest speakers will be used. There will be a group project term, which will require student teams to serve as consultants to real businesses that have asked for help from the Small Business Administration. Because of the group project nature of the course, the absolute drop deadline for all students is September 4 in the fall and January 23 in the spring.

H ADM 405 Quality Planning in the Hospitality Industry
Spring. 3 credits. Limited to 25 seniors and graduate students. Prerequisites: all required hotel undergraduate courses at the 100, 200, and 300 levels. Elective. T. Hinkin. Focuses on the analysis of work processes and examines organizations from three perspectives: the customer, the employee, and management. Provides students with a systematic approach to identifying, prioritizing, and improving key job functions and work processes utilizing the tools of quality management. Readings, case analysis.

H ADM 406 Integrated Studies in the Hospitality Industry
Fall and spring. 3 credits. Limited to hotel school seniors. Elective. Not offered fall 1997. R. Chase. Employs text readings, participation in a simulation of a hotel organization, and guest presentations to explore business missions, objectives, strategies, action plans, and evaluations. As an integrative, summary course, the areas of review and application will involve hotel and food service, marketing, organization, and finance.

H ADM 407 Seminar in Hotel Operations
Spring. 3 credits. Limited to 30 seniors. Estimated cost of field trip, $200. Elective. T. Cullen. Seminar course applies management theory to actual hotel operations via semester-long interactions and visits with the department heads and general manager of a medium-to-large-size hotel. Field trip includes attendance at executive committee meeting, presentations by various department heads, and half-day “shadow assignments.”

H ADM 408 Introduction to Casino Operations
Spring. 2 credits. Limited to 45 juniors, seniors and graduate students. Estimated cost of field trip, $150. Elective. J. Kelly. Introduction to the multi-billion dollar gaming industry, including a historical overview of gaming and examination of legal, social, and economic issues within the industry. Reviews various games played in casinos, current trends, and the most popular casino destinations in the world. Special attention is devoted to the growth of casinos in cruise ships, Indian reservations, and on river boats in the U.S.

H ADM 409 Airline Management
Spring. 3 credits. Limited to 25 seniors and graduate students. Elective. M. Noden. Focuses on the airline and international airline industries and explores both pre- and post-regulatory climates. Emphasis is on dynamic organizational change in response to fluctuating economic and legal conditions. Topics include airline organization, comparative corporate strategies, marketing and distribution networks, operations and service management, union relations, finance, government regulation, and air transport. Case studies and guest lecturers will be used. Also, using the computer-driven simulation exercise called AIRLINE, student teams will operate a small regional carrier.

H ADM 501 Creative Management for Organizational Change
Spring. 3 credits. Limited to 24 students. Elective. Faculty. Through lecture, exercises, and group problem-solving sessions students will explore the characteristics of creative people, organizations, and processes, and obtain an inventory of their own creative ability, examine blocks to creativity and ways to overcome them, plan tactics for selling ideas, discuss methods for leading creative problem-solving meetings, and analyze strategies for producing organizational change. Organizational leaders will present problems for which students will develop creative solutions.

H ADM 503 Managing Across Cultural Boundaries
Fall and spring. 3 credits. Limited to 15 seniors and graduate students. Prerequisites: H Adm 121, 165, 301, 321, or graduate student status. Elective. T. Cullen. Contributes to the development of knowledge and skills needed to manage effectively in other cultures. Objectives are to develop awareness of the pervasive and hidden influence of culture on behavior, particularly with respect to management and management practices; to develop familiarity with the types of situations and issues that confront managers working in foreign countries; and to develop an appreciation of the impact on personal behavior of living and working in another culture. Readings, case studies.

H ADM 605 Best Practices for High Performance and the Management of Change
Fall and spring. 3 credits. Professional master’s elective. Not offered fall 1997. C. Enz. Explores the dynamics of identifying and implementing “best practices” to renew organizations and enhance performance. Examines how to introduce planned change to implement the practices. Emphasis placed on the diagnosis and design of human resource initiatives to achieve improved organizational performance.

H ADM 701 Competitive Strategies for the Hospitality Industry
Fall. 3 credits. Professional master’s requirement. T. Cullin. An integration and application of management concepts, theories, and practices to business situations. Students analyze current problems, formulate strategies, and implement policies.

H ADM 702 Human Behavior in Organizations
Fall. 3 credits. Professional master’s requirement. T. Hinkin. An integrative theoretical application, designed to increase interpersonal and managerial effectiveness. Emphasis on personality and perception, decision making, motivation, power, group process, and diversity management.

H ADM 801 Seminar in Hospitality and Service Inquiry
Fall. 3 credits. Elective. C. Lundberg. This seminar introduces academic graduate students to the major alternative ways of conceptualizing and designing research, and acquiring, interpreting, and disseminating findings. The implications and consequences of one’s choices and tradeoffs among the alternative philosophical, ideological, and pragmatic perspectives and approaches of doing inquiry will be emphasized.
Students will develop and conduct a culture audit in a business. Class discussion, case analysis, and field experience.

H ADM 711 Human Resources Management
Spring. 3 credits. Professional master's requirement. C. Lundberg.
Focuses on the development of human resources management skills and exploration of the dilemmas and responsibilities of leadership. Uses managerial perspective with emphasis on the effects that managerial activities have on recruitment, selection, and retention systems. Individual decision-making and integration abilities will be assessed. Case studies, exercises, and simulations.

FINANCIAL MANAGEMENT COURSES

H ADM 120 Survey of Financial Management
Spring. 2 credits. Limited to non-hotel school students. Elective. Faculty.
A survey of basic principles of financial management, investment management, and financial analysis. Designed for the student who desires a basic general knowledge of financial decision making.

H ADM 121 Financial Accounting
Fall and spring. 3 credits. Limited to hotel school students. Required. D. Ferguson.
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 and spring. 3 credits. Limited to non-hotel school students. Elective. C. Lundberg.

H ADM 125 Finance
Fall and spring. 3 credits. Limited to non-hotel school students. Elective. L. Canina, G. Swanson.
Corporate finance topics include time value of money, financial markets, interest rates, financial statement analysis and planning, working capital policy and management, risk and return, risk management, security valuation models, cost of capital, capital budgeting, capital structure, dividend policy, and creative finance.

H ADM 211 Managerial Accounting
Fall. 3 credits. Prerequisites: H Adm 121 and 175, or equivalents. Required. G. Pobelter.
Focuses on the use of accounting information for management decision making and control. Topics include product costing, management control systems and performance measurement.

H ADM 221 Human Resources Management
Fall. 3 credits. Prerequisites: H Adm 21, 221, or equivalents. Required. S. Carvell.
Provides students with accounting cash flow information for financial planning, capital structure decisions, capital budgeting, evaluation and short-term and long-term financial decision making. Topics include current asset management, short-term financing, capital budgeting, long-term financing, cost of capital, and problems in international finance.

H ADM 321 Hospitality Financial Management
Fall. 3 credits. Prerequisites: H Adm 121, 221 and 222, or permission of instructor. Required. J. Eyster.
Integrates the areas of financial accounting, managerial accounting, and finance and applies the interpretive and analytical skills of each to hospitality-industry situations. Topics include uniform system of accounts, revenue and expense tracking and internal control, accounting systems, ratio and comparative analysis, cost-volume-profit analysis, pricing, operational budgeting, project capital budgeting, decision-making, equity and debt financing structures, and operating agreement forms. Students analyze hospitality operations and projects and present their findings in management report form.

H ADM 322 Principles of Investment Management
Fall. Limited to non-hotel school students. Hotel school students or those with a background in economics, quantitative analysis, and computers are advised to enroll in H Adm 424. Elective. A. Arbel.
An introductory course covering institutional and analytical aspects of security analysis and investment portfolio management including valuation models and practical strategies for stocks, bonds, and mutual fund selection and trading. Computer-assisted analysis, including students' participation in an investment game, is discussed and applied in a realistic manner.

H ADM 323 Hospitality Real-Estate Finance
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: H Adm 321, or equivalent. Elective. J. deRoos.
Focuses on real estate financing for hospitality-oriented projects. Topics include 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, workout strategies for distressed properties, trends in international hotel franchising; and ethical issues of real estate development. Presentations of hospitality industry real estate practitioners.

H ADM 324 International Financial Management
Fall and spring. 3 credits. Prerequisites: H Adm 121, 221, 222, or equivalents, micro and macroeconomics. Elective. J. Eyster.
Focuses on the international aspects of financial management important to the hospitality industry with the intention of designing an understanding of and confidence in dealing with the economic issues faced by the multinational corporation. Areas covered are the international financial management environment, the management of foreign exchange risk, international asset management, and international sources of funds.

Functional areas within hospitality organizations; and b) understand how to effectively attract, retain, and motivate hospitality employees.

H ADM 313 Training in the Hospitality Industry
Fall. 3 credits. Limited to 24 students. Prerequisite: H Adm 211. Elective. B. Tracey.
Training is one of the primary activities for coping with a continuously changing environment. It also is one of the fundamental responsibilities of all hospitality managers. Students will learn the major theoretical and practical issues associated with program design, development, implementation, and evaluation. Semester-long project with one or more hospitality organizations.

H ADM 412 Managing Organizational Change
Spring. 3 credits. Prerequisite: H Adm 211 or equivalent. Elective. Faculty.
Facilitating and managing change in organizations. Topics include change processes, organizational diagnosis, action planning, and consultancy. Individual and team projects.

H ADM 414 Leadership and Small Group Processes
Fall. 3 credits. Limited to 30 hotel school juniors, seniors, and graduate students. Elective. C. Lundberg.
Applications of organizational behavior will be explored through lectures, case studies, and management games and exercises. Students will participate in experiential labs aimed at enhancing their effectiveness as members or leaders of groups. Topics include leadership, decision making, motivation, power, and organizational change.

H ADM 415 Managerial Leadership in the 1990s
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 (boss, staff, internal peers, associates and customers). Because of the popularity of this class, priority will be given in the following order: seniors, juniors, non-employee extramural students, associates, freshmen, and Cornell employees. The absolute deadline for adding or dropping the course is 12:00 noon on the first day of class.

H ADM 416 Special Studies in the Management of Human Resources: Service Cultures
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisite: H Adm 211 or equivalent. Elective. Faculty.
Assists students in understanding the role of human resource management and maintaining effective service-driven operations. Emphasis will be placed on the diagnosis and design of human resource initiatives to achieve strong service cultures and improve organizational performance. Topics include the management of emotions, monitoring and measuring the corporate culture for service, and the linkage of human resource practices to service vision, organizational design, and strategic objectives.
H ADM 326 Corporate Finance  
Fall. 3 credits. Limited to juniors and seniors. Prerequisite: H Adm 321.  
Elective. S. Carvell.  
In-depth analysis of corporate financial management, including financing alternatives and capital structure decisions, cash management, capital budgeting decisions, risk analysis, and working capital management. Although applicable to all businesses, special attention is placed on issues important to the hospitality industry. Emphasizes analytical methods through case studies and an in-depth semester project.

H ADM 421 Internal Control in Hospitality Operations  
Fall. 3 credits. Limited to 30 students. Prerequisite: H Adm 321, 722, or equivalents. Elective. Faculty.  
Hotel and restaurant operations are analyzed from the perspective of preventing fraud and embezzlement. The design and distribution of production, accounting, information systems, and supervisory tasks are studied in a manner that will ensure effective internal control and verifiable audit trails. Case studies.

H ADM 422 Taxation and Management Decisions  
Fall. 3 credits. Limited to 50 juniors, seniors and graduate students. Elective. A. Sciarabba.  
Introduction to tax advantages and disadvantages of various organizational structures, including corporations, partnerships, and single proprietors; financial information reporting to tax authorities and shareholders; and how they differ; use of depreciation methods to achieve tax reductions; syndication techniques; and the role tax laws play in promoting private investment and development.

H ADM 423 Financial Management Policy  
Fall. 3 credits. Limited to 30 students; non-hotel students by permission of instructor. Prerequisite: H Adm 326 or 721. Elective. S. Carveil.  
Covers numerous policy issues in financial management. Each of these issues will affect the potential profitability and survivability of the firm under conditions of uncertainty. The course will concentrate on nine major policy issues including capital structure, dividend policy, lease vs. buy analysis, and working capital financing.

H ADM 424 Security Analysis and Portfolio Management  
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: macro and micro economics, introductory course in statistics and/or quantitative analysis, and knowledge of computers beyond word processing. Elective. A. Arbel.  
An in-depth analysis of financial instruments, investments and portfolio management including fixed income, equity securities, advanced valuation models, risk-return analysis, screening techniques, asset allocation, and active portfolio management and trading. Recent developments in investment research are covered, and large financial databases are used for practical applications of the concepts and techniques presented.

H ADM 621 Hospitality Real Estate Finance  
Spring. 3 credits. Limited to graduate students. Prerequisite: H Adm 722, or equivalent. Elective. J. deRoes.  
For description, see H ADM 323. This graduate course includes the H Adm 323 lectures plus an hour-long discussion session each week which features guest speakers from industry, faculty from other colleges, and case studies.

H ADM 624 Analysis and Interpretation of Financial Statements  
Spring. 3 credits. Limited to seniors and graduate students. Elective. G. Potter.  
Covers the financial accounting issues that are encountered in reporting the operations of corporate enterprises. Emphasis is on the components of financial statements, how and why they are reported, and their impact on the overall financial position of the firm and its acceptance in capital markets. Emphasis is on outsiders' views of the company and their decision making through interpretation of the statements.

H ADM 721 Financial Economics  
Fall. 3 credits. Professional master's requirement. L. Canina.  
Integrates corporate finance with the framework of valuation maximization and the competitive analysis of product and factor markets in the hospitality industry. Topics include short-term asset management, strategic valuation, capital budgeting analysis, capital structure decisions, leasing, and international financial management.

H ADM 722 Hospitality Financial Management  
Spring. 3 credits. Professional master's requirement. Faculty.  
Covers both managerial accounting and financial management as they are practiced in the hospitality industry. Topics include hospitality accounting systems and internal control, financial statement analysis and interpretation, operational analysis, cost behavior, budgeting and forecasting, pricing, and feasibility analysis.

FOOD AND BEVERAGE MANAGEMENT COURSES

H ADM 136 Food and Beverage Management  
Fall and spring. 4 credits. Limited to hotel school students. Required. G. Norkus.  
An introduction to the principles of food and beverage management, beginning with an overview of the food service industry at large. Attention is focused on major industry segments, business practices, and trends. Detailed consideration is given to the components of the food service system: marketing, menu planning, logistical support, production, service, controls, and quality assurance. Product and systems differentiation in various industry segments are emphasized.

H ADM 230 Introduction to Culinary Arts  
Fall and spring. 2 credits. Limited to non-hotel school students. Priority given to seniors and graduate students. S-U grades only. Attendance at first class is mandatory. Absolute drop deadline for fall is September 8; spring drop deadline is January 30. Elective. T. Neuhaus.

Studies of food groups, their respective methods of preparation, cooking, presentation, and holding. Designed for non-hotel students who are considering the professional approach to food preparation and service with hands-on practice. Food product identification, preparation and service methods, and professional language of food and cooking.

H ADM 236 Culinary Theory and Practice  
Fall and spring. 4 credits. Prerequisite: H Adm 136. Attendance at first class is mandatory. Required. T. O'Connor, B. Richmond.  
Designed to introduce the student to food and beverage operations through three major components: fundamental food preparation and properties, food products and preparation, and food safety and sanitation. Students will prepare recipes, menus, and production schedules and will develop the ability to recognize properly prepared foods through preparing, tasting, and evaluating foods. They also will develop an awareness of potential production problems and how to troubleshoot them.

H ADM 237 Seminar in Culture and Cuisines  
Fall. 3 credits. Limited to 20 students. Prerequisites: H Adm 165 and 236, or permission of instructor. Elective. R. Spies.  
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 foods of different cultures. Students prepare research reports and oral presentations, and design menus and orchestrate their preparation.

H ADM 330 Seminar in Chain-Restaurant Operations  
Fall and spring. 4 credits. Prerequisite: H Adm 136 and 236, or permission of instructor. Elective. C. Muller, G. Norkus. Chain-affiliated restaurants account for an ever-increasing market share of all food service dollars. The growth of multi-unit chain operations brings out unique challenges, opportunities, and different orientations for restaurant management. This course will identify these present issues, the historical factors that have led to them, and the pending economic and organizational questions facing the chain restaurant segment. Case studies, company research, and a term project.

H ADM 331 Food Service Distribution Management  
Spring. 3 credits. Limited to 24 juniors, seniors, and graduate students; others by permission of instructor. Elective. E. Merberg.  
Provides an overview of the food service distribution industry: past, present, and future. Specific disciplines of food service distribution include marketing and sales, operations, routing, credit management practices, and financial management of the distribution center. Focus also on the newly emerging role of the "distributor consultant." Concept of developing business partnerships between food service distributors and food service distributors is stressed.
H ADM 332 Reviewing the Restaurant: The Consumer's View of the Dining Experience
Spring. 3 credits. Field trip $200. Limited to 20 students. Prerequisites: H Adm 165 and 335, or permission of the instructor. Elective. T. Kelly.
Trains the student to perform a comprehensive analysis of the restaurant dining experience. The role of the restaurant critic-reviewer will be discussed in depth. The student will examine and enhance his or her critical writing skills, as the course will require each student to complete approximately ten restaurant reviews.

H ADM 333 Current Issues in Food Safety and Sanitation
Spring. Variable to 3 credits. Three-credit registration limited to 12 students. Elective. B. Richmond.
A study of current issues in food safety and sanitation, procedures and regulations that affect managerial decisions in food service and hospitality operations. Topics include risk assessment and hazard analysis; legal responsibilities related to food, food handlers, equipment and food facilities; home illness and other public-health concerns; and certification and training. Preparation for NFI/NRA certification and the Food Protection (ETS) certification exam (optional) is offered.

H ADM 334 Wine and Food Pairing Principles and Promotion
Fall. 2 credits. Limited to 20 seniors and graduate students. Prerequisite: H Adm 430 or permission of instructor. Elective. Faculty.
Focuses on the pairing and marketing of wine and food. Students develop an understanding of regional and varietal wine styles; how foods' flavors can change a wine's flavor, and the promotion of wine and food. Topics include wine and food pairing principles, cuisines and their flavor components, food trends in restaurants and in the home, special event planning, and wine list development. Students design and present wine and food pairings to industry guests.

H ADM 335 Restaurant Management
Fall and spring. 4 credits. Limited to 30 hotel school students per lab; others by permission of instructor. Prerequisites: H Adm 136 and 236. Approximate cost of utensils and manual, $75. Once enrolled, students may not drop the course without permission of instructor. Required. G. Traversi, S. Gould, B. Halloran, B. Lang, J. Ridley.
A restaurant-management course in which each student participates as a manager of a full-service restaurant operation. Topics related to the general management of restaurants, including issues in defining a service philosophy, improving profit margins, securing adequate supplies, identifying target markets, and planning for organization growth. The restaurant-laboratory is based on a hands-on managerial component, from which students become familiar with the various requirements for success of each of the line positions in a restaurant.

H ADM 337 Specialty Foods
Fall. 4 credits. Limited to juniors, seniors, and graduate students. Prerequisites for hotel undergraduates: H Adm 136 and 236. Elective. T. Neuhaus.
An advanced course covering finer points of cooking and baking. A culinary, chemical, and marketing perspective will be taken using principles of organoleptical food evaluation. Topics include menu preparation, garnishes, unusual vegetables and fruits, marinades, charcuterie, wild game, fermentations, and chocolates.

H ADM 338 Health and Fitness in the Resort Hotel and Spa Industry
Fall. 3 credits. Limited to juniors, seniors, and graduate students. Two field trips, $75–100. Pre-requisites: core courses in food and beverage management and marketing. Elective. M. Tabacchi.
Emphasizes the management aspects of spas, health clubs, and spa resorts. Topics include feasibility of success and marketing research necessary to establish new spas, design of menus, mental and physical fitness programs, stress management, spa medical treatments, complementary medical treatments and other spa programs; and personnel required, safety, legal and ethical issues, integration of nutritional menu items and their marketing and merchandising. Guest speakers.

H ADM 339 Airline Food Service Management
Spring. 3 credits. Field trip, $75–100. Prerequisites: H Adm 236, or permission of the instructor. Elective. M. Tabacchi.
Focuses on the challenge of preparing and distributing 20,000–30,000 meals per day to 20–30 different airline catering companies; reheating and re-melting, serving, and clearing those meals at 30,000 feet in confined space and short periods of time. Examines strategies, planning, and forecasting by airline, airline catering, and sales executives, as well as the effect of the economy and the airline's competition upon the types of meals served.

H ADM 430 Introduction to Wines
Fall and spring. 2 credits. Wine glass kit and course fee, $25.00. Limited to hotel school juniors, seniors, and graduate students, and senior and graduate students in all other colleges. Hotel students encouraged to enroll in the fall. All students, except those in the hotel school, must be 21 years old by the first day of university classes. S–U grades only. 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 wines, spirits, and beers at retail outlets and in a restaurant setting. Topics include flavor components in wine, pairing wine and food, responsible drinking, selecting quality and value wines, and wine etiquette. Samples from a variety of countries, regions, and vineyards are evaluated.

H ADM 431 Seminar in Independent Restaurant Operations Management
Fall and spring. 3 credits. Five field trips, $325. Limited to 20 students. Prerequisite: H Adm 136 and 236. Elective. Faculty.
Designed for students who have a strong interest in food and beverage operations and who may be considering a career as an entrepreneur. Students will visit and analyze various independently owned restaurant operations. Analysis covers the restaurant's concept (market), organization, ownership, management, physical structure, staff, front- and back-of-the-house operations, and fiscal integrity. Readings relevant to current topics in the restaurant industry are required. Classes alternate weekly between field trips and seminar/case presentations.

H ADM 432 Contemporary Healthy Foods
Fall. 3 credits. Field trip, $50. Limited to 20 seniors and graduate students, or by permission of instructor. Elective. M. Tabacchi.
Builds a greater awareness and understanding among nutrition and food service professionals of the origins and manifestations of today's health-conscious and reduced food service patron. Topics include the marriage of nutrition and the cuisine demanded by today's consumer, fresh produce, lean meats, and lack of fabricated diet foods. Menu design includes creativity and nutrient density of foods. Major emphasis is on preparation, marketing, merchandising and selling of healthy menus in Statler's outlets.

H ADM 433 Contract Food Service Management
Designed to explore and analyze food service management in business, industry, and health-care facilities, e.g., office/industrial complexes, educational institutions, contract companies, and hospital and extended-care facilities. Characteristics of food service organization structures, controls, systems design, equipment, and government/legal regulations. Readings, small group projects, presentations, discussions, and local site visits.

H ADM 434 Desserts Merchandising
Spring. 3 credits. Limited to 25 students. Prerequisite: H Adm 236, 230, or permission of the instructor. Elective. T. Neuhaus.
A hands-on course providing exposure to a variety of breads, pastries, cakes, and other desserts. Students develop large-scale production skills, become familiar with bakeshop utensils, and advertise and sell their products.

H ADM 435 Selection, Procurement, and Supply Management
Fall. 3 credits. Field trip, $5. Prerequisites: H Adm 136 and 230, or permission of the instructor. Elective. G. Norkus, R. Spies.
Expands upon the concepts of purchasing and supply management that were developed in H Adm 136 and 731. Designed to expose the student to two specific areas: the management of the procurement system and the major commodity groups that are germane to the operation of a hotel or foodservice operation. Lectures include the discussions on the comparison of the purchasing function in the hospitality industry to other industries,
distribution systems, legal and ethical implications in buyer-seller relationships, procurement options, buying strategy development, price protection programs, and other contemporary issues. Students work with the major entree food groups: meats, seafood, and poultry, with emphasis placed on identification, quality and condition, market form, yield tests, and cost analyses.

H ADM 436 Beverage Management
Fall and spring. 2 credits. Limited to 20 hotel school juniors, seniors, and graduate students. Prerequisite: H Adm 335 or 731. Elective. S. Matskoski, A. Nash.

Designed for students who intend to pursue food and beverage as a career. Deals specifically with the management of beverage operations. Lectures develop skills in and awareness of dram shop liability; staff training and responsible customer service; beverage pricing; food and wine pairings; wine list development; purchasing, storage, and service; wine and beverage costs, loss prevention, and creative beverage merchandising. Guest lecturers.

H ADM 437 Specialty Food and Beverage Operations: Guest Chefs
Spring. 3 credits. Limited to 20 students. Prerequisite: H Adm 335 or 731. Elective. R. Lang, H. Winslow.

Designed for students with a strong food and beverage orientation, especially students considering careers in the hotel food and beverage environment, or those who anticipate interacting with current culinary trends. Working in groups, students market, organize, plan, produce, serve, and prepare the financial analysis and accounting relative to four guest chef specialty production nights for the Cornell community, utilizing the Statler Hotel facility. Final project.

H ADM 438 Catering Management
Spring. 2 credits. Field trip, $150. Limited to 20 students. Prerequisite: H Adm 230 or permission of instructor. Elective. R. Spies.

Examines on- and off-premise catering for business and social functions, as well as sports events and office catering. Topics include the organizational structure of catering operations; legal aspects of catering businesses; menu design for special functions and its operational implications; marketing from a caterer's perspective; function planning and management; staff recruitment, training, and supervision; and post-event analysis. Site visits and analyses of actual catering operations.

H ADM 439 Wine: A Cultural and Historical Perspective
Fall and spring. 2 credits. Limited to 200 students. Elective. A. Nash.

Designed to provide students with a cultural and historical perspective on wine and its place in society. Topics include history, people, culture, production of wine in specific with the producing regions of the world, wine and health issues, wine and food pairing, cooking with wine, and retail wine buying strategies. Regions covered will change each semester so students may take the course more than once.

H ADM 533 Advanced Culinary Techniques
Spring. 2 credits. Limited to 18 students with written permission of instructor. Prerequisite: H Adm 436 or permission of the instructor. Elective. S. Matskoski.

Allows students to greatly broaden their culinary skills and awareness through advanced instruction in culinary skill and restaurant operations/management by one of the nation's foremost chefs (owners/managers).

H ADM 631 Case Studies in Multi-unit Restaurant Management
Fall. 3 credits. Limited to 20 graduate students, seniors by permission. Elective. C. Murphy.

Case studies of multi-unit restaurant organizations will focus on topics such as: new venture planning, rapid growth and organizational change, market identification, service delivery and O.E.M.D. demand, corporate culture, operation planning and operations management, strategic planning and implementation, tactics and market responses, international expansion, work breakdowns, and breakthrough thinking. Each class period will be spent in student-organized discourse and exchange based upon their assigned written case analysis. Grading will be on individual case presentations, class participation and written case assignments.

H ADM 633 Food Service Operations Management
Fall. 3 credits. Limited to 20 seniors and graduate students. Elective. T. O'Connor.

Applies fundamental concepts of marketing, financial analysis, food service production and management, and human resource principles that were addressed in previous courses. Combines theory and practice in all levels of a food service operation: basic knowledge, technical skills, and analytical skills. Manages by planning, implementing, critiquing, analyzing and adjusting food service operations. Designs and implements a training program for an opening staff and employees who will be rotating through different positions. Develops budgets, both projected and actual, for different food service operations. Employs a feasibility model for a particular food service concept and operation.

H ADM 731 Graduate Food and Beverage Management
Spring. 3 credits. Professional master's requirement. T. Kelly, T. O'Connor.

Focuses on the technical, managerial, and human resources skills needed to be successful in food service management. Topics include market analysis, concept development, menu planning, operations management, marketing, and current and future issues affecting the food service industry.

MARKETING AND TOURISM

H ADM 240 Marketing Principles
Fall and spring. 3 credits. Limited to non-hotel school students. Elective. A. Nash.

An introductory course providing a basic understanding of consumer purchase decision making, product planning, distribution, promotion, and pricing. Companies and their current marketing strategies will be examined to better understand these fundamental tenets of marketing and how they contribute to the crucial process of strategic planning.

H ADM 241 Marketing Principles
Fall and spring. 4 credits. Limited to non-hotel school students. Elective. Faculty.

For description, see H ADM 240. This course includes the H Adm 240 lectures plus section activities.

H ADM 243 Marketing Management for the Hospitality Industry
Fall and spring. 3 credits. Limited to hotel school students, not open to freshmen.

Required. J. Austin, M. Lynn.

Provides an overview of the discipline of marketing as it applies to the hospitality industry. Topics include understanding how a marketing strategy is devised, especially the relationship of company objectives, internal resources, the external operating environment, and how the special nature of service affects the development of marketing strategies in the hospitality industry.

H ADM 244 Tourism I
Fall. 3 credits. Not open to freshmen.

Elective. M. Noden.

An introductory course in the study of tourism. The origins and evolution of contemporary tourism are 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. Guest lectures highlight the economic operations and effects of tourism in both the public and private sectors.

H ADM 245 The Basics of Hotel Sales
Spring. 3 credits. Field trip, $50. Limited to 30 students. Prerequisite: H Adm 240/241/243, 741, or equivalent. Elective. S. Karuna Karan.

Emphasis on skills and knowledge leading to an understanding of the role of a successful property level sales person. Topics include roles of types of sales positions at the hotel level, tools necessary to make it up the ladder, operation of a hotel sales function, and differing buying strategies of market segments.

H ADM 246 Marketing Research
Fall and spring. 3 credits. Limited to 30 students. Prerequisites: introductory marketing or marketing management and an introductory course in quantitative methods for management.


Introduces students to the basic techniques and practices used to collect and analyze data for decision making in hospitality marketing.

H ADM 247 Marketing Planning for Hotels
Fall. 3 credits. Prerequisite: H Adm 243, 741, or equivalent. Elective. Not offered 1997–98; not offered fall 1998.

Key variables in property level management and their proper application in developing a marketing plan, e.g., marketing intelligence, demand analysis, supply and competitor analysis, segment analysis, resource allocation, sales strategies and measurement of results. Upon completion of the course, the student should be able to design, develop, and implement a comprehensive, targeted, and action-oriented marketing plan for a lodging property.
H ADM 347 Consumer Behavior
Fall and spring. 3 credits. Limited to 55 juniors and seniors. Prerequisite: an introductory principles of marketing or marketing management course. Elective. M. Lynn. Introduces students to various causal processes underlying consumer behavior and their implications for hospitality marketing. Consumers responding to marketing communications and offerings depend on the consumers' perceptions, motivations, personalities, attitudes, group memberships, families, and cultures. Knowing how these factors influence consumers' reactions to marketing efforts will allow students to better anticipate and control those reactions.

H ADM 442 Marketing Communications
Spring. 3 credits. Limited to seniors. Prerequisite: a previous marketing course. Elective. C. Dev, P. Yesawich. Provides students with a managerial understanding of the use of a variety of marketing communication media, including advertising, sales promotion, public relations, direct marketing and out-of-home. Hospitality industry emphasized.

H ADM 444 Tourism II
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: H Adm 243, 244, or equivalents, or written permission of instructor. Elective. M. Noden. An advanced course in the study of tourism. Emphasis is placed on the development of the tourism industrial base and development and financing of superstructure and infrastructure. Econometric model development for demand prediction is examined and analyzed. Students are expected to engage in a wide range of discussion and analysis of the effects of tourism on various environments in social and economic terms. Case studies, occasional guest lectures.

H ADM 445 Services Marketing
Fall and spring. 3 credits. Limited to undergraduate students. Prerequisite: a previous marketing course or permission of instructor. Elective. Not offered fall 1997. L. Renaghan. Students preparing for ownership or management positions will develop an understanding of services marketing principles applicable across entire service sector. Topics include marketing strategies of service firms, new marketing approaches, and the reformulation of traditional marketing principles from consumers and industrial goods marketing. Four case studies, guest lectures.

H ADM 447 Channels of Distribution in Tourism
Spring. 3 credits. Prerequisite: H Adm 343. Elective. M. Noden. Examines the major elements of the structure, arrangement, management, and control of the channels of distribution in the tourism industries. Topics include emerging trends in electronic distribution, organizational structures of distributive consortia, and their effectiveness in service distribution. Significant readings, guest lectures.

H ADM 449 International Marketing
Fall and spring. 3 credits. Limited to 25 students. Prerequisites: Micro and macroeconomics. Elective. Faculty. Develops understanding of international marketing with emphasis on hospitality, industry applications. Focuses on the similarities and differences that exist between domestic and international marketing and the conduct of international marketing in various segments of the world.

H ADM 441 Marketing Decision Models for Service Firms
Fall. 3 credits. Limited to 20 seniors and graduate students. Prerequisite: a principles of marketing or marketing management course and an introductory course in quantitative methods for management. Elective. Not offered fall 1997. Faculty. Introduces students to advanced data analysis and modelling methods used for decision making in hospitality marketing.

H ADM 442 Strategic Marketing
Fall. 3 credits. Limited to 20 graduate students. Prerequisite: a previous marketing course and permission of instructor. Elective. C. Dev. Offers theoretical and practical approaches to addressing strategic marketing challenges in hospitality and service firms. Strategic marketing concepts and principles will be learned through lectures, discussion, and development of a strategic marketing report.

H ADM 443 Marketing Research
Fall and spring. 3 credits. Limited to 20 graduate students. Prerequisites: principles of marketing or marketing management and an introductory course in quantitative methods for management. Elective. Not offered fall 1997. J. Austin. Introduces students to the basic techniques and practices used to collect and analyze data for decision making in hospitality marketing. Advanced research topics, five lab sessions.

H ADM 444 Food and Beverage Marketing Strategy
Fall. 3 credits. Limited to graduate students, seniors by permission. Prerequisite: prior three-credit marketing course. Elective. T. Kelly. Focuses on how to apply marketing, sales, and merchandising to the commercial food and beverage industry. Addresses developing a market segmentation based upon understanding the needs and wants of potential target markets, translating needs and wants into viable food service concept positioning strategy, and marketing strategies used to maintain and increase sales and market share. Recitation and analysis involves substantial use of the Consumer Report on Eating Share Trends (CREST) database.

H ADM 445 Services Marketing
Fall and spring. 3 credits. Limited to graduate students. Prerequisite: previous marketing course, or permission of instructor. Elective. Not offered fall 1997. L. Renaghan. For description, see H ADM 445. This course includes the H ADM 445 lectures plus three case studies and a research paper.

H ADM 446 Marketing Planning For Hotels
Fall. 3 credits. Limited to graduate students. Prerequisite: H Adm 243, 741, or equivalents. Elective. Not offered 1997-98; next offered fall 1998. For description, see 346. This course includes the H ADM 346 lectures plus a theoretical paper.

H ADM 447 Consumer Behavior
Fall and spring. 3 credits. Limited to 55 graduate students. Prerequisite: introductory marketing principles or marketing management course. Elective. M. Lynn. For description, see H ADM 347.

H ADM 741 Marketing Management
Spring. 3 credits. Professional master's requirement. Faculty. Basic concepts and principles underlying marketing decision making and the skills needed to analyze and understand complex marketing situations in order to plan and implement marketing programs.

PROPERTY ASSET MANAGEMENT COURSES

H ADM 255 Hotel Development and Planning
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Required. R. Penner. An introduction and management overview of the problems and opportunities inherent in the development and planning of hospitality facilities. Topics include the project development sequence; conceptual and space planning; architectural design criteria, construction management, and the interpretation of architectural design and consultant drawings. Emphasis is on setting appropriate facilities requirements, understanding industry processes, and implementing properties decisions within a balanced design, operations, and financial framework.

H ADM 350 Real Estate Management
Fall. 3 credits. Elective. J. deRoos. Designed for students interested in the management of residential and commercial real estate. Overview of real estate economics, the relevant law, and different aspects of property management including leases and management contracts, accounting and finance, staffing, and building operations. Examples from several types of properties.

H ADM 351 Hospitality Facilities Design
Fall. 4 credits. Prerequisite: H Adm 255 or 751 or permission of instructor. Elective. R. Penner. A lecture-studio course dealing with property development, planning, and design by focusing on the interpretation and analysis of hotel plans. Students learn basic graphic techniques and apply them to planning problems for hospitality facilities. Final project.

H ADM 352 Hotel Planning and Interior Design
Spring. 3 credits. Field trip, $200; drawing supplies, $75. Limited to 12 students. Prerequisite: H Adm 351. Elective. R. Penner. A project course concerned with hotel planning, interior design, and renovation. Students establish the operator's criteria for the renovation of hotel guestrooms and public areas, prepare budgets, and develop preliminary conceptual designs leading to a substantial graphic presentation. Drawing ability is essential.
H ADM 353 Food Service Facilities Design
Spring. 3 credits. Limited to 12 students. Prerequisites: H ADM 351 and 335 (co-registration is allowed) or food service experience is recommended. Elective. M. Redlin.
An introduction to the basic concepts of food service facilities design and planning. Students will determine space allocations for kitchens and their support areas; develop basic production work flow in the preparation and service area; and select equipment utilizing standards for production capability, quality of construction, and ease of maintenance. Students will use studio time for planning, designing, and writing specifications for a medium-size restaurant kitchen.

H ADM 354 Computer-Aided Design
Fall and spring. 2 credits. Limited to 18 students per lecture. Prerequisite: H ADM 351 or equivalent studio experience. Attendance at first class is mandatory. Elective. S. Curtis.
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 will learn the program in the school's computer center and will develop a complete graphic presentation. Emphasis is on the use and operation of CAD systems in a commercial document production environment.

H ADM 355 Hospitality Facilities Operations
Fall. 3 credits. Prerequisite: H ADM 255. Required. M. Redlin.
An overview of the operation of hospitality facilities, including operating costs for various types of facilities, types and characteristics of major building systems, and the responsibilities of the engineering-maintenance departments. The renovation needs of hospitality facilities are examined and key managerial aspects of renovations considered.

H ADM 356 Hospitality Risk Management
Spring. 3 credits. Limited to 30 hotel school juniors, seniors and graduate students. Elective. D. Stipanuk.
Risk management within the hospitality environment as applied to issues of control and risk financing. Issues in fire protection, customer and workplace safety, OSHA requirements, and customer and corporate security are analyzed. Basic elements of insurance and crisis management are discussed.

H ADM 357 Insurance and Risk Management
Fall and spring. 3 credits. Limited to 75 students per lecture. Prerequisite: an introductory accounting or business course. Elective G. Shankar.
A comprehensive look at risk management within a general business or institutional environment. Reviews insurance and noninsurance solutions to controlling loss, the general legal environment within which risk management processes work, and the integration of crisis management into the overall corporate risk management plan.

H ADM 450 Principles of Real Estate
Fall. 3 credits. Limited to juniors and seniors. Elective. J. Corgel.
Approaches real estate from four perspectives: legal, economic, financial, and business. Understanding these perspectives will enable students to make better investment and financing decisions, to use real estate resources wisely, to understand public-policy issues, and to be prepared for additional courses in real estate investment, finance, and development.

H ADM 455 Special Topics in Properties Management
Spring. 3 credits. Limited to juniors, seniors and graduate students. Elective. D. Stipanuk.
The theme and instructor of the "special topics" course will change each year on the basis of current trends, student interest, and faculty expertise. See the school registrar or properties area coordinator for details about the current topics.

H ADM 456 Hospitality Facilities Management
Fall. 3 credits. Prerequisite: H ADM 355, 751, or permission of the instructor. Elective. Not offered 1997-98. Next offered fall 1998.
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. Emphasis on environmental issues such as indoor air quality, waste management, and energy conservation. Extensive use of the World Wide Web.

H ADM 457 Advanced Development and Construction
Fall. 3 credits. Limited to seniors and graduate students. Elective. Not offered 1997-98; next offered fall 1998.
Focuses on the management structure and systems, laws, regulations, and industry practices that most influence the successful development of commercial and residential real estate, including lodging and eating facilities. Topics include scheduling, budgeting, managing other professionals, and analysis of alternative materials and methods. Guest speakers, case studies, and group project.

H ADM 458 Hospitality Real Estate
Spring. 3 credits. Prerequisite: H ADM 323, 450, or permission of instructor. Elective. J. Corgel.
Expands the student's understanding of the role of real estate in individual hospitality businesses and corporations. Designed for those who plan careers in the hospitality industry. Specific objectives are to develop an appreciation of real estate as a factor in the production of income of hospitality businesses; to develop an appreciation of real estate as an asset that can be managed, sold, and otherwise used to increase the wealth of hospitality corporation shareholders; and to understand the importance of valuing real estate, and the approaches to valuation and contemporary hospitality valuation issues.

H ADM 461 Principles of Real Estate
Fall. 3 credits. Limited to graduate students. Elective. J. Corgel.
For description, see H ADM 450. This course includes the H ADM 450 lectures plus an hour-long recitation each week featuring guest speakers from industry, faculty from other colleges, and case studies. Comprehensive term project.

H ADM 658 Advanced Real Estate
Spring. 3 credits. Prerequisite: H ADM 523, 450 or 651. Co-requisite. Promotes sound real estate investment and finance decision making through the use of advanced theory and techniques in financial economics. Real estate investment decisions are made through applications of the after-tax discounted cash flow technique. Topics include: studies of rates prevailing domestic and international economic conditions in real estate markets, tax rules, and government regulations. Financing decisions are made using the techniques of modern financial analysis. A wide array of financing options is considered including convertible, participating, and accrual mortgages. All types of residential and non-residential real estate are analyzed, however, special emphasis is placed on the analysis of hospitality properties.

H ADM 751 Properties Development and Planning
Spring. 3 credits. Professional master's requirement. J. Clark.
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. Student teams will prepare the program documentation for a new hotel or one undergoing major rehabilitation in conjunction with other professional master's core courses.

COMMUNICATION COURSES

H ADM 165 Managerial Communication I
Fall and spring. 3 credits. Each lecture limited to 16 students. Note: Students required to take this course generally may not delay it. If extenuating circumstances exist, 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, including any ITD semesters. Required. D. Jameson, S. Blyson, S. Jones, Y. Kim. 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. Students write a series of business documents and give several oral presentations.

H ADM 266 Intermediate French: Le Francais de l'Hotellerie et du Tourisme
Spring. 3 credits. Limited to 15 students. Prerequisite: French 123 or equivalent (CPT 560 or above), or permission of instructor. Elective. A. Grandjean-Levy. Offers continuing study of the French language with specific emphasis on the hospitality industry. Material presented considers cultural, geographic, economic, historical, political, and social contexts within which the business functions. The course is conducted in French, emphasizing a conversa-
H ADM 364 Advanced Business Writing
Fall and spring. 3 credits. Limited to juniors, seniors, or graduate students, or written permission of instructor. Prerequisite for undergraduates: H Adm 165 (for hotel school students) or completion of student's freshman writing requirement. Elective. S. Jones, R. Steinhacker.

Focuses on the written communication that requires special persuasiveness and control of tone. Writing assignments will give students a chance to apply the theories of communication, semantics, and human relations covered in the course. The kinds of communications that will be analyzed, evaluated, and written include persuasive messages to subordinates and superiors in an organization; sales letters and other promotion materials; and negative messages such as refusals, rejections, and responses to complaints. A major topic is the planning and executing of a job-hunting campaign, for students prepare resumes, letters of application, and follow-up messages adapted to their individual needs.

H ADM 365 Managerial Communication II
Fall and spring. 3 credits. Limited to 22 juniors and seniors per lecture. Note: Students required to take this course generally may not drop it, however, students may be allowed to drop before the first class meets if the area has a wait list and the vacancy can be filled. Students may drop between the first and second class if they 1) check first with the course chair, and 2) can find a replacement for their place in the course. Students may not drop after the second class unless they petition and present a case of extenuating circumstances. It is expected these cases would be rare. Prerequisites: Hotel undergraduates must have completed H Adm 165 and H Adm 115. Required. J. Brownell, E. Huetteman, Y. Kim, J. Lunley, B. Stevens.

A broad study of communication in a managerial context. Emphasizes the significant role of communication in developing work relationships that enable managers to achieve their goals. It presents the theories and principles of communication that underlie effective performance. 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 463 Persuasive Communication in Organizations
Spring. 3 credits. Limited to 18 students. Prerequisites: H Adm 165 and 365 for hotel school undergraduates, or permission of instructor. Elective. Faculty.

Prerequisites: Proficiency in written communication will be thoroughly examined as they apply to persuasive speaking contexts. Principles of persuasion will be thoroughly examined as they apply to managerial communication tasks. Emphasis on persuasive speaking; also relationship between written and oral communication. Studies the principles of persuasion, analyzes case studies in the hospitality industry, and applies persuasive strategies in simulated workplace settings.

H ADM 661 Organizational Communication For Managers
Spring. 3 credits. Elective. B. Stevens.

Focuses on the complex interactions that occur when people communicate in organizations. Structured around the communication tasks managers must accomplish to be effective on the job. Business cases. Emphasis on design of effective communication strategies. Applications and experiential exercises help students perfect their ability to write, make oral presentations, and interact effectively with others in managerial contexts.

H ADM 761 Communication Modules

Elective modules cover topics related to the professional master's program benchmarks: written communication, presentational speaking, and group process/leadership. Additional topics in support of students' individual goals also may be offered. Topics include organizing ideas, revising and editing written documents, etc. Modules are available on a first-come, first-served basis, and are offered throughout the semester during the management development periods.

OPERATIONS MANAGEMENT, INFORMATION TECHNOLOGY COURSES

H ADM 170 Keyboarding on the Macintosh
Spring. 2 credits. Limited to 30 students. Elective. B. David.

An introduction to the computer and a beginning course in alphabetic and numeric keyboarding. Students learn word-processing skills during the second half of the course.

H ADM 174 Microcomputing

An introduction to microcomputing to develop functional computer fluency. Students develop skills in five generic areas: text, graphics, spreadsheet, presentation, and list processing. The course is entirely lab-oriented and students work in both Mac/OS and Windows.

H ADM 175 Quantitative Methods
Fall and spring. 3 credits. Limited to 120 hotel school students. Co- or prerequisite: H Adm 174. Required. G. Thompson, D. Barrish.

An introduction to statistical and operations management methods appropriate for the hospitality industry. Topics include descriptive statistics, probability, correlation and regression, forecasting, decision analysis, quality control charts, and an introduction to yield management. Emphasis is on practical applications of the techniques to hospitality related problems.

H ADM 374 End-User Business Computing Tools
Spring. 3 credits. Limited to 20 students. Elective. R. Alvarez.

Explores the personal computer as a managerial tool. Concepts of spreadsheet modeling, database, and end-user computing are covered. Students learn to use specific software applications programs to solve original problems. All work is done on IBM computers.

H ADM 375 Hotel Computing Applications
Spring. 3 credits. Prerequisite: H Adm 174 or equivalent. Elective. R. Moore.

Introduces students from a management perspective to technology-based systems used in the hospitality industry which enhance guest service and support management decision making. Topics include following systems: global distribution, yield management, property management, communication networks (LANS and WANS); and food service management. Experience on systems widely used in hospitality industry and develops IBM PC knowledge and skills.

H ADM 474 Corporate Information Systems Management
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective. R. Alvarez.

Explores ten key issues in information technology management through use of case studies of companies with relevant experience with the issues. A basic understanding of information technology, organizational behavior, and general management is advised.

H ADM 674 Service Operations Management
Fall and spring. 3 credits. Limited to 25 graduate students. Prerequisite: H Adm 775 or equivalent. Elective. G. Thompson.

The objective of this course is to improve the understanding of the operations function of service organizations. Focuses on the role and nature of service operations, the relationship of operations to other business functions, and develops skills and provides techniques for the effective management of service operations. Topics include service design, bottleneck and layout analysis, capacity management, workforce management, and quality management. Intended for graduate students interested in services management.

H ADM 675 Yield Management
Spring. 3 credits. Prerequisites: H Adm 175, 771, or equivalent. Elective. S. Kimes.

Students learn how to effectively apply the principles of yield management. Focuses on the integration of yield management techniques with information technology, internal
management issues, and external marketing concerns. Topics include yield management techniques, forecasting, overbooking, group decisions, and management and marketing issues.

H ADM 771 Graduate Quantitative Methods
Fall. 3 credits. Professional master's requirement. S. Kimes. Covers statistical and operations research techniques which can be applied to the hospitality industry. Topics include descriptive statistics, probability, sampling, correlation and regression, forecasting and yield management.

H ADM 772 Information Technology for Hospitality Managers
Fall. 3 credits. Professional master's requirement. R. Moore. Familiarizes students with issues surrounding the use of information technology in supporting hospitality operations from a guest services perspective and decision making from the viewpoint of management.

LAW COURSES

H ADM 385 Business Law I
Spring. 3 credits. Limited to juniors, seniors, and graduate students outside the hotel school, and hotel students by permission of the instructor. Elective. Faculty. Designed to enable students to acquire a basic understanding of law and legal relationships in a business context. Variety of topics aid in making decisions as an executive with managerial responsibilities.

H ADM 387 Business and Hospitality Law
Fall and spring. 3 credits. Limited to juniors, seniors, and graduate students. Required. Faculty. An integrated, chronological presentation of contract, agency, and tort concepts as they apply to the legal aspects of hospitality management. Appropriate federal, state, and local cases, statutes, and other materials are examined. The overall objective is to recognize, analyze, and evaluate legal issues for the purpose of making and articulating appropriate decisions.

H ADM 485 Employment Discrimination Law for Managers
Fall and spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective. Faculty. Provides students with an understanding of anti-discrimination statutes and a framework for establishing the proper policies and procedures for complying with the law, avoiding liability, and maintaining positive employment relations.

H ADM 487 Real Estate Law
Fall. 3 credits. Recommended: completion of H Adm 387 preferred. Elective. Faculty. Familiarizes students with the nature and ownership of real estate. Describes interests in real estate and how title is transferred. Acquaints students with legal aspects of marketing residential and commercial real estate, including shopping center and commercial leases, real estate syndication, and subdividing real estate for development.

H ADM 681 The Interplay of Law and Ethics in Service Industry Management
Spring. 3 credits. Limited to 50 hotel graduate students; seniors and other graduate students by permission of instructor. Prerequisite: completion of all required professional master's first-year courses, or permission of instructor. Elective. Faculty. Involves students in ethical aspects of traditional law problems confronting service industry managers and executives within the areas of commerce, consumerism, administrative law and practice, regulation of anti-competitive practices, and federal and state securities regulation. The impact of the corporation on traditional notions of personal social responsibility will be stressed.

OTHER COURSES

H ADM 101 Microeconomics for the Service Industry
Fall and spring. 3 credits. Limited to 60 hotel school students per lecture, others by permission of instructor. Required. M. Conlin, J. Wissink. Introduces the basic principles of microeconomics and teaches students how they apply to managers of enterprises associated with the hospitality industry. Emphasis on methods of market segmentation in the service industries, analyzing economic incentives involved in franchise arrangements, and the nature of competition in various segments of the hospitality industry.

H ADM 490 Housing and Feeding the Homeless
Spring. Variable to 4 credits. Limited to juniors and seniors. Elective. T. O'Connor. Explores the public and private sector partnership in addressing the crisis of homelessness. Through lectures, readings, discussions, research, volunteerism, and a field placement practicum, students will explore the economic, social, and political issues of our country's concern with housing and feeding homeless people. Students will study the history of homelessness and the strategies to prevent and alleviate the problem. The components of successful housing programs and food assistance programs will be analyzed.

Students taking the course for four credit hours will, in small groups, work with agencies providing services to homeless persons. They will analyze the agency's mission, identify a specific managerial challenge, and formulate an approach and solution to that challenge. This fieldwork will require approximately eight days during the semester.

Students taking the course for three credit hours will research and write a term paper about some aspect of homelessness and volunteer with a service agency approximate three hours per week during the semester.

H ADM 491 Hotel Ezra Cornell
Fall and spring. Variable credit (maximum, 4). Prerequisite: written permission. Elective. G. Pezzotti, Y. Kerr-Donovan. Elective board of directors of Hotel Ezra Cornell receive credit for academic coursework, and the development, organization, and management of the April "Hotel-for-a-Weekend." Students who are considering a board position may pre-enroll for the course and should speak with the instructor for additional information about board positions and required coursework. Election will take place in April after Hotel Ezra Cornell Weekend, at which time the HA 491 course enrollment will be finalized. Further information is available in the Student Services Office, 178B Statler Hall.

H ADM 493 Management Intern Program I—Operations
Fall and spring. 3 credits. Limited to hotel school juniors and seniors with approval of the MIP faculty committee. Prerequisites: Students are expected to have completed H Adm 105, 115, 211, 221, 222, 150, 236, 243, 255, 165, and 174. In addition, completion of the following courses is strongly recommended. H Adm 301, 321, 355, 355, and 365. Additional course work might be required for applicants considering specialized internships. A detailed plan for the completion of all remaining academic requirements must be approved prior to acceptance into the course. Must be taken in conjunction with H Adm 494. S-U grades only. Based on six performance evaluations. Elective. R. Chase.

H ADM 494 Management Intern Program II—Academic
Fall and spring. 6 credits. Must be taken in conjunction with H Adm 493. Letter grades only, based on submission of goals and objective statement, four management reports, journals, debriefing, and oral presentation. Elective. R. Chase.

H ADM 495 Development and Management of Wellness in Business Organizations
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Field trip, $25–50. Elective. J. Fascich. Designed to encourage future managers to evaluate the work environment and to enhance opportunities for diverse worker productivity which should increase the corporation's competitive edge.

H ADM 499 Undergraduate Independent Study
Fall and spring. Variable, to 4 credits. Elective. Faculty. Students are afforded an opportunity to pursue independent study projects under the direction of a faculty member. Permission in writing is required prior to course enrollment. Obtain permission form from the Hotel School Student Services Office. Independent study work must be performed in the term for which it is approved, and the usual add/drop policy applies. Retroactive credit for work commenced after an academic term has ended is not allowed.

H ADM 690 Honors Monograph
Year-long course. 4 credits. Limited to professional master's students who: 1) either have a minimum GPA of 3.7 or are in the top 10 percent of the students in the year group in their first-year professional master's courses; 2) have given evidence of being a good writer by meeting all components of the written communication benchmark; and 3) obtained the approval of a brief topic proposal from the potential adviser. Elective. Faculty.
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 adviser 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 available in the Graduate Office, Room 172 Statler.

**H ADM 699 Graduate Independent Research**

Fall and spring. Credit to be arranged. Elective. Faculty. Student must have in mind a project and obtain agreement from an individual faculty member to oversee and direct the study. Permission in writing is required prior to course enrollment. Obtain permission form from the Hotel School Graduate Office, Room 172 Statler.

**H ADM 791 Creating and Managing for Service Excellence**

Fall. 3 credits. Professional master’s requirement. S. Kimes. Focuses on developing a clear understanding of service excellence from multiple perspectives. Assisted by a faculty team from management, marketing, and operations, students will define, diagnose, design, measure, control, and change service excellence. Emphasis will be placed on critical decision making and strategic thinking.

**H ADM 793 Industry Mentorship Program**

Spring. No credits. S-U grades only. Professional master’s requirement. M. Redlin. Interaction with a senior hospitality industry executive. Objectives are to give the student an overview of the operating dynamics of a segment of the industry, to provide a realistic awareness of day-to-day life working as an executive in the industry, and to develop an awareness of the skills, level of integration, and other factors required for success.

**H ADM 794 Management Development Component I, II, and III**

Year-long course. No credits. S-U grades only. Professional master’s requirement. J. Brownell, B. Chung, E. Huettman, D. Jameson. Individualized approach ensuring that all students meet program benchmarks in written communication, presentational speaking, and group process/leadership skills as well as identify and achieve individual goals. Begins with an assessment center weekend. Students then work with their advisors to complete a personal development plan. Assignments in core courses are used to benchmark students' skills and determine progress. Continues throughout the professional master’s program.

**H ADM 890 M.S. Thesis Research**

Fall and spring. Credit to be arranged.

**H ADM 990 Ph.D. Thesis Research**

Fall and spring. Credit to be arranged.

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**FACULTY ROSTER**

Alvarez, Roy, M.Ed., Auburn U. Lecturer  
Arbel, Avner, Ph.D., New York U. Prof.  
Austin, Jon R., Ph.D., U. of Wisconsin-Madison. Asst. Prof.  
Berger, Florence, Ph.D., Cornell U. Prof.  
Brownell, Judith, Ph.D., Syracuse U. Prof., and Richard J. and Monene Bradley Director of Graduate Studies  
Bryson, Susan, M.A., U. of Chicago. Lecturer  
Canina, Linda, Ph.D., New York U. Asst. Prof.  
Carvell, Steven A., Ph.D., SUNY Binghamton. Assoc. Prof.  
Chase, Robert M., M.B.A., Cornell U. Prof.  
Chung, Beth G., Ph.D., U. of Maryland. Asst. Prof.  
Clark, John J., Jr., Ph.D., Cornell U. Prof.  
Corgel, John B., Ph.D., U. of Georgia. Assoc. Prof.  
Cullen, Thomas, Ph.D., Cornell U. Assoc. Prof.  
Curtis, Steven, B.L.A., Syracuse U. Lecturer  
David, Betty B., Lecturer  
deRoos, Jan A., Ph.D., Cornell U. Asst. Prof.  
Dev, Chheetan S., Ph.D., Virginia Polytechnic. Assoc. Prof.  
Dittman, David A., Ph.D., Ohio State U. Dean and E. M. Statler, Professor.  
Enz, Cathy A., Ph.D., Cornell U. Prof.  
Fyster, James J., Ph.D., Cornell U. Hospitality Valuation Services Professor of Finance and Real Estate  
Ferguson, Dennis H., Ph.D., Cornell U. Assoc. Prof.  
Geller, A. Neal, Ph.D., Syracuse U. Prof. and Associate Dean for Academic Affairs  
Gould, Shelly, B.S., Cornell U. Teaching Support Specialist  
Hartmanis, Reneta, B.S., Cornell U. Lecturer  
Hinkin, Timothy, Ph.D., U. of Florida. Assoc. Prof. and Director of Undergraduate Studies  
Huetteman, Elizabeth, Ph.D., Purdue U. Asst. Prof.  
Jones, Scott L., M.A., Purdue U. Lecturer  
Kelly, Thomas J., M.S., Cornell U. Assoc. Prof.  
Kerr-Donovan, Yariela, M.M.H., Cornell U. Lecturer  
Kim, H. Young, Ph.D., Oklahoma State U. Lecturer  
Kimes, Sheryl E., Ph.D., U. of Texas. Assoc. Prof.  
Lang, Barbara, B.S., Cornell U. Lecturer  
Lankau, Melanie, Ph.D., U. of Miami. Asst. Prof.  
Lunney, Jane, M.A., Pennsylvania State U. Senior Lecturer  
Lundberg, Craig C., Ph.D., Cornell U. Blanchard Professor of Human-Resources Management  
Lynn, Wm. Michael, Ph.D., Ohio State U. Assoc. Prof.  
Muller, Christopher C., M.P.S., Ph.D., Cornell U. Asst. Prof.  
Murkowsi, Stephen A., Ph.D., Cornell U. Banfi Vintners Professor of Wine Education and Management  
Nash, Abby, B.A., Cornell U. Visiting Lecturer  
Neuhaus, Thomas W., M.S., U. of Maryland. Lecturer  
Noden, Malcolm A., Senior Lecturer  
Norkus, Gregory X., M.B.A., 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., B.S., Cornell U. Lecturer  
Rainsford, Peter, Ph.D., Cornell U. Assoc. Prof.  
Redlin, Michael H., Ph.D., Cornell U. Prof.  
Renaghan, Leo M., Ph.D., Pennsylvania State U. Assoc. Prof.  
Richmond, Bonnie S., M.S., U. of Missouri. Senior Lecturer  
Ridley, Jane S., B.A., SUNY at Binghamton. Teaching Support Specialist  
Simons, Tony L., Ph.D., Florida State U. Lecturer  
Stevens, Betsy, Ph.D., Wayne State U. Asst. Prof.  
Tabacchi, Mary H., Ph.D., Purdue U. Assoc. Prof.  
Thompson, Gary M., Ph.D., Florida State U. Assoc. Prof.  
Tracey, J. Bruce, Ph.D., SUNY Albany. Asst. Prof.  
White, Robert, A.O.S., Culinary Institute of America. Teaching Support Specialist  

**Visiting and Other Teaching Staff**

Blanchard, Kenneth, Ph.D., Cornell U. Visiting Assoc. Prof.  
James, Robert, M.B.A., Pace U. Visiting Lecturer  
Merberg, Elliot, B.S., New York U. Visiting Lecturer  
Sciarabba, Andrew, B.B.A., St. John Fisher College. Visiting Lecturer  
Shankar, Gowri, Ph.D., Syracuse U. Visiting Asst. Prof.  
Yesawich, Peter C., Ph.D., Cornell U. Visiting Assoc. Prof.
ADMINISTRATION
Francille M. Firebaugh, dean
Charles McClintock, associate dean
William Lacy, associate dean; director of Cornell Cooperative Extension
Carol L. Anderson, assistant dean; associate director of Cornell Cooperative Extension
Jennifer Gemer, assistant dean; assistant director, Cornell University Agricultural Experiment Station
Brenda Bricker, director, admissions
Mary Rhodes, director, student services college registrar

FACILITIES
The College of Human Ecology anticipates and responds to human needs in the areas of nutrition and health, economic and social well-being, environmental design and technology, and human development through education, basic and applied research, and the extension of knowledge. The college is distinctively characterized by the quality of its research in the natural and social sciences and the design arts, a global perspective in academic programs, a preventive approach to contemporary societal problems, multidisciplinary departments and programs, development of leadership in students and citizens, and a commitment to diverse populations. Faculty and students examine individuals in relation to their family, neighborhood, workplace, and community, seeking a balance between theory and practice that will improve the quality of everyday life.

The college is housed in Martha Van Rensselaer Hall. The Division of Nutritional Sciences, an intercollege division supported jointly by the College of Human Ecology and the College of Agriculture and Life Sciences, has space in Savage Hall and in Martha Van Rensselaer Hall.

The buildings include administrative and faculty offices, classrooms, auditoriums, and lecture halls; wet chemistry and biochemistry laboratories for nutrition, food science, and textile science; experimental food laboratories; design studios and a computer-aided design laboratory; woodworking shops; experimental observation rooms with one-way vision screens and sound-recording equipment; educational television studios; and a printing and reproduction facility. Also included are learning resource centers for career planning, field and international study; a historical costume collection, a human metabolic research unit, a research animal 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, phy, radioisotope analysis, electrophoresis, microscopy, and ultracentrifugation; physical testing equipment; and cameras, videotape, and sound recording equipment.

DEGREE PROGRAMS

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<td>Design and Environmental Analysis</td>
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<td>Human Development and Family Studies</td>
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DIVISION OF STUDENT SERVICES
Brenda Bricker, director, Office of Admissions
Mary Rhodes, director and college registrar, Office of Student Services

Persons interested in undergraduate study in human ecology should contact the Office of Admissions, 170 Martha Van Rensselaer Hall. 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.

Matriculated students can find assistance with matters of academic credit, graduation requirements, academic advising, minority student advising, study abroad advising, career planning and placement, and personal counseling from the Office of Student Services, N101 Martha Van Rensselaer Hall. International students should contact their student counselor in the Office of Student Services.

The Students
The College of Human Ecology undergraduate enrollment is 1,326 with 56 percent in the upper division. About 350 students are graduated each year, and last year 291 freshmen and 113 transfer students matriculated. One hundred faculty members serve as advisers for 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 selective. Approximately 75 percent of the student body comes from New York State, with the remainder from other parts of the United States and abroad. Twenty-nine percent were identified as members of minority groups in 1996. Approximately 243 graduate students have members of the college's faculty chairing their special committees. The college awarded 59 master's degrees and 24 doctorates last year.

ACADEMIC PROGRAMS

Majors
Selection of a major begins with selection of career goals. In their freshman and sophomore years, students can explore ways to relate their personal interests and capabilities to their career goals. As a result, they sometimes decide to change their major. The director of career services and the counselor for career development in the Office of Student Services (N101 Martha Van Rensselaer Hall) and resources in the Student Resource Center (N139 MVR) can help students through their career exploration process.

Each department offers a major, and within most departmental majors there are specific options. The college also offers two interdepartmental majors. Selecting a major means choosing one option in one department. A student may satisfy the requirements of more than one major option. (The college urges students who satisfy more than one major or option to note this in the credentials they file in the university's Career Center and to seek recommendations from faculty associated with the options completed.) Majors include the following options.

Design and Environmental Analysis (DEA): Interior design, facility planning and management, human environment relations.

Human Development and Family Studies (HDFS): Does not have separate options. Courses focus on cognitive, social, and personality development; phases of development; family studies and life course. The department administers an honors program for selected students.

Nutritional Sciences (NS): The division supervises the department major. (By careful planning, students may also meet the minimum academic requirements of the American Dietetic Association.) The division administers an honors program for selected students.

Policy Analysis and Management (PAM): The department supervises four majors: policy analysis and management, consumer economics and housing, human service studies, and policy analysis. Students majoring in human service studies may also meet the requirements of an accredited bachelor's degree program in social work. The consumer economics and housing, human service studies and the policy analysis majors will be terminated after spring, 2000.

Textiles and Apparel (TXA): Apparel design, apparel-textile management, fiber science.
It is possible to change majors. Because any student's interests and goals may change as new options emerge, the college provides ways for students to change their majors. It is important for a student to discuss a possible change of major with her or his faculty adviser or counselor. If the student decides to make a change, a completed change-of-major form (available from the Office of Student Services, N101 Martha Van Rensselaer Hall) will officially record the change so that a new adviser can be assigned to the student.

Students of Mature Status
The college recognizes that students who interrupted their formal education and are returning to school need different courses from those of younger undergraduates. To facilitate the education of mature students, defined as those twenty-four years old or older at first matriculation, the college has adopted certain procedures specifically for that group. The counselor for mature students in the Office of Student Services (N101 MVR) can provide information of interest to mature students.

Mature students are permitted to enroll for as few as 6 credits without petitioning for permission and also are permitted to extend their residency beyond the normal eight terms.

Mature students are encouraged to contact the director of the Continuing Education Information Service, B20 Day Hall, for information on resources available through that office.

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 preparing for graduate study, those pursuing degrees in human ecology-related fields, or those who have interrupted their education and are considering completing degree programs. Students accepted in the non-degree 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 state divisions of the university. Work taken while a person is classified as a special student may be counted toward the requirements of the bachelor's degree.

Empire State Students
Occasionally a student who is completing requirements for a degree through the Empire State College Program is interested in taking a human ecology course. This can be done by registering through the Division of Summer Session, Extramural Study, and Related Programs, B20 Day Hall. All rules of the extramural division apply, and registrations will be accepted only on a space-available basis and with the written approval of the course instructor.

At the time of registration, Empire State College students 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.

**DESIGN AND ENVIRONMENTAL ANALYSIS**

The Department of Design and Environmental Analysis (DEA) is concerned with planning, designing, and managing interior environments to satisfy human needs. Most people spend over 90 percent of their lives inside buildings. Those settings have substantial and far-reaching effects on the quality of our lives. The processes for creating and maintaining the built environment face enormous challenges. These include frequent social and organizational change, technological advances, new building methods, and finite resources. The program in DEA is dedicated to preparing professionals who can meet these challenges.

Diverse faculty backgrounds and teaching approaches help students to develop their multidisciplinary problem-solving and creative abilities, aesthetic judgment, and analytical thinking. Excellent laboratory, shop, studio, and computer facilities permit exploration of innovative concepts for the design and management of interior environments. The relationship between people and their physical surroundings is explored through a combination of academic courses, field experience, and applied research. Examples of student class projects and faculty work are frequently on display in the department's gallery. The Design Resource Center includes books, journals, newsletters, and materials samples for student use.

**Options**

The department offers undergraduate education in three professional areas: interior design, faculty planning and management, and human-environment relations. The interior design option is accredited by the Foundation for Interior Design Education Research (FIDER).

To take full advantage of the course sequence 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 may need one or two extra-semesters to complete the program.

**Option I: Interior Design**

The interior design option prepares students for professional careers in the planning and design of interior spaces and associated products. The program emphasizes a problem-solving approach based upon knowledge of buildings and their associated systems, furnishings and interior products, human-environment relations, and design principles. Some students combine this program with one of the other options.

Careers are available in interior design and space planning, interior architecture, facility planning, interior product design, and housing. This program also serves as an excellent preparation for graduate study in interior design, facility management, architecture, and product design.

**Option II: Facility Planning and Management**

This option is designed to prepare students for professional careers in facility management. The program focuses on the planning, design, and management of facilities for large, complex organizations such as corporations, health-care institutions, research and development laboratories, and universities. Facility planning and management is a basic management function that coordinates and integrates information and expertise from areas such as planning and design, real estate and business administration with human factors, ergonomics, environmental psychology, telecommunications, and building operations for the purpose of developing and managing facilities that support individual and organizational effectiveness.

Excellent career opportunities exist in the facility management divisions of private companies, institutions, the health-care industry, and with private consulting firms offering facility management services. The program is also a good preparation for graduate study in business, planning, or one of the design disciplines and for advanced study in facility planning and management.

**Option III: Human-Environment Relations**

Human-environment relations 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, and to use that knowledge to help architects, planners, interior designers and product designers to plan, design, and manage safe and effective environments. The effect of human capabilities or characteristics such as family structure, life-style, social class, and stage in life cycle on environmental needs and requirements is also a focus of the program. Career opportunities are available in design firms and in urban planning and other public agencies as well as in the facility management and product design division of private companies. Human-environment relations 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 public, facility 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, Paul Eshelman, in E304 Martha Van Rensselaer Hall.

Consultation with faculty advisers about future goals, departmental requirements, sequences of courses, and electives inside or outside the...
college to meet special needs helps students develop their programs. Students majoring in interior design, especially, must begin early to plan and collect materials for a portfolio of their work, which is necessary for many positions and for application to graduate schools. Faculty advisers can make recommendations on what to include. Students are free to change advisers. Although advisers must sign the schedule card 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 the major and the college.

Ownership and Exhibition of Student Work
All design work done in studios as part of an academic program is the property of the department until it has been released by the instructor. The department is not responsible for loss or theft of student work.

HUMAN DEVELOPMENT AND FAMILY STUDIES
The programs of the Department of Human Development and Family Studies (HDFS) are concerned with how people develop throughout the life course. Of equal interest is the family as a context for individual development and as a part of the larger structure of society. An ecological perspective—the person in interaction with complex biological, situational, and environmental components of everyday life—is featured in many departmental courses.

Major social science disciplines concerned with the development of individuals and with the structure and function of families are represented among faculty members with backgrounds in psychology, sociology, history, and education. The department's programs of instruction, extension, and research provide diverse opportunities for students to prepare for career development or to acquire the bases for graduate study. Many of the department's majors are interested in clinical psychology, counseling, law, medicine, special education, or university teaching and research that require some graduate study. Others may go directly into employment in business or industry or take bachelor's-level positions such as youth counselors, day-care workers, personnel assistants, research technicians, and social program assistants.

Academic Advising
Every HDFS major is assigned a faculty adviser in the department, and advising conferences are required at least twice a year. An adviser helps plan the course work and consults with the student about career options. The adviser can also help students find special opportunities for individual study or experience outside the classroom. Although advisers must distribute pin numbers, 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 the major and the college. Students who need an adviser or who want to change advisers for any reason should check with the director of undergraduate studies, Joan Brumberg, or the department office, in NG14 Martha Van Rensselaer Hall.

Curriculum
HDFS majors usually combine a broad liberal education with a more specialized focus on either a problem of human concern or a substantive area of concentration. Areas of specialization available within HDFS include infant, child, adolescent, and adult development; abnormal development; family studies; and social-personality and cognitive development. Some students combine an HDFS major with premedical or prelaw training or with specialized work in an area outside the department, such as communication arts, nutrition, business, or social work.

During their first two years, students are expected to combine a variety of liberal arts courses with HDFS core courses HDFS 115 (Human Development); HDFS 150 (Families and the Life Course); and intermediate courses in phases of development, cognition, or social-personality. This encourages diversity yet ensures a common base for upper-level courses in the major. Courses within the department vary from lectures and discussions to research and independent study.

All students are encouraged to participate in an experiential learning course in their particular area of interest. The course may focus on a naturalistic or laboratory setting (e.g., nursery school, youth detention center, retirement home) or on a research setting (e.g., interviewing, administering tests, observing behavior).

An HDFS major also takes a number of upper-level departmental courses in particular areas as described in the Student Guide. Additional information is available in the HDFS Office of Undergraduate Education, NG14 Martha Van Rensselaer Hall.

Math Requirement
HDFS majors are required to fulfill a math requirement by passing Education 115 or demonstrating equivalent competency by scoring 650 or higher on the math SAT examination.

Teaching Certification Option
The cooperative Cornell HDFS-State University College at Cortland education program is designed to meet New York State certification requirements for teaching grades N–6 while simultaneously earning the Cornell bachelor's degree in HDFS. The program requires that the student spend three years at Cornell and the senior year and part of two summers registered in absentia at SUC Cortland. Students usually keep their Ithaca housing as Cortland is just 18 miles away and the one-semester teaching internship is based in Ithaca.

This highly selective undergraduate program offers an alternative to the option of seeking a master's degree in education after the undergraduate studies at Cortland have been completed. Students interested in the program should discuss the merits of each option with the Coordinator of Undergraduate Education in NG09 MVR.

Course work at Cornell must be carefully planned. Elective options will be somewhat limited because it will be necessary to consider the twenty-seven Cortland credits plus three education courses at Cornell as electives. The teaching certification program is not an option for external transfers entering as late as upper sophomore or junior year. More information is available in the department's Office of Undergraduate Education, NG14 Martha Van Rensselaer Hall.

Honors Program
The honors program leading to a Bachelor of Science degree with honors in HDFS is designed to provide in-depth research experience for students interested in graduate school and to challenge students who enjoy research. Interested students should consult the coordinator of the honors program during their sophomore year.

A grade-point average of 3.5 is required for entry into the program. Honors students must take an approved course in research design, preferably in the sophomore or junior year. Students spend part of their junior and senior year working on a thesis under faculty supervision, completing the project before April 15 of the senior year when the student's oral examination is held. More information is available in the department's Office of Undergraduate Education, NG14 Martha Van Rensselaer Hall.

Language Competency
The HDFS faculty believe that competence in a foreign language is an essential liberal arts goal for the educated HDFS student. Such exposure opens another culture for exploration at both the instrumental and expressive levels, helps students understand language itself, and encourages knowledge of language as a fundamental intellectual tool and as an essential communicative asset with potential applied benefits. While this is not a graduation requirement, it is strongly recommended that HDFS majors develop competency in a second language.

The following departments teach foreign languages or literature or both in the College of Arts and Sciences: Africana Studies and Research Center, Asian Studies, Classics, German Literature, Modern Languages and Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

Work toward foreign language competency should be undertaken in the freshman and sophomore years. Please note that high school or transferred language courses can be used for advanced standing credit, even if the student does not want to do any further language work at Cornell.

Speakers of languages other than English may be awarded credit for their bilingual ability. Their English achievement is measured by the Test of English as a Foreign Language (TOEFL), a requirement for matriculation. Their performance in one other language learned outside the academic environment is measured by examination, and evidence of abilities in reading and writing, as well as speaking, is required. A maximum of 6 advanced placement credits are granted to students who demonstrate PROFICIENCY equivalent to course work at the 200 level or above at Cornell. Students may not earn credit both for PROFICIENCY in their native language and for studying English as a second language at Cornell.
Language Course Placement and Credit

Students who have had two or more years of high school study in a language may not register in any course in that language without being placed by examination. Nor may transfer students register without examination, even though they may have been given credit for language work elsewhere.

The type of examination depends on the language course and the level of achievement:

1) French, German, Italian, Russian, and Spanish courses: the standardized College Placement Test (CPT). Entering students who have not taken the CPT in high school and who want to continue their language study must take the CPT at Cornell during orientation week. Students may retake this examination at Cornell if they have studied the language a year or more since last taking the test. To do this, students register with the Academic and Career Counseling Services, 203 Barnes Hall, and pay a fee.

2) Latin (all courses except 105 and 107): departmental examination.

3) Greek (all courses except 101, 104, and 111): departmental examination.

4) Arabic: departmental examination.

5) Hebrew: departmental examination.

6) Other languages: special examinations: see the professor in charge.

7) High achievement (students with a CPT score of 650 or better in French, German, Hebrew, Italian, Russian, and Spanish): the Cornell Advanced Standing Examination (CASE).

An entering or continuing student with high achievement scores should take the Cornell Advanced Standing Examination (CASE).

See section on College of Arts and Sciences, Language Requirement, for further information.

POLICY ANALYSIS AND MANAGEMENT (FORMERLY CONSUMER ECONOMICS AND HOUSING AND HUMAN SERVICES STUDIES)

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 areas: family/social welfare, health, and consumer policy. Social welfare/family policy and management includes a panoply of governmental and private sector income maintenance, social, and human service delivery programs and policies that range from child adoption and child neglect and abuse policies and programs through income maintenance and antipoverty programs to 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, health maintenance organizations, public health issues, and substance abuse policies. Consumer programs and policies include such regulatory or antitrust programs as advertising, product safety, food and drug safety, nutrition policies, the regulation of credit, insurance, telecommunications, mortgage, housing issues, and public utility markets and also deal with issues such as the invasion of privacy, internet security, and children's TV. 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 college requirements, all PAM majors are expected to take core courses: Introduction to Management, Introduction to Policy Analysis, Research Methods, Multivariate Statistics, Intermediate Microeconomics, and Public Finance. Students will also be expected to develop a concentration of three courses in either social welfare/family, health, or consumer. These concentrations may emphasize either policy analysis or management skills. Finally, PAM majors will have the opportunity to participate in a departmentally approved experiential learning. Please check with the undergraduate advising coordinator, Professor Alan Mathios, for further details.

Consumer Economics and Housing, Human Service Studies, and Policy Analysis

The program in Policy Analysis and Management has been formed from three previous majors: Consumer Economics and Housing (CEH), Human Service Studies (HSS), and the interdisciplinary Policy Analysis program. The Department of Policy Analysis and Management is committed to maintaining these programs for students currently enrolled in them. PAM will offer majors in Consumer Economics and Housing, Policy Analysis, and Human Service Studies to students matriculating in spring 1997 or before and to transfer students who can complete the program by no later than spring 2000. Such students also have the choice of switching to the Policy Analysis and Management major. The department is not obligated to continue teaching courses required for the CEH, HSS, and PA majors or those required for accreditation in Social Work after spring semester 2000. Please see the Human Ecology Student Guide, 1997-98 and PAM director of undergraduate studies Alan Mathios, for further information.

TEXTILES AND APPAREL

The Department of Textiles and Apparel (TXA) focuses on the use of textiles and fibrous materials for apparel, durable and nondurable household goods, composites, geotechnical, and biomedical applications. Programs in the department, in keeping with the overall mission of the college, emphasize the use of materials to meet human needs. The curriculum includes the application of design principles, physical and materials science, economics and marketing, government policy/regulation, management of products and their delivery, and technological developments.

Practical problem-solving skills are developed in the department's laboratories and studios. Academic course work 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, Peter Schwartz (201 Martha Van Rensselaer Hall). 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 early to work with their advisers to develop a professional portfolio of their work. Students are free to change advisers; changes must be recorded with the advising coordinator. Although advisers must sign the schedule card 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 the major and the college.

Ownership and Exhibition of Student Work

All apparel design work done as part of the academic program is the property of the department until it has been released by the instructor. Certain exceptional work may be retained by the department to exhibit for academic purposes. The department is not responsible for loss or theft of student work.

Course Fees

No grade will be given in a course unless the course fee has been paid by the last week of classes.

Key Policy for Apparel Design Studios

To allow design students access to studios for out-of-class work at any hour in which Van Rensselaer Hall is open, and to provide security for the studios, the department has
instituted a key policy. Each student in TXA 040, 145, 264, 367, 375, 425, 446, and 465 who submits a security deposit of $50 will be given a key to the studio in which his or her class is held. If any key is lost, the studio will be rekeyed, and the cost will come from the security deposit of the student who lost the key. At the end of each semester, the studio will be assessed for missing and damaged equipment. The total amount assessed will be deducted from the security deposits of all students assigned to that studio. If all keys are returned and no damage or theft is reported, the security deposits will be returned at the end of the semester. Students who do not wish to work in the studio outside of class hours may elect not to have a key and therefore will not be required to submit a security deposit. Under no circumstances will these students be admitted to the studio outside of class hours.

**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 structure of fabric to solve functional and aesthetic 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. Depending on previous coursework, transfer students may need one or two extra semesters to fulfill the requirements of the major.

**Option I: Apparel Design**

The study of apparel design includes both functional and aesthetic 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, economics, business management, and communication, as well as practical field experiences. This provides students with the experience of working with professionals from a wide variety of disciplines. Students often combine this option with either Option I (Apparel Design) or III (Fiber Science).

**Option III: Fiber Science**

Applications for textile structures include advanced engineering composites, protective clothing for industrial and military environments, and biomedical materials, as well as the more traditional applications found in apparel and home furnishings. The fiber science option provides a strong base in mathematical sciences combined with supporting courses in engineering, consumer economics, and the social sciences.

**Career Opportunities**

Graduates of programs in the Department of Textiles and Apparel have found challenging employment within the textile and apparel sector, in independent and government-sponsored community organizations. Recent graduates are working in the fields of new product development, design, management, engineering, communications, and marketing. In addition, the program prepares students for graduate or professional study in fiber and polymer science, textile marketing, apparel design, textiles, or business and management.

**INTERDEPARTMENTAL MAJOR IN BIOLOGY AND SOCIETY**

Biology and society is a multidisciplinary program for students with special interests in such problems as genetic engineering, environmental quality, food and population, the right to medical care, and the relation between biology, society, and ethics and/or public policy, as well as 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 introductory courses in the fields of biochemistry, chemical and physical biology, genetics, ecology, and history. 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 must be taken in two of the following three concentrations: 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 the Human Ecology Student Guide, available in the Office of Student Services, N101 Martha Van Rensselaer Hall. Academic advising is coordinated by the director of undergraduate studies, S. Kay Obendorf, 208 Martha Van Rensselaer Hall.

**INDIVIDUAL CURRICULUM**

A student who has educational and professional objectives that cannot be met satisfactorily within the framework of existing majors in the College of Human Ecology may petition to develop an individual curriculum. To be approved, the curriculum must be within the focus of the college and be interdisciplinary in design, include at least 40 credits in human ecology coursework, 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.

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 as early as possible and must be made before the second semester of the junior year.

If an individual curriculum seems advisable, Patti Papapietro, the individual curriculum coordinator in the Office of Student Services, N101 MVR, will provide direction in formally developing a program of study. Although the individual curriculum coordinator must sign the course enrollment schedule during course enrollment each term, a student has the responsibility to follow the curriculum as planned or to have any necessary revision approved in writing by his or her advisers and the program coordinator in advance of 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.

**International Study**

Approximately 14 percent of the class of 1997 in Human Ecology studied abroad. Study abroad allows students to focus on international issues and intercultural understanding through sponsored programs of study abroad for which academic credit is available. Course work in a foreign institution will be planned to increase knowledge of the people and institutions of the country concerned; fieldwork may provide guided experience in family, community, or agency situations of the country concerned and in an area related to individual student interest in human ecology. Students should begin planning for their study abroad experience in their freshman or sophomore year. Opportunities for study abroad are available for human ecology students in several ways: through Cornell Abroad, through other U.S. college-sponsored programs abroad, and through direct enrollment in a foreign university. In all cases, students remain registered at Cornell during the overseas study, and their study abroad will be credited as part of their Cornell degree program. Application packets for study abroad can be obtained from an adviser who should be submitted to the study abroad adviser in the Office of Student Services, N101 Martha Van Rensselaer Hall. The Student Resource Center, N139 Martha Van Rensselaer Hall, has catalogs and other information about study abroad opportunities. The study abroad adviser is Mary Rhodes, N101 Martha Van Rensselaer Hall.

**Field Study, Internships, and Research Opportunities**

Field study, internships, and research opportunities allow students to receive academic credit for work that extends and complements their course of study. Through structured experiences facilitated by faculty...
Students strengthen their ability to integrate theory and practice and learn to reflect critically on their experience while broadening their understanding of diversity and complex societal issues. In existing courses and through individual and group projects, students develop an intellectual framework for understanding and solving problems in a variety of challenging settings. Placement opportunities are available in business, health, law, medicine, environmental analysis, education, nutrition, government, laboratories, textiles and apparel, design, social service and community settings. Students are encouraged to plan early for these opportunities.

To learn more, students should consult with their faculty adviser, professor, or undergraduate advising coordinator. They can also visit the Student Resource Center in N-139 MVR and explore listings of opportunities on the "Human Ecology Field Study Coordinator Program" available on Campus Access. New initiatives are encouraged. For further information, contact Kris Deluca-Beach, director of career services, N-101 MVR.

Multicultural Issues in Urban Affairs
Fall and spring semesters: HE 480
This course is a study of multicultural issues in urban affairs as students enhance their academic foundations in career development. Students examine a number of diversity (e.g., race, ethnicity, religion, class, gender, sexual orientation) in relationship to (1) professional life in different sectors of the economy; (2) the development of neighborhoods and communities; and (3) the basis of a just and democratic society. Readings explore the focus on inner-city children and youth under a variety of multicultural-influenced conditions and contexts. Costs include travel to and from sites by public transportation at about $3.00-6.00 each week.

Communities in Multicultural Practice
Fall and spring semesters: HE 490
This course provides students with an understanding of community building processes and experiences. Students participate with children, youth, and their families in the South Bronx. Students immerse themselves in the history and community development efforts of the South Bronx. The South Bronx will be presented as a case study in successful community building with a focus on children and youth. Leaders will present their personal stories in the redevelopment of the South Bronx, creating over the course of the semester a tapestry of stories that make the abstract principles of economics, social, cultural, and political development come to life. Further grounding students in the real lives and conditions involved in the development of the South Bronx will be their participation in after-school programs involving children and youth in a variety of community-based settings. Students will mentor the children and learn about them and their needs, relating these to the content studied in the other two courses of the Urban Semester Program. Costs include public transportation costs to and from the various sites, about $3.00-6.00 each week.

The Winter Intersession in Community Service and Mutual Learning: The South Bronx-Banana Kelly/Cornell University Project in Community Building
Winter intersession: HE 402
Over the course of two intensive weeks, students participate in an ongoing community service project in the South Bronx. In carrying out community service, students participate in a research project with the director of the Cornell in New York City program. In the 1995 intersession, six students mentored 12 children in an after-school program by documenting the community with photographs and stories. A photography exhibit was produced that is presently circulating. Other projects with Banana Kelly are available to students throughout the year. Please contact Dr. Sam Beck in the Cornell in New York City program office.

Fieldwork in Diversity and Professional Practice
Summer session: HE 406
Over the course of an eight-week summer session, students carry out research projects on the multicultural dynamics of professional practice by interning full time in settings of

Cornell in New York City
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. Experiential learning practices inform all courses of study. 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. Students learn by doing and 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, 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 learn how to be agents of change.

Several majors in the college require internships or encourage field study. Check with the advisor or the program coordinator for more information. The Student Resource Center in N-139 MVR and the Field Study Coordinator in N-137 MVR can help you find opportunities and provide more information on departmental opportunities and enrolling in Cornell in New York City.

Multicultural Practice
Fall and spring semesters: HE 470
Students immerse themselves in internship activities three days each week. During small group seminars, students reflect on their experiences in their internships with a focus on multicultural issues, professional practice, and organizational culture.

Gerontology Concentration
Gerontology Certificate Program
This program develops students' understanding of and competence in dealing with the processes and issues of aging. Study in gerontology provides practical experience and preparation for professional work. Students draw on resources of several departments and colleges at Cornell and Ithaca College to shape a curriculum suited to their professional goals and interests. Contact the Gerontology Coordinator, Life Course Institute, 259 Martha Van Rensselaer Hall.

Teacher Certification in Home Economics
Students can combine any major in the college with additional coursework that leads to a home economics teacher certification (kindergarten through twelfth grade) in New York State and a number of other states. Interested students should contact the Office of Student Services in N101 Martha Van Rensselaer Hall.

Double-Registration Programs
Johnson Graduate School of Management
A limited number of highly qualified students from Cornell undergraduate divisions, including human ecology, may be accepted by the Johnson Graduate School of Management after the junior year. Successful applicants need the approval of the admissions office and the registrar in the College of Human Ecology. Accepted students should be aware that if the management course work taken in the senior year is in excess of the 21 additional credits allowed in the Cornell endowed divisions, they will be charged for the additional credits on a per-credit basis. Students entering this program must also complete requirements for the degree and major in Human Ecology.

Law School
A small number of highly qualified applicants may be admitted to the Cornell Law School after only three years of undergraduate study. 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 to discuss the extraordinary admissions criteria. Because students accepted to this program will spend their senior year in the Cornell Law School, they need to plan ahead to ensure that distribution requirements for the B.S. degree from the College of Human Ecology will be met. Successful applicants need the approval of the college registrar.

Cornell Medical College
A limited number of highly qualified students from three Cornell divisions, including the
enrolled in methods and practice-teaching courses. Acceptance of Cornell students into program and that do not duplicate Cornell exceptions will be granted to Cornell students register for one course a term and may take Cornell students are eligible to register only in Cornell and only special fees to Wells College. Students pay regular tuition to may petition to enroll in courses at Wells spring semesters. The program is available only during the fall and spring semesters. For further information students should contact the college registrar, N101 Martha Van Rensselaer Hall.

PLANNING A PROGRAM OF STUDY

Academic Advising

Students who choose to major in a particular department are assigned to a faculty adviser by that department's director of undergraduate studies. The director of undergraduate studies can help match a student's needs with the special interests of a faculty member. Students may change advisers as their own interests change and should see the director of undergraduate studies to discuss such a change. Faculty advisers, and counselors in the Office of Student Services (N101 Martha Van Rensselaer Hall), are available to discuss course requirements and sequences, and electives inside or outside the college, as well as future goals and career opportunities.

Although advisers must provide the advising key number during course enrollment each term, it is the student's responsibility to make sure that her or his 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 who are available for planning and referral to department resource faculty.

Completing Graduation Requirements

A summary of record is kept for each student in the Office of Student Services, N101 Martha Van Rensselaer Hall. At the beginning of fall term each continuing student receives a copy showing which major and degree requirements have already been met. It is important to check this summary and to bring any questions to the attention of the faculty advisor and the staff members in the Office of Student Services. A student may complete the requirements of more than one major.

Electives

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 round out their educations.

Students should consult the index of this Catalog. For further information students should contact the college registrar, N101 Martha Van Rensselaer Hall.

Wells College

Full-time undergraduate students at Cornell may petition to enroll in courses at Wells College. Students pay regular tuition to Wells College, if any are charged. Students are allowed to register for one course a term and may take no more than 12 credits in four years. Exceptions will be granted to Cornell students enrolled in methods and practice-teaching courses at Wells College. Cornell students are eligible to register only in Wells College courses that are relevant to their program and that do not duplicate Cornell courses. Acceptance of Cornell students into Wells College courses is on a space-available basis. Participation in this program is not guaranteed, and Wells College has the right to accept or reject students for any reason it deems appropriate. The program is available only during the fall and spring semesters.

For further information students should contact the college registrar, N101 Martha Van Rensselaer Hall.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

General

Students applying as undergraduates who do not have the required academic unit in biology, chemistry, or physics are required to show evidence of having met this deficiency before matriculation in the college. Freshmen and sophomores are required to enroll in at least one human ecology course per semester.

To graduate, students need to:

1) meet college credit and distribution requirements,
2) complete requirements for a major,
3) achieve a cumulative average of 1.7 (C–) or better,
4) fulfill residency requirements, and
5) complete two terms of physical education within the first two semesters.

College Requirements

These are the general areas of study and specific courses and credits required of every student in the college. The major you choose may require specific courses listed below or may leave you free to choose among certain courses listed there.

Category I General Distribution (37-41)

A. Natural Sciences (6)
B. Social Sciences (6)
C. Humanities (4) Language credit cannot be used in this area (See IV).
D. Written Communications (6) Must be Freshman Writing Seminars. At least one seminar must be in the humanities.
E. Quantitative and Analytical (3-7)
   1. Math competency equivalent to EDUC 115 (precalculus)
      a. AP of 3 or higher on AB test
      b. AP of 2 on BC test
      c. Math assessment test score equivalent to EDUC 115
      d. Pass a math course equivalent to or higher than EDUC 115
2. Statistics, advanced math, logic (4)
   ARME 310 Intro. Statistics (4)
F. Additional credits (12)
Category II Requirements in the Major
(number of credits vary by major)

Category III HUMEC Credits Outside the Major

May not include any HE 00 courses, HE 100, HE 101 or any 403 course. A maximum of three credits of special studies (400, 401, and 402), or of any internship credit may be used. A maximum of five credits of either HE 470 or HE 480 or HE 490 can be used.

Transfer students (external and internal) can combine transfer credit with credit earned in the college, or can prorate the number of credits to complete this requirement. (Refer to "Policies Related to College Requirements" in the Human Ecology Student Guide for details of the policy.)

Category IV Electives

Credits to complete 120 credits overall, exclusive of physical education.

Elective credits can be earned in Human Ecology or elsewhere. Students who earn more than 21 credits in endorsed divisions will be billed for the excess credits at the end of the term. Billable endorsed credits include endorsed courses taken in Category II.

Category V Physical Education

TOTAL credits (exclusive of PE) 120

Students who have successfully fulfilled these requirements should have completed at least two terms of physical education in their freshman year.

Related Policies

College course requirement. Freshmen and sophomores are required to enroll in at least one course in the College of Human Ecology each semester. Students who fail to comply with this requirement will be reviewed by the Committee on Academic Status for appropriate action.

Category I.D. Students who score 4 or 5 on the Princeton AP Exam are awarded 3 credits in English. Students who score 5 on the Princeton AP Exam are exempt from one freshman writing seminar in addition to the 3 English credits awarded.

Category IV. There is no limit to the number of credits that may be taken in the state divisions of Cornell, and therefore students may choose to take additional state credits and graduate with more than 120 credits.

Credits in the endowed divisions in this section may not exceed 21. Any course taken in an endowed division for which a grade of F or U is received will be counted as part of the 21 endowed credits allowed. Students are not required to take elective credit in the endowed divisions.

Elective credits earned in Cornell's endowed divisions during summer session, in absentia credits, and transfer credits are counted as credits earned in the state divisions and therefore do not count as part of the 21 credits allowed in the endowed divisions in meeting the requirements of this section.

Not more than 21 credits in Categories II and IV may be taken in the endowed divisions of the university except under both of the following conditions:

1) The students must have senior status (must be in the final two semesters prior to graduation);
2) Payment must be made for each credit taken in excess of the 21 allowed, whether or not the courses are passed. For the fee per credit charge, students should call the Office of the Bursar.

Category I.D. Transfer students should have taken at least 6 credits in courses in English composition or in courses requiring substantial writing and offering instruction in writing equivalent to that offered in the freshmen writing seminar program at Cornell. Students who have not fulfilled this requirement before transferring must fulfill it after matriculation.

Category III. External and internal transfer students can meet the requirement for course work outside the major in the College of Human Ecology by completion of either of the following:

1) 15 credits of work, outside their department, comprised of transfer credit and credit earned in the college, or
2) credits all taken in this college (no transfer credit is allowed to meet this requirement), on the basis of the status of the student's matriculation and prorated as follows:

Cornell Human Ecology Credits to Satisfy Work outside the Major

Status at Matriculation
Freshman (1-25 transfer credits) 15
Sophomore (26-55 transfer credits) 12
Junior (56-85 transfer credits) 9
Senior (86-120 transfer credits) 9

Note that transfer students are still responsible for completing a minimum of 40 human ecology credits under Category III.

Category IV. Transferred credits for courses applied toward electives do not reduce the 21 Cornell endowed credits that students are allowed. Courses with a passing grade below C will not transfer to meet human ecology degree requirements.

Category V. Transfer students who have had the equivalent of two semesters of college (and therefore enter as sophomores) are not required to take physical education at Cornell, regardless of whether they took physical education at their first college. Exemption from or postponement for medical reasons must be cleared by Gannett Health Center. For further information about exemption from, or postponement of, physical education, students should consult the Office of Physical Education in Teagle Hall.

Related Policies for Freshmen

Category V. Freshmen are required to take two semesters of physical education during their freshman year. Freshman transfer students entering with 12 or more credits have their physical education requirement reduced to one term.

Residency Requirements

All college curricula are planned to fit within an eight-semester program. An average schedule of 15 credits a semester (in addition to physical education) is considered standard, and if pursued for eight semesters will provide the credits needed for graduation. If the student completes all the requirements—for the major, for distribution, for total credits, and for cumulative average—in fewer than eight semesters, the degree may be conferred at the end of the semester in which the last requirements are met. Students who plan to receive their degrees early should notify the college registrar at the beginning of the semester so that their names can be placed on the list of degree candidates.

Sometimes a student (particularly a transfer student) may need an additional semester to complete a program. To register for a semester beyond the eighth, the student submits a general petition to the college registrar in the Office of Student Services, N101 Martha Van Rensselaer Hall. The petition should detail the reasons for wanting to enroll for the extra semester and include a list of courses planned for the additional semester. Such requests are usually granted when there appears to be no feasible way for the student to complete the professional curriculum or the degree requirements without the extra semester.

Freshmen entering the college with 15 transfer credits have seven semesters in which to complete the degree. Transfer students must complete at least 60 credits at Cornell.

Mature students (those at least twenty-four years old at the time of matriculation) are not required to petition the college registrar for approval to study beyond the usual eight semesters.

Exemptions from Requirements

Students who want an exemption from a specific graduation or major requirement may petition, and approval may be given under certain circumstances. Full information about the petition process is given in the Human Ecology Student Guide. Petition forms are available in the Office of Student Services, N101 Martha Van Rensselaer Hall.

PROCEDURES

Course Enrollment and Registration

Students are expected to complete course enrollment during specified times each semester. It is the student's responsibility to learn the dates of course enrollment.

Freshmen and transfer students enrolling in the university for the first time in the fall term request their courses during the summer before they arrive on campus. Enrollment materials are mailed to new students in May. Because new students starting at midyear do not have an opportunity to enroll in courses until after they arrive on campus, the college reserves places for them in human ecology courses. The orientation schedule given to all new students lists a specified time to enroll in such courses.

Continuing students enroll for fall semester in March–April, and for spring semester in October–November preceding the beginning of the term. They are notified of course
Enrollment Dates by poster, e-mail, and by notices in the Cornell Daily Sun. Course enrollment materials are available for continuing students via computer access to Just the Facts and in the Office of Student Services, N101 Martha Van Rensselaer Hall. For the first three weeks of the term, students have an opportunity to add courses in other divisions of the university as well as in human ecology.

Enrollment
Before or during course enrollment, students discuss their program plans with a faculty adviser or a college counselor in the Office of Student Services. For their advising sessions, students need the Course and Time Roster issued by the university registrar which also is available via computer on CUNIPO. Students must obtain an adviser key number from their departmental major faculty adviser, or if they have not declared a major, from a college counselor in N101 MVR.

Students complete their enrollment course requests by the deadline announced by the university registrar.

The following policies and procedures apply to course enrollment.

Permission of Instructor
Certain courses may be taken only with the permission of the instructor as indicated in Cornell University: Courses of Study. For such courses, students must request the instructor's permission during the CourseEnroll 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 Tjadan Hall) before enrolling in the course. Students who want to take an elective course in the Johnson Graduate School of Management are required to obtain permission of the instructor on a course authorization form that the student must file with that school's registrar in 312 Malott Hall.

Special Studies Courses
Each department in the College of Human Ecology (DEA, HDFS, DNS, PAM, and TXA) offers special studies courses that provide opportunities for students to do independent work not available in regular courses. One of these courses, designated 300, Special Studies for Undergraduates, is intended primarily for students who have transferred from another institution and need to make up certain course work.

The other special studies courses are 400, Directed Readings; 401, Empirical Research; and 402, Supervised Fieldwork. These courses are normally taken by upperclass students, and work is supervised on an individual basis by a faculty member in the department in which the course is offered. It is important for students to use the appropriate course number (300, 400, 401, or 402) for a special project.

A student who wants to take special studies courses talks 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 multicopy special studies form, a multicopy description of the study to be pursued. The student obtains the signatures of the instructor and the department chair as well as the student's department adviser before submitting it to the Office of Student Services. The student also must complete a course registration form in the Office of Student Services. Special studies forms and instructions are available in the departmental offices.

To register in a special studies course taught in a department outside the college, students should follow the procedures established for that department.

Course Loads
The normal course load in the college ranges from 12 to 18 credits. During the course enrollment period no student may enroll for more than 15 credits or five courses, whichever is greater.

Credits beyond 15 may be added during the first three weeks of the semester without special permission.

Students should avoid planning excessive work loads; the time required to keep abreast of courses tends to increase as the semester progresses. Courses cannot be dropped after the seventh week of classes without petitioning and by substantiating extenuating circumstances, so students should try to avoid the need to drop courses.

Except for those with mature student status, students must carry at least 12 credits (exclusive of physical education). 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 Student Services, N101 MVR.

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 for more information.)

Students of mature status may carry 6 to 11 credits without petitioning and may have their tuition prorated. However, at the beginning of each term, mature students planning to take a light course load should pick up a proration of tuition form from the Office of Student Services, fill it out, have it signed by the college registrar, and return it to the bursar's office in Day Hall.

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 Cornell University: Courses of Study. Students' professional goals may be considered. Those students not admitted to a course may be placed on a waiting list.

Late Course Enrollment
Students who do not complete course enrollment during the course enrollment period usually must wait until the beginning of the semester 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 N101 MVR as soon as possible. The college registrar can explain available options on course enrollment procedures under such circumstances.

Important: 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 option and other data. Students must correct errors immediately. Procedures for correcting enrollment errors as well as making changes for other reasons are described below under Course Enrollment Changes.

At the beginning of the fall semester, each continuing student receives a copy of his or her summary of record from the Office of Student Services. This summary shows degree requirements that the student has completed. Students are responsible for assuring that their academic program meets degree requirements. They resolve any questions about degree requirements with the appropriate staff person in the Office of Student Services. Students may direct questions about their academic programs to their faculty adviser or to a counselor in the Office of Student Services.

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.

All students must be registered according to university policy 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 will be withdrawn from the university. Should withdrawn students wish to return, they must reapply throughout the admissions committee.

Course Enrollment Changes

Deadlines
• During the first three weeks of the term, courses may be added or dropped.
• From the fourth through the seventh week of the term, course changes may be made with the permission of the instructor (instructor's signature on the add/drop form).
• 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.
• From the eighth week of the term, no course charge may be made without petitioning for approval. Petitions are usually granted only in circumstances beyond a student's control (for example, illness). A student petitioning for medical reasons should provide substantive medical evidence with the petition.
• A student who submits a petition after the seventh week of the term requesting permission to drop a course must attach a statement from his or her faculty adviser to that petition indicating whether or not the advisor supports the request.
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.

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 classes 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. (See Petition Process, General Petition Form for information on the procedure.)

Procedures

It is to the student's advantage to make any necessary course enrollment changes as early in the term as possible. Adding new courses early makes it easier for the student to keep up with course work. Dropping an unneeded course early makes room in the course for other students who may need it for their academic programs.

Ideally, students evaluate their course work load 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, the instructor’s permission must be obtained for a course requiring it, and the same forms for special studies courses must be completed. Aside from the procedures listed below for course enrollment changes, all course change forms for nutritional science majors must be signed by the faculty department adviser.

Waiting List: The Office of Student Services maintains a waiting list of students who want to enroll in courses that have been filled. Waiting lists are maintained on a first-come, first-served basis without regard to seniority or other factors. To keep their names active on a waiting list, students must check in person every 48 hours with the Office of Student Services; names of students who do not check in are automatically dropped from the list.

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.

There is no charge for course changes. To make course changes during the first three weeks, a student takes the following five steps:

1) Obtains a course-change form from the Office of Student Services, N101 MVR.
2) Completes the form and takes it to the appropriate office for signature: for human ecology courses, the forms should be taken to the Office of Student Services; for courses outside the college, the forms should be taken to the appropriate departmental office in the other college.
3) Makes sure that his or her name is added to the list of enrolled students for a course being added, or removed from the class list for a course being dropped. Asks the person recording the change to sign the form.
4) Submits all signed forms to the Office of Student Services, including the forms for out-of-college courses. Changed enrollments and the signed forms are filed in that office. If a student does not drop a course that he or she no longer attends, the student is in danger of receiving an F in the course.
5) Receives carbon copies of each course change form at the time it is submitted. It is important for students to keep these copies to verify later that the forms were filed.

To make course changes during the fourth through seventh weeks of the term, a student takes the following steps:

1) Completes the five steps listed above for changes made during the first three weeks.
2) Obtains the instructors' signatures on the course change form for human ecology courses.

To make course changes after the seventh week of the term, a student must file a general petition form. (See the section below, Petition Process.) Students are expected to attend classes and to do assigned work until the petition has been formally approved or denied.

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. 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 they have been returned to good standing by the Committee on Academic Status. 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. Note that in absentia study and leave of absence status are mutually exclusive.

In absentia petition forms are available in the Office of Student Services, N101 MVR. The student completes the form, has it signed by his or her faculty adviser, attaches catalog descriptions for the courses that will be taken, then submits it to the Office of Student Services, N101 MVR.

Students receive notice of the petition decision by means of a letter from the college registrar.

A student may take up to 15 credits in absentia as long as the courses do not duplicate courses already taken and in absentia courses are applicable to the requirements of the college. A student's petition for more than 15 credits in absentia may be allowed under the following conditions: (1) the work taken represents a special educational opportunity not available at Cornell, (2) it relates to the student's particular professional goals, and (3) those goals are consistent with the focus of the college. The in absentia petition form is used to request more than 15 credits in absentia.

The college registrar requests approval from the appropriate department if a student wants to apply in absentia credit to requirements for 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 Office of Student Services in the College of Human Ecology. 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. Only credits (not course names and grades) for in absentia courses will appear on the Cornell University transcript.

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 at Cornell unless the student has transferred equivalent human ecology credit. (No more than 20 credits of equivalent credit may be applied to the 40 credits required in human ecology course work.)

Leaves of Absence

A student may request a leave of absence before the beginning of the semester or during the first seven weeks of the semester for which a leave is sought. A leave may be extended for a second semester by requesting an extension in writing from the Office of Student Services. Note that in absentia study and leave of absence status are mutually exclusive.

A student considering a leave of absence is urged to discuss plans with a counselor in the Office of Student Services. The counselor can supply the necessary forms for the student to complete and file with the Office of Student Services, N101 MVR.

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
 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 Student Services and filing a written notice of withdrawal in the Office of Student Services. A student considering such an action is urged to discuss plans with a counselor in the Office of Student Services, N101 MVR.

In some instances a student may be given a withdrawal by the college registrar. A student who leaves the college without an approved leave of absence or does not return after the leave has expired will be given a withdrawal after the seventh week of the term in which he or she fails 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.

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.

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 about a deadline, check with a counselor in the Office of Student Services, N101 MVR.

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 in the Office of Student Services.

Students may appeal petitions denied by the college registrar to the Committee on Academic Status. Students who appeal a denied petition must attach a statement from the student’s faculty adviser before CAS will consider the appeal.

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 the Cornell University Courses of Study. Regulations concerning the S-U system require that a grade of S be given for work equivalent to a C- or better, and that a grade of U be given for work below that level. 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 quality for the Dean’s List must take at least 12 credits for the usual A–F grades.

A student may take no more than four courses (or 12 credits) on an S-U basis during his or her college career; however, more than one S-U course may be taken in one semester. S-U courses may be taken only as electives or in the 15 credits required in the college outside the major unless the requirements for a specific major indicate otherwise. Freshmen enrolled in English 137 and 138 (offered for S-U grades only) are permitted to apply those courses to the freshman writing seminar requirement.

To take a course for an S-U grade, a student must check the course description to make sure that the course is offered on the S-U basis; then either sign up for S-U credit during course enrollment, or file an add/drop/change form in the Office of Student Services before the end of the third week of the term. Forms are available in the Office of Student Services. After the third week of the term, students can not change grade options.

Grades of Incomplete
A grade of incomplete is given when a student does not complete the work for a course on time but when, in the instructor’s judgment, there was a valid reason. A student with such a reason should discuss the matter with the instructor and request a grade of incomplete.

Beginning fall 1984, a grade of incomplete may remain on a student’s official transcript for a maximum of two semesters and one summer after the grade is given, or until the awarding of a degree, whichever is the shorter period of time. The instructor has the option of setting a shorter time limit for completing the course work.

If the work is completed within the designated time period, the grade of incomplete will be changed to a regular grade on the student’s official transcript. If the work is not completed within the designated time period, the grade of incomplete automatically will be converted to an F.

When a student wants to receive a grade of incomplete, the student should arrange a conference with the instructor (preferably before classes end and the study period begins) to work out the agreement. A form, called explanation for reporting a final grade of F or Incomplete, which has been signed by both the instructor and the student, must be submitted by the instructor to the Office of Student Services. This form is submitted with the final grade sheets whenever a grade of incomplete is given.

This form is for the student’s protection, particularly in the event that a faculty member with whom a course is being completed leaves campus without leaving a record of the work completed in the course.

If circumstances prevent a student from being present to consult the instructor, the student may, by notified the student, initiate the process by filling out and signing part of the form and turning it in to the Office of Student Services with the grade sheet. Before a student will be allowed to register for succeeding semesters, he or she must go to the Office of Student Services 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 working with the Office of Student Services (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.

ACADEMIC HONORS
The college encourages high academic achievement and recognizes outstanding students in several ways.

Dean’s List. Excellence in academic achievement is recognized each semester by placing on the Dean’s List the names of students who have completed satisfactorily at least 12 credits with letter grades other than S or U and who have a semester grade point average of 3.5 or above. No student who has received an F or U in an academic course will be eligible.

Kappa Omicron Nu seeks to promote graduate study and research and to stimulate scholarship and leadership toward the well-being of individuals and families. As a chapter of a national honor society in the New York State College of Human Ecology, it stimulates and encourages scholarly inquiry and action on significant problems of living—home, in the community, and throughout the world.

Students are eligible for membership if they have attained junior status and have a cumulative average of 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.

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 Family Studies 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 contact Gret Atkin, NI15A Martha Van Rensselaer Hall, their sophomore year or the first semester of their junior year.

**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 August, January or May of the same academic year.

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 ten percent of the senior class, or in the top five percent of the junior class. Provisions also exist for the election of faculty members and graduate students whose work merits recognition.

**INTERDEPARTMENTAL COURSES**

**HE 100 Critical Reading and Thinking**

Fall, spring, or summer. 2 credits.

Enrollment limited. Priority is given to freshmen and sophomores; juniors and seniors are admitted with permission of the instructor only.

The objective of this course is to enable students to improve critical reading and thinking abilities. Theory and research associated with a wide range of reading, thinking, and writing 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 Prefreshman Summer Program students. S-U grades only.

The objective of this course is to enable freshmen and sophomores to succeed at Cornell. Emphasis is placed on acquisition of skills necessary to achieve academic success. Topics include time management, note-taking, mapping, textbook comprehension, exam preparation, and exam strategies. The application of theory to the demands of Cornell course work is stressed. In addition, students are introduced to library and computing resources through hands-on projects.

**THE URBAN SEMESTER PROGRAM IN NEW YORK CITY**

Sam Beck, Ph.D., director

The Urban Semester Program is a series of classes spanning the entire summer year. During either fall or spring semester students enroll in three classes focusing on the opportunities and barriers that a multicultural society presents and their articulation with professional, community, or public policy settings (15-credit residential program). Students intern three to four days each week and are encouraged to live in the Olin Hall dormitory of the Cornell University Medical College.

The three-week winter intersession course (1 credit) enables students to do fieldwork in New York City by working full time in community-based organizations or through research supervised by the director. In the eight-week summer semester (3 credits), students carry out research projects on the nature of professional practice by interning full time in settings of their choice. Students who seek to contribute to their own communities are encouraged to participate in any of the program offerings. Most students work with the program staff to locate internships. For further information contact the Urban Semester Program at (212) 746-2273 or the Student Resource Center, N-139 Martha Van Rensselaer Hall.

New York City offers a wide variety of internship settings. Many bilingual and bicultural internship settings are available in Chinese, Spanish, Creole, Russian, Yiddish, and other languages. Examples of internships follow:

- **Health and medicine**—New York Hospital/Cornell Medical Center, Chinatown Health Clinic, New York City Department of Public Health, Bellevue Hospital, Queens Medical Center for Women and Children, Community Health Project
- **Private and public law**—New Legal Defense and Education Fund, Neighborhood Defender Service of Harlem, Legal Aid, Puerto Rican Legal Defense and Education Fund, NAACP Legal Defense and Education Fund, Gay and Lesbian Anti-Violence Project, Kane Kessler, P.C.
- **Government and community agencies**—Women's Action Alliance, The Center for Puerto Rican Studies, New York City Commission on the Status of Women, New York City Council offices, Cornell University Cooperative Extension, New York City Department of Consumer Affairs
- **Private not-for-profit organizations**—Grant Street Settlement House, Neighborhood Housing Services, Abyssinian Baptist Church Development Corporation, University Settlement Society of New York, Urban Development Corporation, Greater Chinatown Community Association, Lesbian and Gay Community Services Center
- **Private and public schools**—United Federation of Teachers, Central Park East, River East, Manhattan Center for Math and Science, PS 41, City and Country, Churchill School, Little Red School House, St. Ann's School


**HE 401 Empirical Research**

Fall, spring, winter, and summer. 1-15 credits. Permission of instructor. S. Beck.

This course is available to juniors and seniors who wish to pursue a well-defined, independent research project sponsored by one or more faculty members. Honors projects are welcome. Such students must participate in the course work of HE 402, HE 406, or HE 408. Students must provide a project proposal no longer than five pages, an annotated bibliography representing the fields of interest to be researched or explored, and a letter of approval from one faculty member who will sponsor the investigation.

**HE 402 Supervised Fieldwork in Urban Affairs**

Winter. 1 credit. Limited to 12 students. Permission of instructor.

This course allows students to participate in Urban Semester Program research or internship opportunities in New York City. Research projects are carried out under the supervision of the program director and will include opportunities for field observation, interviewing, and library and archival inquiry, focused on socioeconomic processes in urban settings. Students interested in internships locate their own placements with assistance from the Urban Semester Program staff. Students keep a journal that reflects on their community service experiences with a focus on specific learning objectives. Applications and placement information are available in the College of Human Ecology Student Resource Center, N-139 Martha Van Rensselaer Hall. Applications must be accompanied by a resume, a statement of learning objectives, a letter from the placement supporting the student's plan, and a rationale for participating in this activity. The research or community service must take place during the Cornell winter session period.

**HE 403 Teaching Apprenticeship**

Fall, spring, winter, and summer.

For study that includes assisting faculty with instruction. Prerequisite: Students must have taken the course (or equivalent) in which they will be assisting and have demonstrated a high level of performance.

**HE 406 Fieldwork in Professional Practice: Summer in the City**

Summer. 1-3 credits. 8-week session. Limited to 12 students.

This is a seminar that examines the culture of professional practice, how professionals think and behave, and the role of professionals in society through internships and weekly
discussions with practitioners in a variety of fields. Students will carry out fieldwork in internship placements by researching professional practice in New York City. They will interview a minimum of eight weeks in organizations and fields such as business, government, private not-for-profit services, education, medicine and health, law, media, and communications. Students locate their own internships with assistance from the Urban Semester Program staff. Applications and placement information are available in the College of Human Ecology Student Resource Center, N-139 Martha Van Rensselaer Hall.

HE 470 Multicultural Practice
Fall and spring semesters.
Students immerse themselves in internship activities three days each week. During small group seminars, students reflect on their experiences in their internships with a focus on multicultural issues, professional practice, and organizational culture.

HE 480 Multicultural Issues in Urban Affairs
Fall and spring semesters.
This course is a study of multicultural issues in urban affairs as students enhance their academic foundations in career development. Students examine issues of diversity (e.g., race, ethnicity, religion, class, gender, sexual orientation) in relationship to (1) professional life in different sectors of the economy; (2) the development of neighborhoods and communities; and (3) the basis of a just and democratic society. Readings will reflect the focus on inner-city children and youth under a variety of multicultural-influenced conditions and contexts. Costs include travel to and from sites by public transportation at about $3.00-6.00 each week.

HE 490 Communities in Multicultural Practice
Fall and spring semesters.
This course provides students with an understanding of community building processes and enables them to participate with children, youth, and their families in the South Bronx. Students immerse themselves in the history and community development efforts of the South Bronx. The South Bronx will be presented as a case study in successful community building with a focus on children and youth. Leaders will present their personal stories in the redevelopment of the South Bronx, creating over the course of the semester a tapestry of stories that make the abstract principles of economics, social, cultural, and political development come to life. Further grounding students in the real lives and conditions involved in the development of the South Bronx will be their participation in after-school programs involving children and youth in a variety of community-based settings. Students will interview the children about them and their needs, relating these to the content studied in the other two courses of the Urban Semester Program. Costs include public transportation costs to and from the various sites, about $3.00-6.00 each week.

DESIGN AND ENVIRONMENTAL ANALYSIS COURSES

F. Becker, chair; P. Eshelman, undergraduate advising coordinator; A. Hedge, director of graduate studies; A. Basinger, S. Danko, G. Evans, K. Gibson, R. Gilmore, J. Jennings, L. Laquatra, L. Maxwell, E. Schrank, W. Sims

Note: A minimal charge for photocopied course handouts may be required.

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.

DEA 101 Design Studio I
Fall. 3 credits. Each section limited to 18 students. Permission of instructor required. Priority given to interior design majors. Option I majors must take DEA 101 in fall of their first year. Approximate cost of materials, $60. M W F 12:25-1:25; or TR 10:10-1:10. J. Mercer.
A studio course introducing the fundamental vocabulary and methods of two- and three-dimensional design. Students experiment with the development of form through problem-solving approaches.

DEA 102 Design Studio II
Spring. 3 credits. Permission of instructor required. 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. M W F 12:25-1:25. 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
Students in any academic area examine how design affects their daily life and future profession. 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, etc., who have made a difference using design as a tool for positive social change. Utilizing a micro to macro framework, students explore the impact of design from the person to the planet. Additional topics: nurturing innovation, visual literacy, design criticism, design and culture, semiotics, proactive/reflective decision-making, and ecological issues.

DEA 115 Design Graphics
Spring. 2 credits. Option I DEA majors only. Prerequisite: DEA 101; must take DEA 102 and DEA 115 concurrently. Minimum cost of materials, $100. Permission of instructor only. M W F 8:00-11:00. 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
Introduction to the influence of physical environment on human behavior. Topics include environmental influences on crowding, community, crime, and friendship; environmental needs associated with characteristics such as stages in life cycle, life styles, social class, family structures, and handicaps; person-environment fit for lighting, acoustics, indoor air quality and ventilation, and thermal comfort; introduction to human factors and systems analysis; effects of environment on perception-cognition; user-responsive design; participatory design programming; and post occupancy evaluation.

DEA 201 Design Studio III
Fall. 4 credits. Limited to 18 students. Prerequisites: DEA 101,102, and 115 (minimum grades of B-) Recommended: DEA 111 and 115. Coregistration in DEA 203 and DEA 251 is required. Minimum cost of materials, $150, shop fee, $10; optional field trip, approximately $100. diazo machine fee, $8. M W F 12:25-1:25. J. Jennings.
Beginning interior design studio. Focus is on development of basic proficiency in interior design skills. The course is structured around a series of elementary interior and interior-product design problems of 3 to 5 weeks in length.

DEA 202 Design Studio IV
Spring. 4 credits. Each section limited to 18 students. Prerequisites: DEA 201 and 203. Prerequisites or corequisites: DEA 111 and 204. Minimum cost of materials, $120; diazo machine fee, $8; field trip fee. M W F 12:20-1:25. R. Gilmore.
Second 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 3 to 5 weeks duration is structured to emphasize different aspects of the design process.

DEA 203 Design Communications
Fall. 1 credit. Priority given to DEA majors. Lab fee $10. M 7:30-9:55. J. Mercer.
Communication techniques for architectural and interior designers. Students study the various forms of communication used throughout the design process, from programming and conceptualization through construction documentation, and the most effective utilization of those forms. Both verbal and visual presentation methods are stressed.

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.
DEA 243 Inside Out: The American Everyday Interior (also Women's Studies 243)
A study of late nineteenth- and twentieth-century everyday interiors in socio-cultural contexts, with an emphasis on design problems, dissemination, consumer patterns, and gender issues. Topics include women's walls, power in the parlor, photographs as a mirror, the love of the colonial.

DEA 250 The Environment and Social Behavior
Fall. 3 credits. Limited to 16. Priority order: DEA seniors, juniors, sophomores, freshmen. Prerequisite: DEA 150 or permission of instructor. Field trip fee $65, TR 2:55-4:10. G. Evans.
A combination seminar-and-lecture course for students interested in the social sciences, design, or design. Through projects 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 stage 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 Design Process
Fall. 3 credits. Limited 65. Prerequisites: priority given to DEA majors. MWF 9:05-9:55. J. Jennings.
An 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. Field trip.

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 multicopy description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

DEA 301 Design Studio V
Fall. 4 credits. Prerequisites: DEA 111, 150, 201, 202, 203, and 204. Corequisite: DEA 303 and 459. Minimum cost of materials, $150; shop fee, $10; optional field trip, approximately $100; diazo machine fee, $8. TR 12:20-4:25. P. Shelman.
Intermediate-level interior design studio. The course is organized around a series of interior and interior-product design problems of intermediate-level complexity, 3 to 5 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. 4 credits. Prerequisites: DEA 301 and 303 or permission of instructor. Corequisites: DEA 304 and DEA 305. Minimum cost of materials, $150; shop fee, $10; diazo machine fee, $8. MWF 1:25-4:25. K. Gibson.
Intermediate-level interior design studio with an introduction to computer applications, utilizing 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 7:30-9:25 p.m. R. Gilmore.
Basic understanding of furniture types and systems; interior products and equipment such as work-stations; window, wall, and floor coverings; ceiling systems and lighting; and materials. 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
Spring. 1 credit. T 2:30-4:25. A. Basinger.
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. TR 8:40-9:55. A. Hedge.
Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, control/display design, work physiology, and motor performance. Course includes practical exercises and field project work.

DEA 349 Graphic Design
The fundamentals of lettering, typography, layout, presentation techniques and the functional and visual aspects of environmental graphics. Printing processes and the application of photography and illustration are also covered. A series of projects explores problems typical of the graphic design field, and in interior and exterior graphics, signing, and directional systems.

DEA 350 Human Factors: The Ambient Environment
Spring. 3 credits. Recommended: DEA 150. TR 8:40-9:55. A. Hedge.
An introduction to human-factors considerations in lighting, acoustics, noise control, indoor air quality and ventilation, and the thermal environment. The ambient environment is viewed as a support system that should promote human efficiency, productivity, health, and safety. Emphasis is placed on the implications for planning, design, and management of settings and facilities. Course includes a field project.

DEA 374 Elements of Business for Non-Business Majors (also Hotel Administration 104)
Spring. 1 credit. Limited to 36. Weekend course. P. Rainsford.
Focus will be to provide hands-on skills and knowledge about how to start or run a small business. Especially appropriate for students interested in professional careers such as architecture, design, writing, art, engineering, law, and other service businesses. Course structure will use a computer-based management simulation game and will require students to work in management teams of six to start and operate a hotel. Introductory-level course. No previous business experience or computer knowledge required. Students are required to attend all sessions and complete a paper, which will be due a week after conclusion of the course.

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 Counseling 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 after registration. 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 404 Design Studio VII
Advanced interior design studio organized around a series of interior design problems, 3 to 5 weeks in duration. Focus is on development of design skills and on competence in selecting a set of generic interior design problem types.

[DEA 405 Portfolio Preparation]
Students apply graphic design principles to develop a professional portfolio of their work. Also covered are resume writing and planning the job search, and the use of appropriate computer software and computer-aided graphic tools.

DEA 430 Furniture as a Social Art
Spring. 3 credits limited to 15. Prerequisite: DEA 250. S-U option. Cost of building materials: $150. Students must also sign up for 2 hours of DEA shop time each week for model building. M W 10:10-12:05. P. Eshelman.
The course examines furniture as a design process that emphasizes support of human behavior. Information about specific social issues including health care, aging, child care, and education is the starting point for assignments. Students analyze products currently available and design new furniture. Also covered are furniture materials, fabrication processes, and manufacturing techniques.

[DEA 443 Cultural Construction: The Nineteenth- and Twentieth-Century American Interior]
Spring (even-numbered years). 3 credits. Enrollment limited to 15. Prerequisite: DEA 250 or permission of instructor. S-U option. Field trips $30. M W F 1:25-4:25. F. Becker.
This course examines culture as a design process that supports human behavior. Information about specific social issues including health care, aging, 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 444 Cultural Construction: The Nineteenth- and Twentieth-Century American Interior]
Spring (even-numbered years). 3 credits. Enrollment limited to 15. Prerequisite: DEA 250 or permission of instructor. M W F 1:25-4:25. F. Becker, W. Sims.
This course examines culture as a design process that supports human behavior. Information about specific social issues including health care, aging, 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 Seminar in Facility Planning and Management
Series of seminars led by Cornell faculty and other facility management professionals. Topics include strategic space planning, space standards, office automation, project management, energy conservation, environmental protection and regulatory issues.

DEA 453 Planning and Managing the Workplace
Spring. 3 credits. Prerequisite: DEA 250 or permission of instructor. M 7:30-10:30. F. Becker.
Intended for students interested in 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 technologies and work at home, are also covered.

DEA 454 Facility Planning and Management Studio
Spring. 4 credits. Prerequisite: DEA 459 or permission of instructor. Letter grades only. Minimum cost of materials, $100. M 1:25-4:25. W. Sims.
For advanced undergraduates interested in facility planning and management. Purpose is to provide basic tools, techniques, and concepts useful in planning, designing, and managing facilities for large, complex organizations. Covers strategic and tactical planning for facilities, organizing to deliver facility management services, project management, space forecasting, space allocation policies, programming, relocation analysis, site selection, building assessment, space planning and design, furniture specifications, and moves. Sociopsychological, organizational, financial, architectural, and legal factors are considered.

DEA 455 Research Methods in Human-Environment Relations
Fall. 3 credits. Prerequisites: DEA majors only or permission of instructor, and a statistics course. M W F 1:25-2:15. G. Evans.
The course develops the student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Emphasis is placed on selection of appropriate methods for specific problems and the policy implications derived from research. Topics include research design, unobtrusive and obtrusive data-collecting tools, the processing of qualitative and quantitative data, and effective communication of empirical research findings.

DEA 459 Programming Methods in Design
Fall. 3 credits. T R 10:10-11:25. W. Sims.
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 methods to suit problem and creation of new methods or techniques are emphasized.

DEA 470 Environmental Analysis I: Applied Ergonomic Methods
This course covers ergonomics methods and techniques and their application to the design of modern work environments. Emphasis is placed on understanding key concepts. Coverage includes conceptual frameworks for ergonomic analysis, systems methods and processes, a repertoire of ergonomics methods and techniques for the analysis of work activities and work systems. This course is the undergraduate section of DEA 670, which will share the same lectures but will meet for an additional hour. DEA 670 will have additional readings and projects.

DEA 499 Design Studio VIII
Spring. 4 credits. Prerequisites: DEA 301, 302, 303, and 304. letter grade only. Minimum cost of materials, $150; diazo machine fee, $8 per semester. T R 12:20-4:25. S. Danko.
Design--problem-solving experiences involving completion of advanced interior design problems. Problems are broken into five phases: programming; schematic design and evaluation; design development, including material and finish selection; design detailing; and in-process documentation and the preparation of a professional-quality design presentation.

DEA 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. S-U grades optional. Department faculty.
Independent advanced work by graduate students recommended by a special committee chair and approved by the head of the department and instructor.

[DEA 643 Cultural Construction: The Nineteenth- and Twentieth-Century American Interior]
A course intended for graduate students who want a more thorough grounding in the history of vernacular interiors than is provided by DEA 443. Each student is required to attend DEA 443 lectures, meet with the instructor and other graduate students for an additional class hour each week, and do additional readings and projects.

DEA 645 Dancing Mind/Thinking Heart: Creative Problem-Solving Theory and Practice
Spring. 3 credits. Limited to 15 graduate and advanced undergraduate students. Prerequisite for undergraduates: permission of instructor. 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. 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. 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. Prerequisite: DEA 647. Spring: 12 graduate and advanced undergraduate students. Prerequisites for undergraduates: DEA 302 or permission of instructor. Minimum cost of materials $150. Lab fee $35. T R 9:05-12:05. K. Gibson.
Advanced use of computer technology to create and analyze interior environments. Emphasis will be on the use of 3-D modeling, animation, photorealistic rendering and...
with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 455 for more detail.

**DEA 458 Seminar on Facility Planning and Management**
Spring. 1 credit. For graduate students and advanced undergraduates interested in careers in facility planning and management. S-U 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. See DEA 455 for more detail.

**DEA 459 The Environment and Social Behavior**
Fall. 4 credits. Prerequisite: DEA 150 or permission of instructor. Field trip fee $65. T R 2:55-4:10. G. Evans. Intended for graduate students who want to make thorough grounding in 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 do additional readings and projects. See DEA 250 for more detail.

**DEA 460 Design Theory Seminar**
Spring. 3 credits. Enrollment limited to 15 students. T R 10:10-11:30. J. Jennings. Directed toward advanced undergraduate and graduate students with interest in the theory of design. The purpose is to provide an understanding of major theoretical ideas underlying design movements of the twentieth century. Explores these ideas through readings, lectures by faculty and visitors, student presentations of research papers, and seminar discussions.

**DEA 469 Environmental Analysis I: Applied Ergonomics Methods**
Spring (even-numbered years). 4 credits. Enrollment limited to 20. Prerequisite: DEA 651. T R 2:55-4:10. A. Hedge. Intended for graduate students who want a more thorough grounding in 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 do additional readings and projects. See DEA 470 for more detail.

**DEA 470 Environmental Analysis II: Indoor Air Quality Methods**
Spring (odd-numbered years). 3 credits. Enrollment limited to 20. Prerequisite: DEA 652. T R 10:10-11:25. A. Hedge. This course provides in-depth coverage of the nature of indoor air pollutants and techniques for analyzing indoor air quality in modern work environments. Emphasis is placed on understanding key concepts in environmental exposure, toxicology, epidemiology and on understanding the procedures for assessing indoor air quality conditions. Coverage also includes detailed consideration of the design of modern ventilation systems.

**DEA 489 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 AND FAMILY STUDIES COURSES

- **HDFS 115 Human Development**
  Fall or summer. 3 credits. S-U grades optional. M W F 1:25-2:15. S. Ceci. Provides a broad overview of theories, research methods, and current knowledge of human development from conception into adulthood. Course material primarily covers infancy and childhood with considerably less focus on adolescent and adult development. Topics include biological, intellectual, linguistic, social and emotional development as well as the cultural, social, and interpersonal contexts that affect developmental processes and outcomes in these domains.

- **HDFS 150 Families and the Life Course**
  Spring. 3 credits. S-U grades optional. M W F 1:25-2:15. E. Wethington. This course provides an introduction to social scientific research on family roles and functions. Topics include family history, how families change over the life course, and how families are influenced by cultural and economic forces.

- **HDFS 216 Human Development: Adulthood and Aging**
  Spring or summer. 3 credits. Prerequisite: HDFS 115. S-U grades optional. T R 2:55-4:10. Staff. Provides a broad overview of theories, issues, and research in the study of human development from early adulthood to late (adult) life (youth). Attention is focused on the interplay of biological and cognitive factors, interpersonal relationships, social structure, and cultural values in shaping the individual's development. The role of adolescence in both the individual's life course and the evolution of the culture as a whole is also considered. Familiar, peer group, educational, and work contexts for development are discussed.

- **HDFS 218 Human Development: Adolescence and Youth**
  Fall. 3 credits. Prerequisite: HDFS 115. S-U grades optional. M W F 9:05-9:55. S. Ceci. 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.

**HDFS 241 History of Childhood in the United States**
Spring. Limited to 30 students. 3 credits. Not offered 1997-98. J. Brumberg. An examination of childhood and adolescence in various historical contexts: Puritan New England, slave plantations, evangelical revivals, the Western frontier, Victorian families, reform schools, early high schools and colleges, the sexual revolution of the 1920s, ink machines, the Depression and World War II, the 1950s, and more recent social and cultural changes affecting families. Students will evaluate continuities and changes in the lives of American children as well as changing scientific ideas about children. Students have an opportunity to reflect on and write about their own childhood and adolescence. This course is designed to give students a humanities perspective (ethnographies to child psychology) central to many different disciplines.

**HDFS 242 Participation with Groups of Young Children**
Fall or spring. 4 credits. Limited to 20 students (limit depends on availability of placements and supervision). Prerequisites: HDFS 115 and permission of instructor. S-U grades optional. W 10:10-12:05. J. Ross-Bernstein. This course is designed to integrate developmental theories with supervised experience in child care centers, with the intention of enhancing the student's abilities to understand and to relate effectively with young children. Participation, observation, reflection, reading, writing, and sharing of viewpoints are some of the means used to these ends. Placements are in local nurseries, day care centers, Head Start programs, and kindergartens.

**HDFS 243 Participation with Groups of Children, Ages 6-12**
Fall or spring. 4 credits. Limited to 20 students (limit depends on availability of placements and supervision). Prerequisites: HDFS 115 and permission of instructor during preregistration. S-U grades optional. W 12:20-2:15. Not offered 1997-98. Staff. This course is designed to allow students to gain a working developmental perspective on the school-aged child (ages 6-12). Students will participate in area elementary schools for 6 hours per week as a classroom assistant, attend a weekly 2-hour resource and discussion seminar, and complete readings in developmental theory, current trends, and issues regarding children's learning and growth. The application of readings and discussions to the field experience via written assignments will give the student the opportunity for a well-integrated understanding of the school-aged child.

**HDFS 251 Social Gerontology: Aging and the Life Course**
Spring. 3 credits. Limited to 60 students. Prerequisites: HDFS 150 or equivalent to be determined by instructor. S-U grades optional. W 10:10-11:25. D. Dempster-McGinn. 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 history, theories, and research methods. (2) A brief overview of the physiological and psychological changes that accompany aging. (3) An analysis of the contexts (such as family, friends, social support, employment, volunteer work) in which individuals experience differences by gender, ethnicity, and social class. (4) The influences of society on the aging individual. Guest speakers will provide an introduction to various careers in the field of gerontology.

**HDFS 253 Gender and the Life Course**
Fall. Limited to 110 students. S-U grades optional. T R 10:10-11:40. P. Moen. This course examines 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.

**HDFS 258 History of Women in the Professions, 1800 to the Present**
Spring. 3 credits. S-U grades optional. Human ecology students must register for HDFS 258. T R 8:40-9:55. J. Brumberg. The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, home economics, and social work) as well as women's struggles to gain access to medicine, law, and the sciences. Lectures, reading, and discussion are geared to identifying the cultural patterns that fostered the conception of gender-specific work, and the particular historical circumstances that created these different working opportunities. The evolution of "professionalism" and the consequences of professionalism for women, family structures, and American society are also discussed.

**HDFS 260 Personality Development (also Psychology 275)**
Fall 1997. 3 credits. T R 10:10-11:25. Spring 1999 C. Hazan. T R 12:20-1:45. 3 credits. Prerequisites: HDFS 115 or Psychology 101 or permission of instructor. Offered alternate years. An introduction to personality psychology, with an emphasis on personality development and contemporary research. Covers the major theories of personality, influences on personality development (including genetic, biological, experiential and environmental factors), and methods for assessing personality.

**HDFS 261 The Development of Social Behavior**
Spring. 3 credits. Prerequisite: HDFS 115 or Psychology 128. Offered alternate years. T R 1:25-2:40. C. Raven. Issues in the development of social behavior are viewed from the perspective of theory and research. Likely topics include bases of social behavior in infancy and early childhood, the role of parents, siblings and peers, the development of prosocial and aggressive behavior, the development and functioning of attitude and value systems, and the function and limits of experimental research in the study of social development.

**HDFS 284 Introduction to Sexual Minorities (also Women's Studies 285)**
Fall. 3 credits. Prerequisite: one social science course. S-U grades optional. M 3:00-5:00 p.m. B. Lust. This course introduces students to theories, empirical scholarship, public policies, and current controversies with lesbian, gay, bisexual, transgender, sexual questioning, and other sexual minorities. The major focus is on gay, lesbian, and bisexual development, lifestyles, and communities with additional emphasis on ethnic, racial, gender, and class issues. Requirements include reaction papers to the readings.

**HDFS 300 Special Studies for Undergraduates**
Fall or spring. Credit to be arranged. Permission required. Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students preparing a description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the coordinator of undergradaute studies, is filed at course registration or during the change of registration period.

**HDFS 313 Problematic Behavior in Adolescence**
Fall. 3 credits. Prerequisite: HDFS 115 or Psychology 101. HDFS 216 recommended. Not offered 1997-98. T R 2:55-4:10. J. Haukgaard. This course will explore several problematic behaviors of adolescence, including depression, drug abuse, eating disorders, and delinquency. Various psychological, sociological, and biological explanations for the behaviors will be presented. Appropriate research will be reviewed, treatment and prevention strategies will be explored. An optional discussion section will be available to students who would like to prepare a paper to discuss readings and lectures in greater depth.

**HDFS 334 The Growth of the Mind**
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HDFS 635, a supplemental graduate seminar. Prerequisites: A course in human experimental psychology, statistics, or HDFS 115 or equivalent; or permission of the instructor. S-U grades optional. Offered alternate years. Not offered 1997-98. B. Lust. In this course the fundamental issues of cognition are introduced. What is the nature of human intelligence? of logical and scientific reasoning? How are knowledge and understanding acquired and represented in the human mind? What is the nature of mental representation? What are the characteristics of the mind at birth? What is the relation of the acquisition of knowledge and understanding to their final representation? What are the relations between language and thought? In the study of those issues, how can epistemology and experimental psychology be related through the experimental method? Basic debates in the study of cognition are introduced and discussed throughout: for example, the roles of inattention and learning, the distinction between competence and performance, and the relation between...
induction and deduction in the acquisition of knowledge. Those psychological issues are set in a context of basic epistemological issues involving the tension between rationalism and empiricism. The course will analyze Piaget's comprehensive theory of cognitive development and empirical results. Current research in cognitive development will be contrasted.)

HDFS 344 Infant Behavior and Development
Fall 3 credits. Prerequisites: HDFS 115, a biology course, and a statistics course. Not open to freshmen. M W F 1:25–2:15. S. Robertson.

Behavior and development from conception through the first two years after birth will be examined in traditional areas (e.g., perception, cognition, socioemotional, language, motor). The fundamental interconnectedness of these aspects of development will be strongly emphasized, as well as their relation to the biology of fetal and infant development. Topics with implications for general theories of development will be emphasized (e.g., the functional significance of early behavior, the nature of continuity and change, the role of the environment in development). Conditions which put infants at risk for poor development (e.g., premature birth, exposure to environmental toxins, maternal depression) and topics with current social, ethical, or political implications (e.g., infant day care, fetal rights) will also be considered. An emphasis on research methodology in the study of early behavior and development will be maintained throughout the course.

HDFS 346 The Role and Meaning of Play
Fall 2 credits. Limited to 30 juniors and seniors. Prerequisite: HDFS 115. M T W F 7:30–9:25 p.m. J. Ross-Bernstein.
The aim of this course is to examine the play of children ages three through seven. Through seminar discussions, workshops, films, and individualized research, the student will explore the meanings and validity of play in the lives of young children, the different ways that children play and the value of each, and the effect of the environment in enhancing and supporting play.

HDFS 347 Human Growth and Development: Biological and Behavioral Interactions (also Biology and Society 347 and Nutritional Sciences 347)
Spring 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and HDFS 115 or Psychology 101. Offered alternate years. Limited to 150 students.

This course is concerned with the interrelationships between physical and psychological growth and development in humans during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and its variations for current and subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.

HDFS 348 Advanced Participation with Children
Spring. 4 or 8 credits. Limited to 20 students (limit depends on availability of placements and supervision). Prerequisites: HDFS 244, 245, 342, 343, 331; and permission of instructor. Recommended: HDFS 346. S-U grades optional. T 12:20–2:15. J. Ross-Bernstein.

An advanced, supervised field-based course, designed to help children and consolidate their understanding of children. Students are expected to define their own goals and assess progress with supervising teachers and instructor; to keep a journal; and to plan, carry out, and evaluate weekly activities for children in their placement. Conference group and readings focus on 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 two to ten years of age and provide education, care, or special-purpose interventions for them.

HDFS 353 Risk and Opportunity Factors in Childhood and Adolescence
Spring. 3 credits. Enrollment limited to 100 students. Prerequisites: HDFS 115 and HDFS 150. S-U grades optional. T R 1:25–4:20. J. Garbarino.

This course explores the meaning of risk and opportunity factors in the lives of children and youth. It begins from an understanding of risk accumulation and resilience as they relate to social policy, professional practice, and community development. The concept of "social toxicity" will be emphasized as it organizes central themes of the course. Assignments include writing research-based editorials and participating in a simulated public policy debate.

HDFS 354 Families in Cross-cultural Perspective
Spring. 3 credits. Prerequisites: HDFS 115 or HDFS 150 or Rural Sociology 101 or Anthropology 101 or 102, or Psychology 101 or equivalent. S-U grades optional. Not offered 1997–98. M W F 10:10–11:00. L. Lee.

This course will be taught with an emphasis on the life cycle of families and individuals. Focus will be on the rites/rituals, both subtle and obvious, that mark an individual's movement through the stages of life. The approach will be both anthropological and historical. Students will see correlations between diverse family forms in the United States and around the world.

HDFS 359 American Families in Historical Perspective (also Women's Studies 387, History 359, American Studies 359)

This course provides an introduction to and overview of problems and issues in the historical literature on American families and the family life cycle. Reading and lectures demonstrate the pattern of American family experience in the past, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family deals with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students are required to do a major research paper on the history of their family, covering at least two generations, and demonstrating their ability to integrate development theory, data drawn from the social sciences, and historical circumstances.

HDFS 362 Human Bonding
Fall. 3 credits. Prerequisite: HDFS 115 or Psychology 101. S-U grades optional. T R 1:25–2:40. C. Hazan.

The science of interpersonal relationships. Examines the basic nature of human affectional bonds, including their functions and dynamics. Covers such topics as interpersonal attraction and mate selection, intimacy and commitment, love and sex, jealousy and loneliness, the neurobiology of affiliation and attachment, and the role of relationships in physical and psychological health.

HDFS 370 Experimental Psychopathology (also Psychology 325)
Fall. 4 credits. Limited to sophomores, juniors, and seniors. Prerequisites: HDFS 115, Psychology 101, or Education 110; a course in statistics (e.g., Psych 350, Soci 301, Educ 352 or 353, Ag Ec 310 or equivalent); and an introductory biology course. Letter grade only. M W F 11:15. M. Lenzenweger, Fall 1999–M. Lenzenweger.

A research-based survey of the cognitive, emotional, and biological aspects of psychopathology across the life span. The major mental illnesses will be covered, including schizophrenia, anxiety disorders, affective disorders, and personality disorders as well as psychopathological disorders of childhood. Emphasis will be placed on the development of psychopathology, current theories and models of etiology, and intervention strategies. This course is intended to be a rigorous introduction to the scientific study of psychopathology and psychopathological development, minimal attention to psychotherapy.

HDFS 397 Experimental Child Psychology
Fall. 4 credits. Prerequisites: HDFS 115 or Psychology 101 and one course in statistics. Intended primarily for students interested in entering graduate programs involving further research training. Limited to 16 students. M W 8:40–9:55. L. Lee.

A study of experimental methodology in research with children. Includes lectures, discussions, and practicum experiences covering general experimental design, statistics, and styles and strategies of working with children.

HDFS 400-401-402-403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. Enrollment limited to juniors and seniors with a minimum 3.0 G.P.A. Permission required. Prerequisites: either HDFS 115, 150, and two intermediate level HDFS courses, or four courses in psychology or sociology. S-U grades optional. Not offered.

For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of HDFS not otherwise provided through course work in the department or...
Although the required readings are primarily culture shape adolescent experience. Paper.

Research and independent study.

Empirical Research

Prerequisites: In addition to the general prerequisite courses, a statistics or methods course and at least one course directly linked to the area of study. Permission required.

For study that predominantly involves data collection and analysis, or laboratory or studio projects.

Supervised Fieldwork

Prerequisites: In addition to the general prerequisite courses, an observation or participation course. Permission required.

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.

Teaching Apprenticeship

Prerequisites: In addition to the general prerequisite courses, students who have taken the course or equivalent and received a grade of B+ or higher. Permission required.

For study that includes assisting faculty with instruction.

Female Adolescence In Historical Perspective (also Women's Studies 438 and History 458)

Spring. 3 credits. Limited to 25 students. Prerequisites: HDFS 258 or 359 or a 300- or 400-level history or women's studies course. Permission of instructor required. T 2:20—4:25. J. Brumberg.

A reading, writing, and discussion course that will attempt to answer a basic historical question that has consequence for both contemporary educational theory and social policy: How has female adolescence in the United States changed in the past 200 years? The focus will be on the ways in which gender, class, ethnicity, and popular culture shape adolescent development. 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.

Language Development (also Psychology 436 and Linguistics 436)

Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HDFS/LING 635, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology or child psychology, cognitive development, or linguistics. S-U grades optional. Offered alternate years. T 3:35—4:25. 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 are discussed, as are the fundamental linguistic issues of Universal Grammar and the biological foundations for language acquisition. The appropriate communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.

Thinking and Reasoning

Fall. 3 credits. Prerequisite: HDFS 115 or Psychology 101. T 1:25—2:40. B. Koslowski.

The course will examine problem solving and transfer, pre-causal thinking, logical thinking, practical syllogisms, causal reasoning, scientific reasoning, theories of evidence, expert vs. novice differences, and non-rational reasoning. The lecture runs 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.

Infancy through Adolescence


The course will be an overview of current and classic issues and research in cognitive development. Central topics of both "hard cognition" (i.e., empirical 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.

Internship In Educational Settings for Children

Fall or spring. 8—12 credits. Prerequisites: HDFS 115, 242, or 243 and 348. Recommended: HDFS 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 two to ten and their families. 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 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.

Nontraditional Families and Troubled Families

Fall. 3 credits. Limited to 30 students. Prerequisites: HDFS 115 and 150. Letter grades only. Not offered 1997—98. T R 8:40—9:55. J. Haugaard.

This is an advanced course designed to explore the functioning of families. The first part of the course examines social 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.)

Families and Social Policy

Spring. 3 credits. Prerequisite: one course in the area of the family and sociology. S-U grades optional. Not offered 1996—97. P. Moen.

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.

Health and Social Behavior

Fall. 3 credits. Prerequisites: HDFS 150, HSS 101, Sociology 101, or Rural Sociology 101 and a course in statistics. Letter grades only. T R 8:40—9:55. E. Wethington.

This course critically examines theories and empirical research on the relationships among social group membership, social status; physical and mental health; and family structure, 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.

Sexual Minorities and Human Development (also Women's Studies 467)


The first half of the course covers topics of a fairly general nature regarding theoretical, research, and applied issues on sexual minorities. In the second half of the course, students will determine the content through their selection of particular topics that interest them. The success of the course depends on students feeling personally engaged and committed to the course content. Because of the multidisciplinary nature of the course, it is hoped that students from a variety of backgrounds in disciplines, gender, sexual orientation, ethnicity, race, class, and religious affiliation will feel comfortable in the course.

Neurobiology of Personality and Psychopathology

Fall. 3 credits. Limited to 30 students. Prerequisites: HDFS 115 or Psychology 101, Psychology of Psychopathology (HDFS 370 or Psychology 352), a semester of biology OR biological psychology. Letter grades only. Not offered 1997—98. T R 2:55—4:10. R. Depue.

For juniors and seniors who have an interest in the neurobiology of behavior. Course material is presented within an evolutionary biology perspective, where the development
of neurobehavioral responses as a means of adapting to critical internal and external stimuli. Focus is on the general role played by the biogenic amines (dopamine, norepinephrine, and serotonin) and opiates in personality and psychopathology. Specifically, the relation of dopamine and positive emotional stability, norepinephrine and negative emotionality, serotonin and behavioral stability, and opiates and social reward attachment is explored in the area of personality. The manner in which these neurotransmitters may also be involved in disorders of affect, anxiety, personality, obsessive-compulsion, and autism, respectively, is covered. The manner in which environmental influences across the lifespan may be coded in the brain and influence the development of personality and psychopathology is explored. Approximately 24-30 papers and chapters will be read and discussed.

**HDFS 467 Psycho-social Issues in Asian American Identity**

Spring. 3 credits. Enrollment limited to 50 students. Prerequisites: HDFS 115 or Psychology 101 or permission of instructor. S-U grades optional. W 7:30-9:25, L. Lee. The course will cover theories of identity and self and their usefulness in understanding identity formation for various ethnic groups within the AsianAmerican population. It will examine the impact of various societal forces, e.g., racism, stereotypes, etc. as well as life experiences, e.g., family values, etc. in shaping or contributing to the formation of identity or identities of Asian Americans.

**HDFS 470 Advanced Experimental Psychological Amorality**

Fall. 3 credits. Limited to 20 juniors or seniors, not open to graduate students. Prerequisites: HDFS 370, statistics (Psychology 350 preferred), introductory biology or neurobiology. Permission of instructor required. Letter grades only. TBA. Not offered 1997-98. M. Lenzenweger. This course is intended to be an opportunity for advanced undergraduate students (i.e., juniors and seniors) to explore rigorously and in depth the empirical research literature concerning several specific forms of severe psychopathology. The course will focus on schizophrenia, affective illness, and personality disorders. Each syndrome will be discussed in terms of phenomenological and classification issues, etiological factors, and developmental trajectory within the context of the diathesis-stress model of psychopathological development.

**HDFS 471 Child Development and Psychopathological**

Spring. 3 credits. Limited to 60 advanced-level students. Prerequisites: a basic course in psychology or instructor's permission. Letter grades only. Not offered 1997-98. T R 2:55-4:10. M. Haugard. This class will explore the development and process of mental, emotional, and behavioral disorders in children such as mental retardation, autism, and attention deficit disorders. Topics will 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.

**HDFS 473 Schizophrenia**

Fall. 3 credits. Limited to 25 students. Prerequisites: HDFS 370 OR Psychology 325, and a statistics course and a neurobiology course. Letter grades only. Offered alternating years. T R 10:10-11:25. M. Lenzenweger. This course will examine the nature of schizophrenia as a major mental illness in depth. The history of the illness will be traced from early observations through the most current nosological perspectives. Research data from a variety of relevant disciplines will be examined with a particular emphasis on etiology, course, and outcome of the illness. Perspectives from classification, behavioral genetics, neurobiology, psychology, and epidemiology will be integrated within an experimental psychopathology framework. This course will not focus on issues related to treatment or nontreatment approaches to the disorder.

**HDFS 482 Child Development and Social Policy**

Fall. 3 credits. Enrollment limited to 25 HDFS juniors and seniors or by permission of instructor. Prerequisites: HDFS 115, HDFS 150, and a course in statistics. HDFS 260 OR 261 strongly recommended. Letter grades only. Offered alternate years. Not offered 1997-98. T R 12:20-1:45. C. Raver. Course work and seminar discussion emphasize the integration of basic research in young child emotional development with intervention and prevention-oriented research. The course also examines theoretical models of the relations between risk and resilience in child development, family functioning, community and culture. Policies in the domains of parenting, early childhood education, family and community violence, poverty, and child care are analyzed. Broad questions regarding the identification of social problems and the design of solutions are considered within cultural and historical contexts.

**HDFS 498 Senior Honors Seminar**

Fall. 1 credit. Required for, and limited to, seniors in the HDFS honors program. S-U grades only. TBA. Staff. This seminar is devoted to discussion and presentation of honors theses being completed by the senior students.

**HDFS 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. Topics Courses

Fall or spring. 2-4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor required. This series of courses provides an opportunity for undergraduates to explore an issue, a theme, or research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other format.

**HDFS 215, 315, 415 Topics In Adolescent and Adult Development**

**HDFS 225, 335, 435 Topics In Cognitive Development**

**HDFS 245, 345, 445 Topics In Early-Childhood Development and Education**

**HDFS 255, 355, 455 Topics In Family Studies and the Life Course**

**HDFS 265, 365, 465 Topics In Social and Personality Development**

**HDFS 275, 375, 475 Topics In Developmental Psychopathology**

**HDFS 285, 385, 485 Topics In the Ecology of Human Development**

The Graduate Program

HDFS graduate courses are only open to undergraduates with instructor’s permission.

**General Courses**

**HDFS 610 Processes In Human Development**

Spring. 3 credits. Limited to 20 students. Open to graduate students and seniors in HDFS. Prerequisites: Psychology 101 or permission of instructor. Letter grades only. W 2:00-4:25. U. Bronfenbrenner. This course focuses on the development of human development as a function of organism-environment interaction through the life course. Topics to be examined will include the following: the ecology of cognitive development, developmentally instigative characteristics of persons and environments; developmental processes in males and females; activity and work as developmental processes; intimate relationships as contexts of development; developmental processes in adulthood. The final selection will be responsive to student interests.

**HDFS 617 Adolescence**

Spring. 3 credits. Not offered 1997-98. Staff. 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.

**HDFS 631 Cognitive Development**

Spring. 3 credits. Not offered 1997-98. Staff. 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.

**HDFS 649 Infant Development**

Fall. 3 credits. Not offered 1997-98. TBA. S. Robertson. Development in infancy will be 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 experience 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 will also be considered, such as premature birth, perinatal medical complications, and exposure to environmental toxins. The course will combine perspectives from developmental psychology and psychobiology.

[HDFS 650 Contemporary Family Theory and Research]
Fall. 3 credits. Not offered 1997–98.
E. Wethington.
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.

HDFS 660 Social Development
Spring. 3 credits. S-U grades optional.
C. Raver.
This course is designed to provide both broad and in-depth training in the areas of social and emotional development during infancy and childhood. It will cover most of the major topic areas and theoretical orientations. Consideration will be given to basic influences on socioemotional development—biological, social, and cultural. Coverage will include normative development as well as the origins and nature of individual differences. We will explore such fundamental issues and questions as: What is normal? What are emotions? What role do they play in the development and organization of personality? What are the effects of early social relationships on emotional regulation? When and how does the self-system emerge? Emphasis will be on the processes—both internal and external—that help determine the course and outcome of development.

[HDFS 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. Not offered 1997–98.
TBA. M. Lenzenwegner.
Overview of current theories and empirical research on functional and organically based psychological disorders. Topics to be 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.

HDFS 618 Seminar in Adolescence and Adult Development
Topics include peer relations, parent-teen relationships, self-esteem, youth and history, work, and moral development.

HDFS 633 Seminar on Language Development
Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.

HDFS 635 Seminar in Cognitive Development
Topics include attention, perception, memory, and communication. Assessment and intervention in relation to these processes will be considered when possible.

HDFS 645 Seminar on Infancy
Focuses on selected topics in the developmental psychology and psychobiology of infancy (including fetal development). Special topics vary and depend in part on student interests.

HDFS 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.

HDFS 655 Seminar in Family Studies and the Life Course
Topics include early attention, perception, memory, and communication. Assessment and intervention in relation to these processes will be considered when possible.

HDFS 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.

HDFS 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.

HDFS 685 Seminar in Human Development and Family Studies
Topics include development of self-concept, sex-role identity, observational methods, and interviews in developmental research.

HDFS 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.

Individuated Special Instruction
HDFS 700-706 Special Studies for Graduate Students
Fall or spring. Credits and hours to be arranged. S-U grades at discretion of instructor.
Independent advanced work by graduate students recommended by their Special Committee chair with approval of the instructor.

HDFS 700 Directed Readings
For study that predominantly involves library research and independent study.

HDFS 701 Empirical Research
For study that predominantly involves collection and analysis of research data.

HDFS 702 Practicum
For study that predominantly involves field experience in community settings.

HDFS 703 Teaching Assistantship
For students assisting faculty with instruction. Does not apply to work for which students receive financial compensation.

HDFS 704 Research Assistantship
For students assisting faculty with research. Does not apply to work for which students receive financial compensation.

HDFS 705 Extension Assistantship
For students assisting faculty with extension activities. Does not apply to work for which students receive financial compensation.

HDFS 706 Supervised Teaching
For advanced students who assume major responsibility for teaching a course. Supervision by a faculty member is required.

HDFS 899 Master's Thesis and Research
Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser.

HDFS 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. S-U grades only. Prerequisite: permission of thesis adviser.

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 100 Skills for Learning in the Field
(formerly HSS 100)
Fall and spring. 3–4 credits. Priority given to PAM students. Open to all levels, undergraduate and graduate. Limited to 30 students. T R 2:30–4:25. R. Bounous. Students learn to be self-directed learners and to integrate theory and experience. Topics include experiential learning, participant observation, interpersonal communication, critical analysis, and empowerment. These ideas and skills are learned through participation in CLASP, an adult literacy program.

PAM 180 Human Services in Contemporary Society
(formerly HSS 101)
Fall. 3 credits. Recommended for freshmen and first-year transfer students. T R 10:10–11:25. Staff.
A lecture and discussion course designed as an introduction to the community base of services. Current and historical human services are examined. Emphasis is placed on social services, education, health, and criminal justice. Barriers to delivery are discussed, such as racism, sexism, classism, sexual preference, physical disability, and age. Contemporary issues that impact on service delivery will also be discussed with attention to the interrelationship between direct and public service.

PAM 200 Intermediate Microeconomics (formerly CHN 210)
Fall or spring. 4 credits. Prerequisites: Econ 101 or equivalent. Fall: preference to sophomores and juniors. Spring: preference to juniors and seniors. M W F 11:15–12:05. B. Rosen.

A section is mandatory. Theory of demand and consumer behavior including classical and indifference curve analyses; theories of production and cost; models for the following markets—competitive, monopoly, monopolistic competition, oligopoly, and inputs; general equilibrium; welfare economics; public goods; risk.

PAM 201 Determinants of Behavior (formerly HSS 246)
Fall. 3 credits. Prerequisites: introductory sociology and introductory psychology and HDFS 115. Enrollment limited to 45. Priority given to social work majors. M W F 2:30–3:20. J. Mueller.

This course provides an interdisciplinary knowledge base for human service professionals. We examine behavior in the human environment from ecological, ethological, historical, cultural, and social system perspectives. Applications are made to professional practice at the micro level (counseling with individuals and families or other small groups) and at the macro level (social planning and policy formulation for vulnerable groups in our society).

PAM 202 Household and Family Demography (formerly HSS 226)
Fall. 3 credits. Prerequisite: QSOC 101 or equivalent. S-U grades optional. T R 2:30–3:45. M. Rendall.

This course identifies important trends in U.S. household and family structure, examines the demographic, social, and economic forces behind recent changes in household structure, and evaluates current and future consequences and policy implications of these changes for both households and society. Topics include historical and contemporary trends in the size and composition of families and households, trends in marriage, divorce, remarriage, contraception, childbearing, and living arrangements, and interrelationships between household division of labor. Policy implications of all of the above are also considered.

PAM 204 Applied Public Finance
Spring. 3 credits. Prerequisites: PAM 200 or equivalent. C. C. Miller.

The public sector now spends nearly $2 out of every $5 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 will provide 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 will be presented with a focus on the role of public policy in improving economic efficiency, improving equity by altering the distribution of wealth and income, and promoting the goals of equity and social justice.

PAM 205 Research Methods (formerly HSS 292)

Sections TBA. W. Trochim.

Students will learn the logic and methods of social science research and develop skill in transforming issues of interest to them into researchable questions. 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 no later than their junior year.

PAM 206 Racism in American Society (formerly HSS 280)
Not offered Fall 1997. For description, see AS&RC 280.

PAM 220 Introduction to Management
Spring. 3 credits. D. Tobias and J. M. Walston.

This course includes 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 221 Groups and Organizations (formerly HSS 220)
Spring. 3 credits. Enrollment limited to 125 students. M W F 10:10–11:00. L. Street.

A basic course in the social psychology of groups and human service organizations. Study of the human service organization focuses on individual, group, and organization interface in terms of such issues as the perception of roles, norms, communication, power, leadership, and other issues. Students are expected to learn about the basic concepts and propositions that provide insight into organizational issues that confront members of organizations. Exercises are used to heighten understanding of group and organizational behavior.

PAM 223 Consumers in the Market (formerly CEN 233)
Fall. 4 credits. Prerequisites: Econ 101 or equivalent. M W F 2:30–3:20. R. J. Avery.

A study of the structure and functioning of consumer retail markets with emphasis on the role and activities of the major players in these markets—firms, consumers, and governments. The nature and consequences of various types of market failures are studied from the perspective of the firm, the consumer, and the role of government. Case studies and outside lecturers are used to impart reality to the course.

PAM 230 Introduction to Policy Analysis
Fall. 3 credits. E. Peters and J. Zeigler.

Policy analysis is an interdisciplinary field that uses theories, concepts, and methods from disciplines such as economics, sociology, and political science. Substantive issues in the public policy arena. Students will be introduced to the functions of and interactions between the major institutions (public and private) at the national, state, and local level involved in the policy making process. The course will focus on public policy analysis in the consumer, health, and family/social welfare areas and will also include an introduction to the technical skills required to undertake policy analysis.

PAM 270 Housing and Society (formerly CEH 247)
Spring. 3 credits. S-U grades optional. M W F 10:10–11:00. P. Chi.

A survey of contemporary American housing issues as related to the individual, the family, and the community. The course focuses on the current problems of the individual housing consumer, the resulting implications for housing the American population, and governmental actions to alleviate housing problems.

PAM 281 The Elements of Helping (formerly HSS 210)
Fall and spring. 3 credits. Limited to 50 students. Priority given to HSS majors. S-U. Prerequisite: Attendance at first class meeting mandatory. W 1:25–4:25. C. Miller.

An introduction to the theoretical and practical aspects of human service processes. Included is an overview of the helping relationship covering roles, characteristics, relationships, dilemmas, and career issues of helpers. The course focuses on understanding and development of helping skills. Through role playing and exercises, students deal with basics such as attending, listening, responding, empathy, respect, genuineness, and confronting. Other topics include self-awareness, learning, communication, and conflict management. The course includes an overview of some of the major theories of helping. The theory base underlying principles taught in the course is general systems theory.

PAM 300 Special Studies for Undergraduates (formerly CEN and HSS 300)
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 comprehensive description of the study they want to undertake on a form available from the Student Services Office. This form, signed by both the instructor directing the study and the head of the department, should be filed at course registration during the change-of-registration period.

PAM 301 Economic Organization of the Household (formerly CEN 232)
Fall. 3 credits. Prerequisite: Econ 101 or equivalent. S-U grades optional. T R 10:10–11:25. W. K. Bryant.

Economic models and theories help explain a wide variety of family and individual behavior. Topics include the demand for consumer goods and services; consumption and saving; time allocation in the household including labor supply, household production and leisure, human capital of the individual; fertility; marriage and divorce. Within each topic, uses of the material by public- and private-sector decision makers are discussed.

PAM 303 Ecology and Epidemiology of Health (formerly HSS 330)

Ecological and epidemiological approaches to the problems of achieving human health
within the physical, social, and mental environment. The course introduces epidemiological methods to the students and surveys the epidemiology of specific diseases such as AIDS, hepatitis, Legionnaires' disease, plague, cancer, and chlamydia. Application of epidemiology to health care will be discussed.

PAM 305 Introduction to Multivariate Analysis (formerly CEH 307) Fall. 4 credits. Prerequisites: ARME 310 or ILRST 210 or equivalent. M W F 10:10–11:05. C. D. Harper. 

The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple linear regression procedures are discussed. Students are required to specify, estimate, and report the results of an empirical model. Factor analysis and analysis of variance will be covered as well. Section meets once a week.

PAM 310 Evaluation of Public Policies (formerly CEH 483) Fall. 3 credits. Prerequisites: Econ 101, PAM 200, or equivalent and an introductory statistics course. T R 11:40–12:55. B. Rosen.

This is an advanced course in economic policy analysis that builds on the material covered in PAM 330. Introduction to Policy Analysis. The course will use a series of policy examples to demonstrate the economic approach. Special topics in cost-benefit analysis and policy evaluation techniques will be developed when necessary for the example under study. Examples of topics that may be addressed include excise taxation, economic evaluations of health care innovations, environmental policies, traffic regulations, consumer policies, and welfare reform.


This course focuses on external and internal forces that drive consumer demand. Material in this course will cover the processes whereby consumers interpret market-provided information and the social forces impacting consumer purchase decisions. Particular emphasis will be placed on communication institutions in the market (advertising, the news, and other mass media) and the control of these institutions through government regulation. A select group of consumer policy issues will be covered, such as consumer evaluation of product safety and quality, food additives, consumer privacy, and socially responsible advertising.


Offers students the opportunity to explore family business topics such as business formation, growth and expansion, strategic management, professionalization, succession, locational choices, and family dynamics, conflicts, and relationships relative to the business. An overview of families who own businesses and the profiles of their businesses will be presented along with the examination of the course topics relative to the various stages of business activity including feasibility, start-up, ongoing maintenance, expansion or redirection, and exit or transfer. Case studies from the Harvard Business School series will be utilized to examine the course topics listed above. The course also provides an introduction to researching family businesses by surveying the conceptual issues and methodological approaches related to the study of family businesses.


Allows students to develop research skills by providing opportunities for hands-on survey and fieldwork. Topics and activities include research design, sampling, questionnaire development, and statistical analyses related to family-owned businesses; critical review of current research approach in relevant databases used in research business ownership; and implementation and completion of an actual survey of fieldwork project of selected family business owners, or the use of extant databases for descriptive analyses of family-owned businesses.


The study of personal financial management at various income levels and during different stages of the family life span. Course topics include financial management frameworks and decision-making processes, basic economic and financial principles, returns to human resources, income and wealth analysis, the role of consumer and mortgage credit, financial insolvency and counseling, expenditure and purchase analyses, the use of budgets and record keeping in achieving family economic goals, economic risks and available protection, retirement and estate planning, and alternative forms of savings and investments.


Introduction to the tools and techniques of policy analysis. Topics covered include microeconomic concepts such as consumer and producer surplus, deadweight loss, rational for public policy, benefit-cost analysis, impact assessment, semi-experimental, quasi-experimental, and non-experimental designs; and the social ecology of policy analysis.

PAM 331 Introduction to Program Planning and Development (formerly HSS 433) Fall and spring. 3 credits. M W F 9:05–9:55. Staff.

The course provides an introduction to program planning and development in the delivery of human services. Models of program planning, development and delivery will be analyzed in relation to practice. The processes of conceptualizing a program and the context of planning and development (political, organizational, economic, and social) will be examined. Basic tools and techniques available to planners will be identified and selected skills developed. Issues related to ethics, power/authority, confidentiality, and accountability will be included. Professional roles and competencies needed will be highlighted throughout the course. Students may take the course for a fourth credit, which will require attending a discussion section every other week and observations of settings.

PAM 340 The Economics of Consumer Policy (formerly CEH 330) Fall. 4 credits. Open to juniors, seniors, and graduate students. Prerequisites: Econ 101, 102 or permission of instructor. Class packets on sale at Campus Store. T R 12:20–1:30. D. Lillard.

Students are acquainted with the basic approaches to consumer policy and perform economic analyses of specific consumer policy issues. Three specific areas of policy intervention are addressed: externalities and public goods; anti-trust and regulation of "natural" monopolies; and markets characterized by imperfect information. Policy discussions are reinforced through the use of specific real-world examples. Students are required to write three short papers on each area of policy intervention discussed in class.


Economic analysis of the roles played both by the courts and by federal and state regulatory legislation in altering consumer markets, consumer behavior, and consumer welfare. Topics include economic theories of contract law, products liability, accident law and antitrust law, as well as the activities of such agencies as the Federal Trade Commission, the Food and Drug Administration, and the Consumer Product Safety Commission.


This course will look at the structure of financial markets in the United States. A number of different markets and institutions will be examined including banks, savings and loans, insurance companies, pension funds, government bond markets, credit unions, and finance companies. The principles underlying government regulation of these institutions will be explored, as well as management problems and concerns. The emphasis will be on learning the institutional environment, not on personal finance.

PAM 350 Contemporary Issues in Women's Health (formerly HSS 335) Fall. 3-4 credits. T R 12:20–1:35. A. Parrot.

This course will deal with the history of women in medicine and historical and cultural treatment of women's health problems. Health care research and the exclusion of women from research trials and protocols will also be addressed. Reproductive issues, alternative approaches to treatment, medical problems, ethical issues, cancers, factors that contribute to post-traumatic stress disorders, health promotion behaviors, political issues, and routine medical recommendations will also be discussed in depth. Students may take the course for a fourth credit, which will require attending a discussion section every other week and observations of settings.
facilities that provide a variety of women's health care (i.e., birthing center, mammogram, and ultrasound center, wellness center, hospital labor and delivery unit, LaMaze class, women's self-defense class, etc.) on the alternate weeks.

PAM 351 Community Mental Health (formerly HSS 380)

Summer only. 3-4 credits.

Students become acquainted with basic concepts in the field of community mental health. Beginning with the injustices that served as a catalyst for community mental health movement, the course evaluates the ethical and practical challenges experienced by mental health professionals in the community. Other topics include social roles of mental illness, epidemiology, the role of culture and social class in mental illness, public attitudes, and civil liberties.

PAM 370 Wealth and Income (formerly CEH 355)

Fall. 3 credits. Open to sophomores, juniors, and seniors; graduate students may elect to audit and write a research paper for 1 to 2 credits under PAM 600. Prerequisites: Econ 101–102 or equivalent. S-U grades optional. M/W/F 9:05–9:55. D. Lillard.

The wealth and income positions of American households are defined and described. Various statistics are employed to present conflicting pictures of the distribution of income using the same underlying data. Several models of economic determinants of income are presented and redistributive policies are discussed in the context of the economics of the political and philosophical positions for and against such policies.

PAM 371 Economics of Family Policy—Adults (formerly CEH 320) (also Economics 420)

Fall. 4 credits. Limited to 40 students. Junior or senior standing; non-PAM majors by permission of instructor. M/W/F 1:25–2:15. Not offered 1997–98. Staff.

This course examines the economics of family policy issues that have a particular impact on adult family members. Emphasis in this course is on the economic behavior surrounding the policy and the incentives set up by the policy. Policies considered include marriage and divorce, family leave policy, policies assisting single parents, and policies affecting caregiving.

PAM 372 Economics of Family Policy—Children (formerly CEH 321) (also Economics 421)


This course examines the economics of family policy issues that particularly affect children. This course focuses on a) the economic behavior that generates the policies and b) the economic incentives and behavior that result from the policies. Topics include child welfare, education, day care provision, child support, and adoption.

PAM 373 The Economics of Welfare Policy (formerly CEH 356)

Fall. 4 credits. Prerequisite: Econ 101 or equivalent. S-U grades optional. M/W/F 11:15–12:05. M. Rendall.

Using the tools of this course, this course examines welfare policy. Included are an examination of which populations are affected, what behavior various policies are likely to engender, and how much income redistribution occurs as a result of various welfare policies. Also evaluated are various proposals for welfare reform.

PAM 374 Urban Economics and Policy (formerly Economics 421)

Spring. 4 credits. Prerequisite: PAM 200 or equivalent. S-U grades optional. T/R 2:30–3:45. N. Kuty.

This course explores the economics of cities and urban problems. The course is a study of the location choices of firms and households, growth of cities, and determination of land rents. The urban policy issues explored in this course include housing, urban poverty, zoning, and community development.

PAM 375 Housing for the Elderly (formerly CEH 444)

Fall. 3 credits. Prerequisite: PAM 270 or permission of instructor. S-U grades optional. T/R 2:55–4:10. P. Chi.

This is a service-based seminar that will allow students to explore, through a wide range of service experiences, the different ways community agencies adults to remain independent in such diversified residential settings as planned retirement housing, subsidized housing for the low-income elderly, home-sharing projects, ECHO housing, accessory apartments, shared group living projects, and continuing care retirement community. This seminar will focus on how the residential environment influences the ability of older adults to function independently while meeting their need for services. Throughout the seminar, students will be asked to reflect critically on how their service experience complements, challenges, or extends the course curriculum. The seminar will meet every week for 2 hours. Students are also required to have 4–6 hours of service a week, 4 during the weeks the seminar meets and 6 during the other weeks.

PAM 376 Housing, Neighborhood and Community (formerly CEH 445)

Spring. 3 credits. Prerequisite: PAM 270 or permission of instructor. S-U grades optional. M/W/F 2:30–3:45. Not offered 1997–98. P. Chi.

A study of interrelationships between housing conditions, neighborhood transition, and community development. Both theoretical and empirical analyses are used on residential patterns, neighborhood change, and community power will be examined. Special attention is also given to government policies that deal with fair housing, residential segregation, neighborhood revitalization, and community development.

PAM 380 Human Sexuality (formerly HSS 318)

Spring. 3 credits. Limited to 500 students. Prerequisite: an introductory course in human development and family studies, psychology, or sociology (or equivalent social science). Recommended: one course in biology. T/R 2:55–4:10. A. Parrott.

The aim of this course is to provide students with an understanding of the interactions and interpersonal relationships that influence sexual development and behavior. The course will focus on the evolution of sexual norms, cross-cultural customs, legislation within changing sociopolitical systems, and delivery of services related to sexual issues, needs, and/or problems. Future trends in sexuality will be addressed. Biological and developmental components of human sexuality will also be addressed. An underlying issue is the influence of our social and cultural systems on the development of sexual needs, standards, and values. Research and theory in human sexuality will be explored in an interdisciplinary approach drawing on human and organizational behavior, biology, history, communication arts, education, research theory, law, sociology, and psychology.

PAM 381 Health-care Services and the Consumer (formerly HSS 325)

Fall. 3 credits. Prerequisite: an introductory course in human services or health or biology. S-U grades optional. T/R 12:20–1:45. Staff.

This course is an introduction to health care services and will present developments in the health field that affect the availability and kinds of health services. Emphasis is placed on interrelationships between types of practitioners, institutions, and agencies, and the part each can play in prevention, diagnosis, and treatment of disease and disability. Focus will include historical and current trends, quality health care, consumer issues, cultural concerns, ethical issues, politics and policies, and the contemporary problems of health care.

PAM 383 Social Welfare as a Social Institution (formerly HSS 370)

Fall. 3 credits. M/W/F 9:05–9:55. J. Allen.

A philosophical and historical introduction to social welfare services. The course reviews the historical, social, and political contexts within which social welfare programs and the profession of social work have evolved. It discusses the political and ideological processes through which public policy is formed and the ways in which policies are translated into social welfare programs. Basic issues in welfare are discussed through present program designs, public concerns, and the interrelationships and support of services in the community.

PAM 400-401-402 Special Studies for Undergraduates (formerly CEH and HSS 400)

Fall and spring. Credits to be arranged. S-U grades optional. Staff.

For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of CEH, HSS, or PAM 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 Student Services 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. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies forms is necessary. Students, in consultation with their faculty supervisor, should register for one of the following subdivisions of independent study.

PAM 400 Directed Readings (formerly CEH and HSS 400)

For study that predominantly involves library research and independent reading.
For study that predominantly involves data collection and analysis.

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.

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.

Spring. 9 credits. Prerequisite: PAM 480 or 481-482 (482 may be taken concurrently). M 1:25-4:00. The process of change at the individual, family, and community level is a major theme of the senior seminar. The second theme, which is integrated throughout the course, concerns ethical principles and values that should inform professional practice. We will also discuss value dilemmas attendant on interventions to promote change at both the micro and macro levels of practice.

Fall. 3 credits. S-U grades optional. T R 12:20-2:15, L. Street. This course provides an introduction to the local political environment of human service agencies and programs. Special attention is given to how community issues are raised, debated, and resolved. Topics include the roles of service providers, local government officials, social movement organizations, federal and state agencies, the courts, and the news media. Previous or concurrent participation in community activities is desirable but not required.

Spring. 3 credits. S-U grades optional. Prerequisites: PAM 200 or equivalent or permission of instructor. T R 8:45-9:55. D. Kenkel. This course uses the tools of economics to provide a better understanding of health behavior and policy. One focus is on policies that promote public health, including education programs and cigarette and alcohol taxation. Policies that influence consumer choices about health care and health insurance are also considered.

Spring. 3 credits. S-U grades optional. Prerequisites: PAM 200 or equivalent or permission of instructor. T R 8:45-9:55. D. Kenkel. An examination of the policy-making process and the significance of national policies as they affect the distribution of social services. Frameworks for analyzing social policy are used to evaluate existing social programs and service-delivery systems. Implications for change in policies at the national, state, and local levels are discussed.

Fall or spring. 4-7 credits. Prerequisites: any of the following (ARMH 310, ARME 411, BTRY 215, PAM 305, ECON 319, ECON 320); Basic Economics: ECON 101 or permission of either instructor. Open to juniors and seniors; limited to 100. S. Ceci, E. Peters. The course brings together the analytical tools and key models of economics and psychology to investigate issues raised by Hermstein and Murray's book The Bell Curve. The objective of the course is to bring research into the classroom by enabling students to understand and use (in the lab) the methods available for defining and assessing intelligence and its relationship to success in life and other social issues.

Spring. 3 credits. Limited to 20 students. T R 10:10-11:25. Not offered 1997-98. D. Barr. The course will take a theoretical world view of power and the historically colonial relationship between the American ruling class and other people. The three dimensions of power will be used as the framework for analysis. The relationships among social class, race, sex, and power will be under study. In addition, the class will explore the nature of empowerment and new theories of power and empowerment.

Spring. 3 credits. S-U grades optional. Limited to 20 juniors and seniors. T R 10:10-12:05. L. Street. This course is for students who are interested in understanding crime and crime-control policies. The purpose of the course is to learn how to think about crime problems in terms of their social, political, and human service contexts. The following topics are among those addressed in order to realize the objectives of the course: American culture and crime policy; criminal justice agency and system operations; criminal offending and victimization; race and crime; and community crime-control programs. These topics are examined from the point of criminal justice, social justice, and public health perspectives.

Spring. 3 credits. Prerequisite: PAM 383 or Government 111 or Sociology 141. S-U grades optional. M W 9:05-9:55. J. Allen. An examination of the policy-making process and the significance of national policies as they affect the distribution of social services. Frameworks for analyzing social policy are used to evaluate existing social programs and service-delivery systems. Implications for change in policies at the national, state, and local levels are discussed.

Spring or fall. 4-7 credits. Limited to juniors and seniors majoring in human service studies. Prerequisite: PAM 100. Precourse enrollment required. T 1:30-4:25. Staff. Students intern for a minimum of 10 hours a week in a human service organization and attend a weekly seminar or office hours with a focus on integrating classroom and field-based learning. The course is structured as an opportunity for students to learn experientially and, at the same time, provide meaningful services to human service organizations. Interns are expected to take active roles in structuring, monitoring, and assessing their learning under the guidance of a faculty instructor.

Spring. 3 credits. Limited to 25 social work students. Prerequisites: introductory psychology, introductory sociology, one course in human development, grades of C+ or better in PAM 201 and 383. Lec M W 10:10-12:05 and Lab T R 9-5. R. Bounous, E. DeLara.

Fall. 9 credits. Limited to 25 social work students. Prerequisites: grade of B- or better in PAM 481 and satisfactory performance in fieldwork. M W 10:10-12:05 and Lab T R 9-5. R. Bounous, E. DeLara.

Fall or spring. 2-4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor required. Hours to be arranged. Department faculty.

This series of courses provides an opportunity for advanced undergraduates to explore an issue, a theme, or research in the areas of departmental concentration. Topics vary each time the course is offered. Descriptions are available at the time of course registration. Although the courses are usually taught as seminars, a subject may occasionally lend itself to lecture, practicum, or other format.
PAM 600 Special Problems for Graduate Students (formerly CEH and HSS 600)
Fall and spring. Credits to be arranged. S-U grades optional. Staff of the course and the experience of the student. S-U grades optional. T R 12:20-1:35. E. Peters.

PAM 601 Research Workshop in Consumer Economics and Housing (formerly CEH 601)
Fall and spring. 1 credit. S-U grades only. W 12:10-1:30. Staff. Research workshop designed to provide a forum for graduate students in consumer economics and housing to present their research.

PAM 603 Teaching Experience (formerly HSS 603)
Fall and spring. 1-3 credits. S-U only. For students assisting faculty with instruction. The aspects of teaching and the degree of involvement vary depending on the needs of the course and the experience of the student. Does not apply to work for which students receive financial compensation.

PAM 604 Economics of Consumer Demand (formerly CEH 613) (also Economics 413)
Fall. 3 credits. Prerequisite: PAM 200, Economics 311 or 313, or concurrent enrollment in one of the three, and two semesters of calculus. S-U grades optional. T R 8:40-9:55. W. K. Bryant. Introduction to microeconomic level to theory and empirical research on household demand, consumption, and saving. Emphasis 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 will be introduced.

PAM 605 Economics of Household Behavior (formerly CEH 624) (also Economics 498)
Spring. 3 credits. Prerequisite: PAM 604 or Economics 609-610 or consent of instructor. S-U grades optional. T R 12:20-1:35. E. Peters. This course examines economic models of fertility, investment in children, family formation and dissolution, resource allocation within the household, and intergenerational transfers across households. Empirical applications of the models are presented for both developed and developing countries. Implications of the models for family policies such as child care subsidies, divorce laws, and family planning programs are also discussed.

PAM 606 Demographic Techniques (formerly CEH 606)
Fall. 3 credits. S-U grades optional. T R 12:20-1:35. M. Rendall. 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 and period analyses, sources and quality of demographic data, population estimation and projection, and stable population models.

PAM 607 Advanced Family Demography (formerly CEH 627)
Fall. 3 credits. Prerequisite: PAM 606 or equivalent. S-U grades optional. W 1:25-3:55. Offered alternate years. Offered 1997-98. M. Rendall. This course builds on the basic methods of dynamic population analysis covered in PAM 606, Demographic Techniques, extending them to the study of lives and populations structured not only by age and sex, but also by family status. The same or very similar methods apply to populations structured on other discrete dimensions (e.g., labor force status, region of residence, health status). Life-course analysis methods used to study the distribution of total lifetime are extended to the study of the distribution of total lifetime between family states. Methods for studying reproduction are extended to the study of kin and family sizes resulting from distributions of reproductive performance in the female population. Methods for studying individual lifetimes are also extended to the study of intersecting lifetimes, primarily through nuptiality. These are two-sex models or, more generally, models of interacting populations. Finally, household structure, fission, and fission are studied. This combines elements of interacting-population and kin-availability modeling, plus static population-comparison methods.

PAM 610 Introduction to Program Evaluation (formerly HSS 608)
Fall. 3 credits. J. Greene. This course provides a conceptual introduction to the theory and practice of social program evaluation. It is designed particularly but not exclusively for students planning a major or minor in HSS program evaluation and planning. The course emphasizes two major dimensions of evaluation: 1) its practical, real-world, political dimension and 2) its theoretical, methodological dimension. At the intersection of these two dimensions lie issues of evaluation’s purpose and role, which are also addressed in the course.

PAM 611 Program Evaluation and Planning—Topic course (formerly HSS 611)

PAM 612 Measurement for Program Evaluation and Research (formerly HSS 690)
Fall. 3 credits. E. Rodriguez. The course reviews measurement theory and its application to the evaluation of human service programs. Major topics include experimental, quasi-experimental, and nonexperimental research designs; basic sampling; measurement theory; and the theory of validity in research. Attention is given to issues that arise in the application of research designs to the evaluation of programs, including problems of randomization, causal inference, replication, and utilization of results. The central role of the general linear model in the statistical analysis of outcome evaluation is presented through case examples and computer simulation. Students will encounter examples of outcome evaluations from a range of disciplines including health, mental health, social welfare, criminal justice, social policy, and education.

PAM 614-615 Program Evaluation in Theory and Practice (formerly HSS 692-693)
Fall and spring. 3 credits each. M. Rendall. This course introduces participants to a range of approaches to the evaluation of human service programs. Students will encounter examples of outcome evaluations within a range of disciplines including health, mental health, social welfare, criminal justice, social policy, and education.

PAM 616 Strategies for Policy and Program Evaluation (formerly HSS 695)
Fall. 3 credits. Prerequisites: PAM 612 and 613 or 617 or equivalent. Offered alternate years. T R 9:00-10:15. M. Rendall. This course provides an introduction to the role of evaluation in policy and program decision-making. Students will learn about the process of planning, implementing, and using program evaluation and will develop skills in evaluation design, data collection, and analysis. The course will emphasize the application of evaluation methods to real-world problems and the interpretation of evaluation results.

PAM 617 Qualitative Methods for Program Evaluation (formerly HSS 696)
Spring. 3 credits. Prerequisites: PAM 612 and 613 or equivalent. T R 12:20-1:35. J. Greene. The course presents a qualitative approach to applied research and the evaluation of human service programs. Topics include the epistemological assumptions underlying this approach, questions of entry into setting, methods for data collection and data analysis, reporting, confidentiality of participants, and the ethics of qualitative inquiry. The course aims to help students understand how, when, and why a qualitative approach to social inquiry can be used appropriately, effectively, and ethically.
PAM 618 Seminar in Program Evaluation and Evaluative Research (formerly HSS 697)  
This ongoing seminar is topically organized according to student and faculty projects. Focuses on professional issues in evaluation practice, including consulting, ethics and standards, preparation of conference and publication materials, and various methodological issues.

PAM 620 Human Service Administration—Topic Course (formerly HSS 610)  

PAM 623 Consumer Decision Making (formerly CEN 639)  
Individual and family decision making with respect to their market purchases will be investigated from a multidisciplinary perspective. Topics to be covered in the course include cognitive theories of information processing, the group interaction in decision making, and the effect of advertising, imperfect information, and uncertainty on consumer product evaluation and purchase behavior. Special attention will be given to decision making by consumers in various market segments, e.g., low-income consumers, children, and the elderly. Specific attention will be paid to how consumers in these segments process marketer-provided information and their related consumption decisions.

PAM 630 Seminar in Program Planning and Evaluation (formerly HSS 668)  
Fall. Variable credit. T R 12:20–1:35. Staff.  
Topics include microlevel program planning, third-sector organizations, and intergovernmental influences on program planning, policy formation, program implementation, and mainstreaming. Two or more human services are examined.

PAM 631 Ethics, Public Policy, and American Society (formerly HSS 658)  
Fall. 3 credits. M W 2:00–4:25. J. Ziegler.  
This course will explore 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 non-profit agencies and private enterprises act will be examined. How do standards of ethical behavior in the professions get established? How are public policy issues with ethical implications resolved? Readings will be drawn from political philosophy, contemporary social science, and imaginative writing. Class participation is essential. Open to seniors and graduate students.

PAM 632 The Intergovernmental System: Analysis of Current Policy Issues (formerly HSS 664)  
Fall. 3 credits. Open to seniors who have had a course in American government and to graduate students. M W 10:10–12:00. J. Ziegler.  
This course offers advanced policy analysis of current political/social/economic issues in the context of the intergovernmental system. Particular attention is paid to how certain policy and human service issues are played out at the federal, state, and local levels of government, and to the formulation of federal and state budget policy. General public administration theory is considered. Students work in teams on a policy/administrative research project and report to the class.

PAM 633 Social Policy and Program Planning in Human Services (formerly HSS 660)  
An examination of the policy process with an emphasis on the ways in which this process determines the allocation and distribution of social services in the fields of health, education, income security, employment, criminal justice, and housing. The relationship of the policy process to the political economy, to intergovernmental relations, and to social change at the national, regional, state, and local levels will be analyzed. To this end history, theory, cultural values and beliefs, and the structure of society will also be investigated. The role of evaluation in policy planning and implementation will be underscored. Current issues in policy, such as the role of the private and voluntary sectors, interest group politics, barriers and constraints to the development of effective policies, and the respective roles of consumers, clients, and human service professionals in the policy process will also be addressed.

PAM 640 Information and Regulation (formerly HSS 640) (also Economics 435)  
Spring. 3 credits. Prerequisite: PAM 604 or PAM 200 and two semesters of calculus. Class packets are on sale at Campus Store.

PAM 650 Health Administration—Topic course (formerly HSS 612)  
Topical Seminars and Practice  
Seminars and practice, offered periodically and reflecting faculty and student interest, with changing topics and instructors. Content, time, credits, and instructors to be announced. Seminars and practice offer concentrated study in a specific human service area or in the education, planning, or evaluation processes within human services.

PAM 651 Seminar in Mental Health Services (formerly HSS 613)  
Fall. 3 credits. Open to undergraduate seniors with instructor's approval. T 4:00–6:30. J. Mueller.  
Using lectures, case examples, and class discussions, we will look from both administrative and clinical perspectives at the organization and delivery of mental health services to the mentally ill, mentally infirm, or seriously emotionally and/or developmentally disabled. We will examine model programs for long-term community care and services designed to meet the special needs of ethnic/racial minorities, women, and homeless persons who are mentally impaired. State/federal partnerships will be discussed in terms of their impact on fiscal and human resources for both public and for-profit agencies.

PAM 652 Health Care Services: Consumer and Ethical Perspectives (formerly HSS 625)  
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. T 10:10–11:25. A. Parrott.  
The course will focus 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, practitioner burnout and training, ethics of transplant surgery and funding, reproductive technology, AIDS research and funding, animals in medical research, right to die, and baby and granny Doe cases.

PAM 653 Health Economics and Policy (formerly CEN 632)  
This course provides a survey of research in health economics and its relevance for health policy. Models of health capital, household production, and insurance are developed and used to address public health policies and health insurance programs and reforms. Major issues in the economics of the health care sector are discussed, including the markets for physician services, hospital care and long-term care. Much of the course focuses on the U.S., but it will also review research on other countries, especially developing countries that face a much different set of health policy issues.

PAM 654 Legal Aspects of Health-Services Delivery (formerly HSS 627)  
Spring. 3 credits. Prerequisites: PAM 657 or permission of instructor. Staff.  
This course introduces principles of the law that are specifically applicable to health-service delivery. Topics considered include the liability of hospitals and their staff and personnel for injuries to patients; medical records and disclosure of information; consent to medical and surgical procedures; responsibility for patients' personal property; collection of bills; medical staff privileges, and confidential communications.

PAM 655 Comparative Health-Care Systems (formerly HSS 630)  
Spring. 3 credits. Open to graduate students and a limited number of seniors with permission of instructor. M 7:30–10:00 p.m. P. F. O'Connor.  
An overview of health services is given within the larger context of the social and economic development policies of several industrialized democracies and developing countries. Sociocultural, economic, and epidemiologic factors are stressed as keys to the formulation of realistic strategies. Resource allocations for health services are assessed against the backdrop of changing rates of economic growth.

PAM 656 Managed Health Delivery Systems: Primary-Ambulatory Care (formerly HSS 631)  
Spring. 3 credits. Prerequisite: PAM 657. T R 2:30–3:45. R. Battistella.  
The concept of primary care is used to enhance understanding of the direction and...
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pursuit of ongoing changes in health services organization and financing. Pressures on
traditional indemnity insurance and solo fee-
for-service medicine are examined in the
context of the unmanaged to managed
delivery systems. The course is
divided into two parts: Part 1 examines
the development of health maintenance organiza-
tions and related forms of managed care
against the backdrop of larger public policy
concerns. Part 2 focuses on administrative
financial topics associated with the design,
marketing, and operation of managed delivery
systems in highly competitive markets.

Considerable attention is given to the
relationship between the physician and
management with respect to such subjects as medical
practice policies, productivity, quality assurance, and
outcome measurement. The consumer
health care behavior literature is reviewed in
the light of marketing strategies and utilization
control objectives. Many of the managerial
topics are amplified by field trips and a select
group of visiting speakers.

PAM 657 Health Care Organization
(formerly HSS 634)

Fall. 3 credits. Limited to 30 students.
Priority given to Sloan students or
permission of the instructor. T R 12:20-
1:35. R. Battistella.
The course will provide an introduction at the
graduate level to the organization of health
providers in the United States, the interrela-
tionships of different services, and major sources
and methods of paying for care. The course
will describe how health services are
structured in the United States and how these
different services interrelate along the
continuum of care. The student will describe and
analyze organization, delivery, and
financing issues from a variety of perspectives
using specific performance criteria (e.g.,
equity, quality, efficiency). Innovations by the
public and private sectors in the delivery and
reimbursement of health care will also be
presented.

PAM 658 Field Studies in Health
Administration and Planning
(formerly HSS 635)

Fall or spring. 1-4 credits. TBA. Staff.

Students interested in developing administrativa-
and program-planning research skills are
given an opportunity to evaluate an ongoing
phase of health care agency activity in the
light of sound administrative practice and
principles of good medical care. In planning
and carrying out the research, students work
closely with a skilled practicing administrator
and with members of the faculty.

PAM 659 Epidemiology, Clinical
Medicine, and Management
Interface Issues (formerly HSS 637)

Spring. 3 credits. T 3:45-6:15.
E. Rodgin.

This course explores from an empirical and
analytical framework the relationships
between epidemiology, clinical medicine, and
management. The course will review the
epidemiology, policy issues, and treatment of
selected health care services, and major issues
accounting for a significant percentage of utilization and cost of health
care services. In addition, students will have
an opportunity to explore issues of resources
allocation and continuous quality improve-
ment. The format for the class is lecture,
discussion, and case analysis.

PAM 660 Quality in Health Care
Organizations (formerly HSS 638)

Spring. 1 credit. TBA. A. Kabeenell.
The quality of health services—the extent to
which the appropriate and most effective care
is properly administered in the least costly
manner—is a topic of paramount importance
to patients. But, it is also a central concern of
the providers and managers of health services
and those who pay for care. It is also a
cornerstone of health care reform. Through
readings, lecture, discussion, and group work,
this course will acquaint the student with the
basic elements of managing quality in health
care organizations. Defining quality from
many perspectives; measuring performance
and detecting poor quality care;
traditional and progressive approaches to
managing quality including Continuous
Quality Improvement, and the politics of
quality, both within and outside the organiza-
tion.

PAM 661 Economics of Health and
Medical Care (formerly HSS 640)

Fall. 3 credits. T R 8:30-9:55. J. Kuder.
The course is designed for graduate students
who seek an understanding of the tools,
terminology, and way of thinking of economics
as it is applied to decision making in health
services delivery, administration, and policy.
The philosophy of the course approach is
based upon the often-quoted credo of John M.
Keynes, "The theory of economics does not
furnish a set of rules which immediately
applicable to policy. It is a
method rather than a doctrine, apparatus of
the mind, a technique of thinking which helps
its possessor to draw correct conclusions." The
basis of this approach will be the
economic reasoning and principles that are
applicable to health care applications. The course
subsequent to that of strategy setting at the CEO level will briefly discuss
the economics associated with the
providers and managers of health services
and those who pay for care and will also focus on
the many challenges that managers face in
making budgetary and other decisions.

PAM 662 Health Care Financial
Management I (formerly HSS 641)

Spring. 3 credits. T 10:10-12:40.
J. Kuder.
The course is designed to give graduate students
an intensive introduction to the issues and
techniques in the financial management of
health care providers. The course focuses on
the principles and practices of financial
management, including financial statement
analysis and interpretation, working capital
management, financial reporting, and the
measurement of financial performance. The course
also covers the role of financial management in
the health care industry and the impact of
economic and regulatory changes on financial
management practices.

PAM 663 Health Care Financial
Management II: Payment Systems
(formerly HSS 642)

Spring. 3 credits. Prerequisite: PAM 662.
The purpose of this course is to develop an
understanding of the theories in which health
care payment and reimbursement systems are
assessed and the techniques through which they
operate.

PAM 664 Information Resources
Management in Health and Human
Service Organizations (formerly HSS 645)

Spring. 3 credits. Prerequisite: PAM 662.
The course focuses on the nature of decision
making and decision support systems, sources of
information, and the strategic management
of information resources in organizations.
The seminar is topical, addressing current program evaluation and evaluative research and analysis and appraisal of current literature on multiple regression. The seminar focuses on This advanced course is intended for students student and the Special Committee. and residence units are arranged between the student and the agency, while course credit an internship is negotiated between the local levels in positions consistent with academic and professional goals. Opportuni­
determined by availability and students' Internship placement in human services is an opportunity for simulations so that students discussed from the perspective of leadership change within the work environment will be The introduction of new Readings include both new theoretical topics on the supply side include housing starts, mainte­
nance, and rehabilitation. Topics in housing finance such as mortgage choice, and the demand for home mortgage debt will be studied. Housing policy issues such as tax policy, housing for the elderly, fair housing, rent control, and zoning also will be ad­ressed.

PAM 674 Housing Economics (formerly GEN 648) Spring. 3 credits. Prerequisite: PAM 200 or Economics 311 or 313. M 1:25–3:55. N. Kutty. A survey of economic theory and empirical research related to housing markets. The course studies the demand and supply sides of the housing market as applications of microeconomic theory. Topics related to housing demand include tenure choice (decision to own or rent), household formation, mobility, and discrete choice models of housing demand. Topics on the supply side include housing starts, maintenance, and rehabilitation. Topics in housing finance such as mortgage choice, and the demand for home mortgage debt will be studied. Housing policy issues such as tax policy, housing for the elderly, fair housing, rent control, and zoning also will be addressed.

PAM 680 Leadership in the Human Services (formerly HSS 655) Spring. 3 credits. Limited to 20 students. S-U grades optional. T R 4:00–5:15. J. Mueller. Students in this seminar will study human service organizations in the context of their changing economic, political, ecological, and technological environments, and in terms of the leadership behaviors of administrators who are making successful adaptive responses to these changes. The introduction of new organizational forms and strategies for nurturing innovation and for effecting cultural change within the work environment will be discussed from the perspective of leadership roles at various organizational levels. Readings include both new theoretical literature and appraisal of current literature. The seminar format provides an opportunity for simulations so that students can enact and receive feedback on their own developing leadership skills.

PAM 704-705 Internship in Human Service Studies (formerly HSS 711-712) Fall, spring, or summer. 1–15 credits. S-U grades optional. Internship placement in human services is determined by availability and students' academic and professional goals. Opportuni­
ties are available in public and private human service organizations at the national, state, and local levels in positions consistent with students' needs and desires. The duration of an internship is negotiated between the student and the agency, while course credit and residence units are arranged between the student and the Special Committee.

PAM 718 Advanced Seminar in Program Evaluation (formerly HSS 790) Fall, spring. 1–3 credits. S-U grades optional. This advanced course is intended for students with at least three courses in evaluation (PAM 612 series or equivalent) and statistics through multiple regression. The seminar focuses on analysis and appraisal of current literature on program evaluation and evaluative research. The seminar is topical, addressing current issues of importance in the field.

PAM 799 MPS Problem Solving Project Fall or spring. Credits to be arranged. For students recommended by their chair and approved by the instructor in charge for independent advanced work. S-U grades optional. PAM 899 Master's Thesis and Research (formerly CEH and HSS 899) Fall and spring. Credit to be arranged. PAM 999 Doctoral Thesis and Research (formerly CEH and HSS 999) Fall and spring. Credit to be arranged. Seminars and practica—PAM 618 and 620 (formerly HSS 697 and 698) Seminars and practica, offered periodically and reflecting faculty and student interest, with changing topics and instructors. Content, time, credits, and instructors to be announced. Seminars and practica offer concentrated study in a specific human service area or in the education, planning, or evaluation processes within human services. Topics Courses—PAM 611, 620, and 650 (formerly HSS 611, 610 and 612) Fall or spring. 2–4 credits. Prerequisites and enrollment limits vary with topic being considered in any particular term. Permission of instructor required. Hours to be arranged. This series of courses provides an opportunity for graduate students to explore an issue, a theme, or research in the areas of departments of 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.

TEXTILES AND APPAREL COURSES

A. Lemley, chair, A. Netravali, director of graduate studies; P. Schwartz, director of undergraduate studies; S. Ashdown, C. C. Chu, C. Coffman, C. Jirousek, S. K. Obendorf, A. Racine, S. Watkins

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.

TXA 114 Introduction to Computer-aided Design Fall and spring. 3 credits. Fall, T, W, or R 1:25–4:25. It is important for students on wait lists to attend the first class. Limit 12 per lab section. Priority given to TXA and DEA students. S-U grades optional. A. Racine

A studio course that focuses on using the microcomputer as a design tool. The command-driven AutoCAD software program is the medium of expression for creating, modifying, and plotting visual images. Students will develop two-dimensional surface designs based on historical and cultural sources for portfolios and display. Approximate cost of supplies is $800; lab fee $10.

TXA 125 Art, Design, and Visual Thinking Fall. 3 credits. S-U grades optional. Lecs M W F 12:20–1:10. 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 element, lectures emphasize the varieties of visual expression to be seen in works of art and design. Social, cultural, and historic interpretations of visual expression are discussed.


TXA 145 Introduction to Apparel Design Spring. 4 credits. Limited to 36 students with 18 students per lab section; priority given to TXA majors or students transferring into TXA. Apparel design majors should take course during first year. Minimum cost of materials, $125; lab fee, $10. Lec T 1:25–4:25 and lab F 10:10–12:05 or lec R 1:25–4:25 and lab F 12:20–2:15. A. Racine. Intensive study of principles and processes of flat-pattern design with emphasis on creative expression in children’s apparel. Students develop a thorough understanding of principles and techniques needed to produce apparel.

TXA 217 Drawing the Clothed Figure Spring. 3 credits. Enrollment limited to 18 students. Prerequisite: a basic drawing course. Priority given to apparel design students. Letter grades only. Minimum cost of supplies $125.00. Lab fee: $30. T R 10:10–1:10. S. Watkins. To improve the student's ability to illustrate two-dimensionally the interaction of draped fabric and the human form and to develop awareness of clothing as a design medium. Emphasis is on development of techniques and skills in selected media necessary for the communication of design ideas.

TXA 237 Structural Fabric Design Fall. 3 credits. S-U grades optional. Prerequisite: TXA 135. Recommended: college algebra. Lecs M W F 9:05–9:55. A. Netravali. 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 246 Introduction to Functional Apparel Design Fall. 4 credits. Prerequisite: TXA 135 and TXA 145. Letter grades only. Minimum cost of materials, $125; lab fee, $10. T R 10:10–1:10. S. Watkins. This studio course applies the principles and processes of advanced pattern making and the theory of functional clothing to the development of sportswear, actionwear, and clothing for active leisure activities. Assigned problems will require students to use the design process...
to apply information about body structure, user needs (thermal protection and comfort, mobility, and visibility), and the nature of materials to the production of functional, fashionable apparel.

TXA 269 Style, Fashion, and the Apparel Industry
Spring (last seven weeks of semester). 2 credits. Prerequisite: TXA 125 and TXA 135. Not open to freshmen or those who have taken TXA 245. Lec M W 10:10-12:05. A. Racine.

Illustrated lectures will focus on changes in the U.S. apparel industry and fashion from the nineteenth century to the present day due to social forces, technological developments, and shifting demographics. The Cornell Costume Collection will be used for discussion. Students will write research papers on issues related to the apparel/textile complex.

TXA 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged. Staff.

Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multiplicity description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the department chair, is filed at course registration or during the change-of-registration period.

TXA 331 Apparel Production and Management
Fall. 3 credits. Prerequisites: Economics 101 and 102 and an upper-division course in either apparel or textiles. T R 10:10-11:25. Staff.

Introduction to technical and economic aspects of textile and apparel production. Emphasis is on design and functioning of apparel manufacturing systems and their components. Analysis of efficient manufacturing methods such as Quick Response (QR), Just-in-Time (JIT) as applicable to apparel production, and use of computer technology in production and quality control will be included.

TXA 335 Fiber Science
Spring. 3 credits. Prerequisites: College chemistry and physics. Lecs M W 1:25. Lab M 2:30-4:25. A. Netravali.

This course covers fibers commonly used in various engineering, medical, and apparel applications. Topics include nature of polymer molecules, chemical structure of organic fibers, inorganic fibers, micro-macro structure of fibers, fiber dimensions, environmental effects (mechanical, optical, thermal, and frictional properties of fibers. Fiber uses such as composites in aerospace and other structural components, circuit boards, bulletproof vests, sutures, artificial arteries, geotextiles, sporting goods, etc. will be discussed.

TXA 336 Fundamentals of Color and Dyeing
Fall. 3–4 credits. Prerequisite: College Natural Science Requirements. Fiber science students are required to take the lab. Lec M W F 1:25-4:25. C. C. Chu.

Color is an extremely important and useful factor in daily life. This course will emphasize theories and scientific principles of color, providing a framework for the use of colors in design, marketing, or research. How colorants are used to dye fabrics will be addressed. Although fabrics are chiefly used to illustrate color in the class, much of the information and knowledge will be useful to non-textile majors. Guest lecturers from industry will provide the practical aspects of color in business.

TXA 367 Draping
Spring. 4 credits. Limited to 20 students. Prerequisite: TXA 125, TXA 246, and one drawing course. Minimum cost of materials, $125; lab fee, $10. M W 1:25-4:25. S. Ashdown.

This studio course examines the process of creating a three-dimensional garment from the two-dimensional fabric. Through exercises, the principles and processes of draping, advanced flat pattern making, and fitting are studied. Assigned problems require the students to make judgments regarding the design process, the nature of materials, body structure, function, and fashion.

TXA 368 Computer-Aided Apparel Design
Spring (first seven weeks of semester). 2 credits. Prerequisite: TXA 114, TXA 125, TXA 246, and TXA 367. Students whose programs include field or international experience must elect to enroll in TXA 367 and TXA 368 in the same term. Recommended: two art or drawing courses. Minimum cost of materials, $125; lab fee, $10. M W F 10:10-12:05. A. Racine.

Intermediate apparel students prepared to challenge and refine their design skills will be presented with a variety of complex studio problems involving computer-aided apparel design and team work.

TXA 375 Color and Surface Design of Textiles
Fall. 4 credits. Recommended: TXA 114 and TXA 135. Minimum cost of other materials, $100; lab fee, $75. Limited to 15 students. T R 1:25-4:25. C. Jirousek.

Studio experience in the surface design of textiles combined with exercises in color theory. Textile projects will utilize techniques such as block printing, batik, silk painting, silk screen, and stitchery to produce a portfolio of textile designs. Studio work will be augmented by lectures on color and color theory illustrated by slides and textile examples.

TXA 400-401-402-403 Special Independent Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grade optional.

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
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

TXA 403 Teaching Apprenticeships
Fall or spring. 2–4 credits. Prerequisites: student must have upperclass standing, have demonstrated a high level of performance in the subject to be taught and in the overall academic program, and have permission of the instructor and the department chair. S-U grades optional. Staff.

Apprenticeship includes both a study of teaching methods in the field and assisting the faculty with instruction.

TXA 432 Product Quality Assessment

This course covers evaluation of fibers, yarns, fabrics, and garments, with emphasis on the meaning of standards, testing philosophy, quality control, and analysis. Day-to-day tests done in textile and apparel industry will be discussed. Laboratory sections will introduce students to various test methods, data generation for analysis, and evaluation.

TXA 436 Fiber Chemistry
Spring. 3 credits. S-U grade optional. Senior and first-year graduate students. Lecs M W F 10:10-11:00. C. C. Chu.

The chemical and physical structure of several commercially important fibers, such as cotton, wool, silk, polyesters, nylons, acrylics, polylefins and spandex and their polymerization process are discussed. The general chemical and physical properties of each will be given. Degradation reactions for certain fibers such as polyolefins and acrylics will be discussed.

TXA 439 Biomedical Materials and Devices for Human Body Repair

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
Spring. 3 credits. S-U grades optional. Prerequisite: TXA 135 and ARME 240 or equivalent. Lec T R 2:30-3:45. P. Schwartz.

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 will be emphasized throughout.

TXA 446 Apparel Design: Intermediate Functional Clothing Design
Spring. 3 credits. Prerequisites: TXA 367 and TXA 246 or permission of instructor. Minimum cost of materials, $125; lab fee, $15. Not offered 1997–98. S. Watkins. Complex problems in functional apparel design will be studied with an emphasis on totally encapsulating clothing. Students will work in groups and individually to set design criteria and develop innovative solutions for current problems in protective apparel.

TXA 465 Apparel Design: Product Development and Presentation
Fall. 4 credits. Prerequisites: minimum of three drawing or art courses, TXA 367, TXA 368, and with TXA 375 or permission of instructor. Minimum cost of materials, $250; lab fee, $10. M W 10:10–1:10. S. Ashdown. Through studio problems in apparel design, students will investigate the influence of manufacturing technology and cost on apparel products. Garments are developed to various stages from sketches to finished samples. Some portfolio development included.

TXA 499 Honors Thesis Research
Fall and spring. 1–6 credits (maximum 6 credits for graduation). S-U grades optional. Prerequisite: TXA 246 or permission of instructor. TXA students who have been admitted to college honors program. 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. Prerequisite: permission of instructor. A. Nethawat. Formation and properties of fiber-forming polymers, rubber, 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. S-U optional. Prerequisites: TXA 336 or equivalent and organic chemistry, or permission of instructor. Not offered 1997–98. C. C. Chu. Chemical aspects of textiles with emphasis on finishes and dyeing will be discussed. Industrially important textile chemicals used for dyeing and enhancing fiber and fabric properties, such as durable press, anti-soiling, water repellency will be 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 impact of these textile chemicals and current federal regulation will be briefly discussed.

TXA 635 Special Topics in Textiles and Apparel
Fall. 3 credits. prerequisite: permission of instructor. Staff.

TXA 637 Research Seminars in Apparel Design
Fall and spring. 1 credit; S-U optional; repeat of course each semester is encouraged for all apparel design graduate students. Available to advanced undergraduate students with permission of individual instructor. Apparel Design faculty.

TXA 639 Mechanics of Fibrous Assemblies
Fall. 3 credits. Prerequisite: solid mechanics or permission of instructor. Not offered 1997–98. S. Watkins. A study of the mechanics of fiber assemblies: idealized yarn and fabric models; statistical bundle theories; deformation of yarns and fabrics in tension, shear, and compression stress; bending and buckling, and the mechanical behavior of nonwoven textile materials.

TXA 664 Human Factors: Anthropometrics and Apparel
Spring (even-numbered years). 3 credits. S-U grades optional. Limit 15. Prerequisite: permission of instructor. Open to advanced undergraduates. 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 675 Aesthetics and Meaning in World Dress
Spring. 3 credits; S-U grades optional. Prerequisite: TXA 125 or course in history of art, costume history, or other history. Offered alternate years. C. Jirousek. An examination of the aesthetic and social psychological relationship between body and clothing in the context of various cultures. Students will develop a research topic to be presented orally and in a term paper and will participate in the development of an exhibition.

TXA 899 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. Staff.

TXA 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Staff.

FACULTY ROSTER
Anderson, Carol L., Ph.D., Iowa State U. Assoc. Prof., Human Development and Family Studies, Assistant Dean
Ashdown, Susan, Ph.D., U. of Minnesota. Asst. Prof., Textiles and Apparel
Avery, Robert B., Ph.D., U. of Wisconsin. Prof., Policy Analysis and Management
Avery, Rosemary J., Ph.D., Ohio State U. Assoc. Prof., Policy Analysis and Management
Barr, Donald J., Ph.D., Indiana U. Prof., Policy Analysis and Management
Battistella, Roger M., Ph.D., U. of Michigan. Prof., Policy Analysis and Management
Betz, Franklin D., Ph.D., U. of California at Davis. Prof., Design and Environmental Analysis
Boyd, D. Michael, B.A., U. of North Iowa. Prof., Design and Environmental Analysis
Brumberg, Joan J., Ph.D., U. of Virginia. Prof., Human Development and Family Studies
Bryant, W. Keith, Ph.D., Michigan State U. Prof. and Chair, Policy Analysis and Management
Canfield, Rick, Ph.D., U. of Denver. Asst. Prof., Human Development and Family Studies
Chi, Peter S., Ph.D., Brown U. Prof., Policy Analysis and Management
Chu, Chih-Chang, Ph.D., Florida State U. Prof., Textiles and Apparel
Cochran, Moncrieff, Ph.D., U. of Michigan. Prof., Human Development and Family Studies
Cornelius, Steven W., Ph.D., Pennsylvania State U. Assoc. Prof., Human Development and Family Studies
Danko, Sheila M. D., Rhode Island School of Design. Assoc. Prof., Design and Environmental Analysis
Depue, Richard, Ph.D., U. of Oklahoma. Prof., Human Development and Family Studies
Eckenrode, John J., Ph.D., Tufts U. Assoc. Prof., Human Development and Family Studies
Evans, Gary, Ph.D., U. of Massachusetts at Amherst. Prof., Design and Environmental Analysis
Firebaugh, Francille M., Ph.D., Cornell U. Prof., Policy Analysis and Management, Dean
Garbarino, James, Ph.D., Cornell U. Prof. and Director, Family Life Development Center
Garner, Clark E., M.F.A., U. of Kansas. Prof., Design and Environmental Analysis
Gerner, Jennifer L., Ph.D., U. of Wisconsin. Prof., Policy Analysis and Management, Assistant Dean
Gibson, Kathleen J., M.A., Ohio State U. Asst. Prof., Design and Environmental Analysis
Greene, Jennifer C., Ph.D., Stanford U. Assoc. Prof., Policy Analysis and Management
Hamilton, Stephen F., Ed.D., Harvard U. Prof. and Chair, Human Development and Family Studies
Haugard, Jeffrey, Ph.D., U. of Virginia. Asst. Prof., Human Development and Family Studies
Hazan, Cindy, Ph.D., U. of Denver. Assoc. Prof., Human Development and Family Studies
Heck, Ramona K.Z., Ph.D., Purdue U. Assoc. Prof., Policy Analysis and Management
Hedge, Alan, Ph.D., U. of Sheffield (England). Prof., Design and Environmental Analysis
Hogarth, Jeanne M., Ph.D., Ohio State U. Assoc. Prof., Policy Analysis and Management
Jennings, Jan, M.S. Oklahoma State U. Assoc. Prof., Design and Environmental Analysis
Jirousek, Charlotte, Ph.D., U. of Minnesota. Asst. Prof., Textiles and Apparel
Kutty, Nandinee K., Ph.D., Syracuse U. Asst. Prof., Policy Analysis and Management
Kenkel, Donald, Ph.D., U. of Chicago. Assoc. Prof., Textiles and Apparel
Lemley, Ann T., Ph.D., Cornell U. Prof., and Lee, Lee C., Ph.D., The Ohio State U. Prof., Design and Environmental Analysis
Lenzenweger, Mark F., Ph.D., Yeshiva U. Assoc. Prof., Human Development and Family Studies
Lust, Barbara C., Ph.D., City U. of New York. Prof., Human Development and Family Studies
Maxwell, Lorraine E., Ph.D., City U. of New York. Asst. Prof., Design and Environmental Analysis
McClintock, Charles, Ph.D., SUNY at Buffalo. Prof., Policy Analysis and Management, Associate Dean
Minot, Marion E., Ph.D., Cornell U. Prof., Policy Analysis and Management
Moen, Phyllis, Ph.D., U. of Minnesota. Prof., Human Development and Family Studies
Netravali, Anil, Ph.D., North Carolina State U. Assoc. Prof., Textiles and Apparel
Obendorf, Sharon K., Ph.D., Cornell U. Prof., Textiles and Apparel
Parrot, Andrea, Ph.D., Cornell U. Assoc. Prof., Policy Analysis and Management
Pillemer, Karl A., Ph.D., Brandeis U. Assoc. Prof., Human Development and Family Studies
Pollak, Patricia B., Ph.D., Syracuse U. Assoc. Prof., Policy Analysis and Management
Potts, Marion H., Ph.D., Penn State U. Prof., Human Development and Family Studies
Raver, C. Cybele, Ph.D., Yale U. Asst. Prof., Human Development and Family Studies
Rendall, Michael, Ph.D., Brown U. Asst. Prof., Policy Analysis and Management
Roberts, Steven S., Ph.D., Cornell U. Assoc. Prof., Human Development and Family Studies
Savin-Williams, Ritch C., Ph.D., U. of Chicago. Prof., Human Development and Family Studies
Schwartz, Peter, Ph.D., North Carolina State U. Prof., Textiles and Apparel
Shapiro, Constance H., Ph.D., Cornell U. Prof. and Chair, Policy Analysis and Management
Sims, William R., Ph.D., Massachusetts Inst. of Technology. Prof. and Chair, Design and Environmental Analysis
Street, Lloyd C., Ph.D., U. of California at Berkeley. Assoc. Prof., Policy Analysis and Management
Suci, George J., Ph.D., U. of Illinois. Prof., Human Development and Family Studies
Trockin, William M. K., Ph.D., Northwestern U. Prof., Policy Analysis and Management
Watkins, Susan M., M.S., Pennsylvania State U. Prof., Textiles and Apparel
Wethington, Elaine, Ph.D., U. of Michigan. Assoc. Prof., Human Development and Family Studies

Lecturers
Beck, Sam N., Ph.D., U. of Massachusetts. Sr. Lecturer, Urban Semester
Boucous, Russell M., Ph.D., Cornell U. Sr. Lecturer, Policy Analysis and Management
Dimmick, Donna I., Ph.D., Cornell U. Lecturer, Policy Analysis and Management
Dempster-McClain, Donna I., Ph.D., Cornell U. Sr. Lecturer, Human Development and Family Studies
Diaz, Gladys M., M.A., Cornell U. Lecturer, Policy Analysis and Management
Dimitri, Laura, M.P.A., Harvard U. Lecturer, Policy Analysis and Management
Fisher, Amy, M.S., Rush U. Lecturer, Division of Nutritional Sciences
Gilmore, Rhonda, M.A., Cornell U. Lecturer, Design and Environmental Analysis
Johnson, Ellen, M.S.W., Syracuse U. Lecturer, Policy Analysis and Management
Racine, Anita, Ph.D., Cornell U. Sr. Lecturer, Policy Analysis and Management
Rosen, William, Ph.D., U. of CA. Sr. Lecturer, Policy Analysis and Management
Ross-Bernstein, Judith, M.Ed., Northwestern U. Lecturer, Human Development and Family Studies
Tennant, Priscilla A., M.Sc.Ed., SUNY-Cortland. Lecturer, Division of Nutritional Sciences
ADMINISTRATION
Edward J. Lawler, dean
Robert Smith, associate dean, academic affairs
Ronald L. Seeber, associate dean, extension and public affairs
James E. McPherson, assistant dean, Office of Student Services
Gordon Law, librarian
Francine Blau, director, research
Michael O'Hara, director, school relations
Patricia Welch, director of budget
Robert Stern, graduate faculty representative
Tove Hammer, editor, Industrial and Labor Relations Review

DEGREE PROGRAMS

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THE SCHOOL
The School of Industrial and Labor Relations at Cornell (ILR) is a small school within a large university. It tries to maintain the small-college atmosphere expected of an institution that has about 650 undergraduates and approximately 120 graduate students, even as ILR students participate fully in the activities of the larger Cornell community.

Ives Hall classroom building is expected to be complete for spring 1998. ILR students will return to modern, technologically advanced lecture halls and seminar rooms, as well as to a library enlarged in size and more useable for study. During the construction, ILR classes will meet in buildings near the Ives Hall complex of faculty and administrative offices. Lunches, receptions, parties, and activities will be organized to promote the continuing interaction of ILR students and faculty.

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 recent 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 the field, 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 120 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, 163 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 Relations
International and Comparative Labor Relations is concerned with international and labor relations systems and labor markets in other parts of the world. Countries include those in Western Europe, as well as the newly industrializing countries in Asia and the Third World.

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 polices. 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 work place, 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 will be 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 open 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. Using another option, some ILR students arrange for dual registration in the Johnson Graduate School of Management, earning their bachelor's degree in ILR and a master's degree in the Johnson Graduate School of Management after five years of study.

Some students elect to spend a semester in New York City, Albany, or Washington, D.C., with a chance to observe actual labor problem solving as interns in congressional offices, labor organizations, personnel offices, and state and federal agencies. For more information, see "Special Academic Programs," below.

Study abroad 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 wish 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), good academic standing, approval of the plan by the director of student services, and payment of a special in absentia registration fee. Course work taken in absentia is usually not evaluated for transfer credit until the work has been completed and the student has returned to the school. Students then submit a course syllabus and other evidence of content to the chairman of the department that might have offered the respective course, or to a counselor in the Office of Student Services if the course is more appropriate as a general elective.

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 needs to successfully complete 120 credits. This requires eight terms for an average of 30 credits a year although some students accelerate their studies.

Curriculum Changes Effective Fall 1994 for Entering Class

FRESHMAN YEAR

Fall Semester

Freshman Writing Seminar 3
Introductory Microeconomics (ECON 101) 3
History of American Labor: Nineteenth Century (ILRBC 100) 3
Social and Psychological Foundations of Organizational Behavior I (ILRBC 170)* 3
ILR Colloquium (ILRDI 150) 1
Elective 3

Spring Semester

Freshman Writing Seminar 3
Introductory Macroeconomics 102 3
History of American Labor: Twentieth Century (ILRDC 101) 3
Social and Psychological Foundations of Organizational Behavior II (ILRBC 171)* 3
Elective 3

Physical Education, Fall and Spring

SOPHOMORE YEAR

Fall Semester

Statistics I (ILRST 210) 3
Development of Economic Institutions (ILRST 140) 3
Labor and Employment Law (ILRST 201) 3
Distribution: Cultural Perspectives 3
Elective 3

Spring Semester

Statistics II (ILRST 211) 3
Human Resource Management (ILRHR 260) 3
Economics of Wages and Employment (ILRST 240) 3
Distribution: Western Intellectual Tradition 3
Elective 3

JUNIOR AND SENIOR YEARS

Economic Security (ILRST 340) 3
Collective Bargaining (ILRST 300)* 3
Distribution: International and Comparative ILR 3
Distribution: Upper Division Writing 3
Distribution: Science and Technology 3
Advanced Organizational Behavior (ILRST 420) 3
ILR and General Electives 3
ILR Advanced Electives—27 credit hours in no fewer than 9 courses
General Electives—34 credit hours of which up to 22 hours may be freely elected in the university's endowed divisions

*New Course Numbers

Required Courses

(55 credits)

The curriculum prescribes the courses and subjects listed in the table above, to be taken in the terms indicated. In the senior year, all courses will be electives.

Elective Courses

(65 credits)

From the courses offered by the school, students must select a minimum of 27 credits of ILR elective courses. No more than 9 of these credits may be satisfied by ILR 499, Directed Studies, or ILR 497–498, Internships, or ILR 495, Honors Program.
Undergraduates are required to select one intensive writing course (each 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.

SCHEDULING AND ATTENDANCE

Schedule Changes
Occasionally it may be necessary for a student to request changes in his or her course schedule either before a term begins or during the semester. Such requests must be directed to the Office of Student Services to avoid possible loss of academic credit.

Class Attendance
It is each student's responsibility to attend all scheduled classes unless approved excuses have been given by the faculty. In some courses an instructor may permit a maximum number of class absences without a grade penalty or dismissal from the course. An explanation for absence from class may occasionally be secured from the Office of Student Services in advance of the expected absence. An approved absence may be warranted by:
1) participation in authorized university activities such as athletic events, dramatic productions, or debates;
2) medical problems supported by a record of clinic or infirmary treatment;
3) serious illness or death in the immediate family;
4) other circumstances beyond the student's control.

A request for explanation of an absence should, when possible, be made to the Office of Student Services before the date of expected absence. A reported and explained absence does not relieve a student from fulfillment of academic requirements during the period of absence. The course instructor has the authority to determine what work must be completed. The office can only confirm the explanation for absence. Students should inform the Office of Student Services of any problems they have meeting course requirements.

ACADEMIC STANDING AND GRADES

Academic Integrity
In 1987 the faculty of the School of Industrial and Labor Relations approved a revised code of academic integrity. This code, while based on the Cornell University code, varies somewhat.

Absolute integrity is expected of all Cornell students in all academic undertakings. They must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity. The code specifically prohibits:
1) knowingly representing the work of others as one's own;
2) using or obtaining unauthorized assistance in any academic work;
3) fabricating data in laboratory or field work;
4) giving fraudulent assistance to others;
5) fabricating data in support of laboratory or field work.

Full details on the applications of those prohibitions to course work, term papers, examinations, and other situations are listed in the code. Copies are available from the Office of Student Services, 101 Ives Hall.

Dean's List
A Dean's List is compiled for each of the four undergraduate classes each term on the seventh day following receipt of final grades from the registrar. Eligibility for the Dean's List is determined by applying all of the following criteria:
1) achievement of a term average for freshmen of 3.3 or better; for sophomores of 3.4 or better; and for juniors and seniors of 3.6 or better;
2) a minimum course load for the term of 12 letter-graded credits;
3) completion of all courses registered for at the beginning of the term;
4) satisfaction of all good-standing requirements.

Academic Standing
Good standing requires that all of the following criteria be met at the end of each term:
1) an average of C- (1.7) for the semester's work, including a minimum of 8 completed and letter-graded credits;
2) no failing grades in any course, including physical education;
3) a cumulative average of C- (1.7) for all completed terms.

If at the end of any term a student fails to maintain good standing or if overall academic performance is so marginal as to endanger the possibility of meeting school and university degree requirements, his or her record is reviewed by the Committee on Academic Standards and Scholarships. The committee may issue a written warning to the student at that time. If a student does not improve after the written warning, he or she may be denied permission to register for the next term.

Involuntary Separation from the School for Academic Reasons
A student may be denied permission to reregister at the end of any term when he or she has failed:
1) to establish good standing after a semester on warning;
2) to maintain an average of 1.7 in any term after a previous record of warning;
3) to achieve good standing after being on warning any two previous semesters;
4) two or more failures in one term or has a term average of 1.0 or below.

The Academic Standards and Scholarship Committee may decide to permit a student to remain on warning more than one semester if there has been significant improvement even though the cumulative average is still below 1.7.

S-U Grading Policy
An undergraduate may register to receive a final grade of S (Satisfactory) or U (Unsatisfactory) in courses that offer this option—either in the school or in other divisions of the university—subject to the following conditions:
1) the S-U option may be used in ILR and in out-of-college course electives only, not in directed studies;
2) students are limited to registering in two S-U courses a term;
3) S-U registration is limited to 4 credits for each course;
4) students registering for S-U grades must be in good standing;
5) students must fulfill the graduation requirement of 105 letter-graded credits.

ILR faculty members assign a grade of U for any grade below C- and a grade of S for any grade of C- or better. A grade of U is considered equal to an F in determining a student's academic standing, although it is not included in the cumulative average.

No change of grading (from letter to S-U or from S-U to letter) may be made after the first three weeks of class. There are no exceptions to this restriction, and appeals will not be accepted.

Grades of Incomplete
A grade of incomplete is assigned when the course has not been completed for reasons that are acceptable to the instructor. It is understood that the work may 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.

Dual Registration in the Johnson Graduate School of Management

Dual informal registration in the Johnson Graduate School of Management leads to a Bachelor of Science degree in industrial and labor relations and a master's degree in management after five years of study and is open to students who meet the requirements of the Johnson Graduate School of Management.

Early planning by each student, preferably in the sophomore year, is desirable to ensure that the expectations of the Johnson Graduate School of Management and ILR curriculum requirements are fulfilled. Students interested in the very limited and selective program of the Johnson Graduate School of Management should contact the Admissions Office, 319 Malott Hall, and a counselor at the Office of Student Services.

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 problems. A number of selected students spend a term of the junior year in Albany, New York City, or Washington, D.C., in close contact with practitioners. Their activities include independent research and seminars on work 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 (for 3 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 agreements with universities in Germany, Israel, England, and the Scandinavian 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


This first semester of a two-semester sequence covers the major changes in the nature of work, the workplace, and the institutions involved in industrial relations in the United States through the end of the nineteenth century.

ILRBC 100 Introduction to U.S. Labor History: Nineteenth Century

Fall. 3 credits. C. Daniel, I. DeVault, N. Salvatore

This second semester of a two-semester sequence covers the major changes in the nature of work, the workplace, and the institutions involved in industrial relations in the United States from the end of the nineteenth century up to the present.

ILRBC 101 Introduction to U.S. Labor History: The Twentieth Century

Spring. 3 credits. Prerequisite: ILRBC 100. C. Daniel, I. DeVault, N. Salvatore

An undergraduate seminar whose topic changes depending on semester and instructor.

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 aspects 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 will involve a study of union constitutions and other primary documents, in addition to secondary readings. Attention will be 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. I. DeVault

This course will explore immigrant workers' experiences in the 19th and 20th centuries from different perspectives. We will 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, we will look at U.S. citizens in their roles as gatekeepers of immigrants, detractors of immigrants, and as models for the aspirations of immigrants. Throughout the course our main examples will come from the industrial and union realms.

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 in part 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 in part on alternative dispute resolution systems in the United States and other countries. Student participation in class discussion is expected and assignments will include an original research paper.

ILRBC 384 Women and Unions (also WOMNS 384)

Fall or spring. 4 credits. I. DeVault

Will explore women's participation in the United States labor movement in the nineteenth and twentieth centuries. Issues covered will include women workers' relations with male-dominated unions, 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 The African-American Workers, 1865-1910: The Rural and Urban Experience
Spring. 3 credits. Prerequisites: junior or senior or permission of instructor. N. Salvatore.
Examines the history of blacks in America from Emancipation through the experience of the first generation after slavery, with a focus on the work experience. Topics will include the restructuring of work during Reconstruction, the relationship between work and black organizational developments, between black and white workers, and the nature of work in the agricultural south and in cities throughout the nation.

ILRCB 386 The African-American Workers, 1910-The Present: Race, Work and the City
Fall. 3 credits. Prerequisites: junior or senior. N. Salvatore.
Examines the history of blacks in America from the start of the Great Migration through the 1970s, with a focus on the work experience. Topics will include the effect of migration and urbanization on black workers, the nature of the relationship between black and white workers as influenced by depression and two world wars; and an examination of the effect of the Civil Rights movement on the economic circumstances of black workers.

ILRCB 401 My Brother's Keeper: Volunteerism 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. Topics include altruism versus self-interest; why individuals volunteer labor and raise and donate money; the structure and practices of charitable organizations; the economic effects of voluntary labor and philanthropic gifts; and the law of raising and distributing money.

ILRCB 407 Contemporary Trade Union Movement
Spring. 3 credits. Prerequisites: Undergraduates, ILRCB 100, 101, graduate students ILRCB 502. R. Seeger, R. Hurd.
An examination of contemporary trade union issues, including union power, political action, collective bargaining, picketing, and organizing efforts. The course will cover structural, functional, and strategic aspects of contemporary unions. Speakers from the union movement will address the class.

ILRCB 482 Ethics at Work
Fall or spring. 3 credits. Prerequisites: junior or senior or permission of instructor. M. Gold.
Major theories of ethics are examined, then applied to issues in the employment relationship such as genetic screening of job applicants, 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 488 Liberty and Justice for All
Fall or spring. 3 credits. Prerequisite: 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). 5 credits each term. Admission 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 planned; (c) a faculty member agrees to act as thesis supervisor; and (d) the candidate, endorsed by the proposed faculty sponsor, is submitted to the Committee on Academic Standards and Scholarship Committee.

ILRCB 497-498 Internship
Fall and spring. 497, 3 credits; 498, 6 credits. Stahl.
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the director of Off-Campus Credit Programs. Upon approval of the internship, the Office of Student Services will register each student for 497, for 3 credits graded A+ to F for individual research, and for 498, for 6 credits graded A+ to F, upon 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 research, conducted under the direction of a member of the faculty, in a special area of labor relations not covered by regular course offerings. Registration is normally limited to seniors who have demonstrated ability to undertake independent work. Eligible students should consult a counselor in the Office of Student Services at the time of course registration to arrange for formal submission of their projects for approval by the Academic Standards and Scholarship Committee.

ILRCB 500 Collective Bargaining
Fall. 3 credits. Open only to graduate students.
A comprehensive introduction to the industrial relations system of the United States. The negotiation, scope, and day-to-day administration of contracts, union and employer bargaining structures; implications of industrial relations issues for U.S. competitiveness and public policy; industrial conflict; U.S. industrial relations in international and comparative perspective.

ILRCB 501 Labor and Employment Law
Fall. 3 credits. Open only to graduate students. M. Gold, R. Lieberwitz, K. Stone.
A survey and analysis of the law governing labor relations and employees rights in the workplace. The first half of the course examines the legal framework within which collective bargaining takes place, including union organizational campaigns, negotiations for and enforcement of collective bargaining agreements, and the use of economic pressure. The second half of the course surveys additional issues of rights in employment, including such topics as employment discrimination, the developing law of "unjust dismissal," and union democracy. Also serves as an introduction to judicial and administrative systems.

ILRCB 502 History of Industrial Relations in the United States since 1865
Spring. 3 credits. Open only to graduate students C. Daniel, L. DeVault, N. Salvatore.
This introductory survey course emphasizes historical developments in the twentieth century. Special studies include labor union struggles over organizational alternatives and such other topics as industrial conflict, the working-class life styles, radicalism, welfare capitalism, union democracy, and the expanding authority of the federal government.

ILRCB 504 Labor Economics
Fall and spring. 4 credits. Limited to 21 students. Prerequisites: undergraduates, ILRCB 200, 201 graduate students ILRCB 500 and 501; permission of instructor. J. Gross, R. Lieberwitz.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of a mock arbitration hearing, and the preparation of arbitration opinions and post-hearing briefs.

ILRCB 506 The Economics of Collective Bargaining in Sports
Fall or spring. 3 credits. L. Kahn.
Surveys economic and industrial issues in the sports industry. Topics include: 1) salary determination, including free agency, salary caps, salary arbitration; 2) competitive balance and financial health of sports leagues; 3) anti-trust issues in sports; 4) labor disputes, union history, and contract administration issues in sports leagues; 5) discrimination in sports; 6) performance incentives.

ILRCB 507 Theories of Equality and Their Application in the Workplace
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 are institutionalized in the workplace. Theories attempting to define "equality" and specific workplace issues are studied, including the means for achieving equality at the workplace. The course entails a high level of student participation in class discussions, and assignments include a research paper.
ILRCB 605  Readings in the History of Industrial Relations in the United States
Fall. 3 credits. Limited to seniors and graduate students. C. Daniel, N. Salvatore.
A seminar covering, intensively, original and secondary sources and scholarly accounts for different periods in American history.

ILRCB 606  Theories of Industrial Relations Systems
Fall or spring. 3 credits. Limited to seniors and graduate students. Prerequisites: ILRCB 100, 101, 200; graduate students, ILRCB 500. H. Katz.
Will trace 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 seniors. ILRCB 200, 201, 500, 501. J. Gross.
An examination of the often hidden values and assumptions that underlie the contemporary U.S. systems of employment law, work and business, and industrial relations. Classroom discussions and student research projects will use novels and short stories (as well as the literature of industrial and labor relations) to focus on issues such as: discrimination; law, economics and the state; work and business; power, conflict and protest; and rights and justice.

ILRCB 608  Special Topics in Collective Bargaining, Labor Law, and Legislation
Fall and spring. 3 credits. Prerequisites: ILRCB 201, 500, 501. M. Gold.
This seminar provides a basis for understanding the political, economic, and legal aspects of collective bargaining and highlights the interaction of these domains as they apply to unions and collective bargaining in the United States. Coverage includes the legal and institutional context in which collective bargaining occurs, the historical evolution of the legal context, and the empirical evidence, both recent and historical. Topics include the impact of case law on collective bargaining, legislative action and the political process, the labor movement, institutional models and ethnic differences, and major issues in current bargaining. The seminar will acquaint students with significant cases and documents related to the study of collective bargaining, and will provide an understanding of the role of academic research in the evolution of collective bargaining law and practice.

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 will look at the theoretical attacks on the New Deal collective bargaining system and at some of the current proposals for its replacement. Some of the topics to be discussed: the theory of regulation embodied in the National Labor Relations Act; classical versus alternative concepts of labor markets and their policy ramifications; the emerging of the global economy and its ramifications for domestic labor regulation. There will also be discussion of alternative systems of labor regulation, such as found in West Germany, Sweden, and Japan.

ILRCB 650  Service Work and Workers in Historical Perspective
Fall or spring. 3 credits. I. DeVault.
This seminar will examine the development of a service economy in the United States. Readings will include general and theoretical works, but the main focus will be recent historical scholarship on specific occupations and situations in the "nonproductive" workforce. Students will 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.
Consider the recent developments such as concession bargaining, worker participation programs, and the growth of nonunion firms in the United States. This course will review recent research and new theories arguing that such a transformation is under way. Course material will focus on industrial relations practice in the private sector in the United States, although some attention will also be given to developments in Europe, the United Kingdom, and Japan.

ILRCB 655  Employment Law
Spring. 3 credits. Prerequisites: ILRCB 201, 500. M. Gold.
This course examines the legal framework within which employers and employees interact. The course will focus on the relationship between the law and the workplace and will examine employment law in the United States. Topics covered will include: the regulation of wages and hours, the regulation of working conditions, the regulation of health and safety, the regulation of equal employment opportunity, the regulation of employee benefits, the regulation of the relationship between the employer and the employee, the regulation of the relationship between the employer and the government, and the regulation of the relationship between the employee and the government. The course will cover the following topics: the regulation of wages and hours, the regulation of working conditions, the regulation of health and safety, the regulation of equal employment opportunity, the regulation of employee benefits, the regulation of the relationship between the employer and the employee, the regulation of the relationship between the employer and the government, and the regulation of the relationship between the employee and the government.

ILRCB 657  Values in Law, Economics, and Industrial Relations
Fall and spring. 3 credits. Limited to 21 seniors. ILRCB 200, 201, 500, 501. J. Gross.
An examination of the often hidden values and assumptions that underlie the contemporary U.S. systems of employment law, work and business, and industrial relations. Classroom discussions and student research projects will use novels and short stories (as well as the literature of industrial and labor relations) to focus on issues such as: discrimination; law, economics and the state; work and business; power, conflict and protest; and rights and justice.

ILRCB 682  Seminar in Labor Relations Law and Legislation
Fall or spring. 3 credits. Limited enrollment. Prerequisite: permission of instructor. R. Lieberwitz.
Legal problems in public employment and other areas of labor relations affecting the public interest.

ILRCB 683  Research Seminar in the History of Industrial Relations
Fall or spring. 3 credits. Prerequisites: ILRCB 100 and 101, graduate students, ILRCB 502. C. Daniel, I. DeVault, N. Salvatore.
The areas of study are determined each semester by the instructor offering the seminar.

ILRCB 684  Employment Discrimination and the Law
Fall. 3 credits. Prerequisite: ILRCB 201/501 or equivalent. M. Gold.
This course provides an overview of employment discrimination law in the United States. The course will cover the following topics: the regulation of wages and hours, the regulation of working conditions, the regulation of health and safety, the regulation of equal employment opportunity, the regulation of employee benefits, the regulation of the relationship between the employer and the employee, the regulation of the relationship between the employer and the government, and the regulation of the relationship between the employee and the government.

ILRCB 685  Research Seminar on Trade Unions
Fall or spring. 3 credits. Prerequisite: ILRCB 200 or 500, permission of instructor. S. Kunvilla.
Designed to provide an analytical survey of recent research on trade unions in the United States. Major topics include changes in trade union activity, the role of trade union growth and decline, economic and non-economic effects of unions, internal union government, and commitment and participation in trade union activity. This is a research-oriented course.

ILRCB 686  Collective Bargaining in the Public Sector
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 200 and 201; graduate students, ILRCB 500 and 501. R. Hobdon.
An examination of the development, practice, and extent of collective bargaining between federal, state, and local governments and their employees. The variety of legislative approaches to such matters as representation rights, unfair practices, scope of bargaining, impasse procedures, and the strike against government are considered along with implications of collective bargaining for public policy and its formulation.

ILRCB 688  Constitutional Aspects of Labor Law
Spring. 3 credits. R. Lieberwitz.
The study of the United States Constitution as it applies in the workplace. This course will focus on the First Amendment, Fifth Amendment, Fourteenth Amendment, and Commerce Clause, with issues including freedom of speech and association, 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 701  Theory and Research in Labor and Employment Relations
Spring. 3 credits. Open to graduate students who have had ILRCB 500 and ILRCB 723 or their equivalents. Recommended: a statistics course beyond the level of ILRST 510. Staff.
This seminar 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 explore 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 702  The Economics of Collective Bargaining
Spring. 3 credits. Prerequisites: ILRCB 500; ILRLE 540 (or their equivalents) and an understanding of multiple regression analysis; or permission of instructor. Staff.
This course focuses on both the empirical and open to 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 (neoclassical, institutionalist) are compared. The statistical techniques and empirical results of research on the union effect on economic outcomes (wages, prices, inflation, 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.

ILRBC 783 Seminar in American Labor History
Spring. 3 credits. Permission of instructor. W. Salvatore.
A reading and research seminar for graduate students that focuses on selected topics in nineteenth- and twentieth-century labor history. The topic changes each semester.

ILRBC 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.

ILRBC 798 Internship
Fall and spring. 1–3 credits. Designed to grant credit for individual research under direction of a faculty member by graduate students who have been selected for an internship. All requests for permission to register for ILRBC 798 must be approved by the faculty member who will supervise the project.

ILRBC 799 Directed Studies
Fall and spring. Credit to be arranged. For individual research conducted under the direction of a member of the faculty.

ILRBC 980 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 will be expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student’s thesis research.

HUMAN RESOURCE STUDIES

ILRHR 260 Human Resource Management
Fall and spring. 3 credits. Open only to ILR students; others by permission of instructor. R. Batt, M. Roehling.
An introductory overview of the management of human resources in organizations. Topics include human resource decisions dealing with staffing, employee development, work-system rewards, and employee relations. Emphasis is on (a) problem-solving and decision-making approaches; (b) operational methods, technologies, and practices; (c) application of relevant behavioral science theory and research; and (d) legislation and other environmental constraints having an important bearing on the effective utilization of human resources by an enterprise.

ILRHR 266 Personal Computer Basics
Fall, spring, and summer. 2 credits. Limited. Staff.
Provides basic skills in the use of IBM personal computers (PCs) using the Windows environment. Course covers basic hardware, terminology, fundamentals of Disk Operating System (DOS), Internet and Lexis Nexis, Windows 95, 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 Policy
A review of labor-market trends, data collection systems, and the consequences of public efforts to ensure that the employment potential of the nation’s human resources and to combat unemployment. The major segments of the nation’s educational training enterprise—public education, higher education, employer-provided training, apprenticeship, and special training programs for the disadvantaged—are examined. Special policy and programmatic issues pertaining to youth, rural workers, welfare reform, direct job creation, worker relocation, economic development, targeted tax credits, industrial policy, and “enterprise zone” proposals are examined. Comparisons are made with other nation’s human resources.

ILRHR 362 Career Development: Theory and Practice
Fall 1997, spring 1998. 2 credits. 7 weeks. Prerequisite: ILRHR 260 or permission of instructor. Limited to 30. S-U only. J. McPherson.
The components of career management: individual factors and organizational realities in the development of careers and organized programs for career management. Two complementary learning tasks required: information-gathering for career decision making based on self-assessment activities, and comprehension of research from economic, psychological, and social factors encountered as careers develop. Grade based on short writing assignments and research paper.

ILRHR 363 Leadership Seminar for Fraternities and Sororities
Spring 1998. 2 credits. S-U only. Permission of instructor. Staff.
Provide students with an opportunity to develop their leadership and management skills. The philosophy of the class is that fraternity and sorority houses are small businesses and the leadership must be able to manage and lead for them to succeed. The learning method will be “hands on” with participants working on weekly assignments that involve their application of lessons learned to their current job duties. Students will participate in class discussions and meetings with guest speakers and debrief sessions where they report the results of their use of the material obtained from class in their current situations.

ILRHR 366 Women at Work
Fall or spring. 3 or 4 credits. Prerequisite: ILRHR 260 or equivalent.
Various aspects of female occupational roles in twentieth-century United States. Social, and legal factors that influence women’s choice of careers, work socialization and training, and subsequent labor-market experiences are studied. Working women’s entry-level jobs, opportunities for advancement, and income are compared to men’s.

ILRHR 460 Human Resource Strategies for Entrepreneurial Firms
Fall or spring. 4 credits. Open to juniors and seniors. ILR 260 or permission of instructor. L. Cyr, T. Welbourne.
This class utilizes a semester-long case study that focuses on human resource issues and strategies for growing, entrepreneurial firms. Students solve weekly dilemmas by integrating their knowledge of the functional areas of human resource management with general management, human resource strategy, entrepreneurship, accounting/finance, marketing, public relations, and small business management. Creative solutions to problems are communicated to the class via role plays, formal presentations, special meetings, and class discussions. In addition to the semester-long case study, students work in teams to develop their own case of an existing company. The emphasis is on integration of concepts, application, and real-life business situations, and acquisition of general management skills and knowledge.

ILRHR 461 The Design of Work Systems: Comparative and Interdisciplinary Perspectives
Fall or spring. 3 credits. Prerequisite: ILR 260 or equivalent and consent of instructor. Limited to juniors and seniors. R. Batt.
Seminar designed to explore the state of knowledge and current research concerning the design and development of alternative work systems. Focus on understanding alternative approaches to work restructuring and their differential effects on firm competitiveness and employee welfare. The first half of the course considers classic texts on mass production, flexible specialization, sociotechnical systems, diversified quality production, and lean production. It compares these workplace models in their original national contexts and in subsequent transplants. Relevant research from economics, engineering, organizational behavior, human resources, and industrial relations is examined. The second half of the course considers these alternative approaches to restructuring in the context of specific manufacturing and service industries and occupational groups. Students are required to hand in weekly memos covering the readings, actively participate in seminar discussions, and write two research papers on topics relevant to the course.

ILRHR 466 Comparative Human Resource Management
Fall. 3 credits. L. Cyr, T. Welbourne.
Surveys human resource management practices in two key regions of the world: Western Europe and the Pacific Rim. The focus is on HR issues related to management of professional and managerial work forces such as selection and staffing, development, and appraisal and reward systems. Special attention is given to current changes and trends in the HRM area (e.g., unification of Europe, reform of Japanese firms). Implications for multinational operating in these countries will be discussed.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Fall 1997</th>
<th>Spring 1998</th>
<th>Prerequisite(s)</th>
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<tbody>
<tr>
<td>ILRHR 468</td>
<td>Human Resources Management Simulation</td>
<td>3 credits. Limited to juniors and seniors.</td>
<td>3 weeks. W. Wasmuth.</td>
<td>ILRHR 260 or equivalent.</td>
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<tr>
<td>ILRHR 495</td>
<td>Honors Program</td>
<td>Fall and spring. 3 credits.</td>
<td>V. Briggs.</td>
<td>For description, see the section on Collective Bargaining, Labor Law, and Labor History.</td>
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<tr>
<td>ILRHR 497–498</td>
<td>Internship</td>
<td>Fall and spring. 3 and 6 credits.</td>
<td>For description, see the section on Collective Bargaining, Labor Law, and Labor History.</td>
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<tr>
<td>ILRHR 499</td>
<td>Directed Studies</td>
<td>For description, see the section on Collective Bargaining, Labor Law, and Labor History.</td>
<td>3 credits.</td>
<td>G. Thomas.</td>
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<tr>
<td>ILRHR 560</td>
<td>Human Resource Management</td>
<td>Fall 1997 and spring 1998. 3 credits.</td>
<td>Open only to graduate students. Staff.</td>
<td>A survey course covering the major areas of the management of human behavior in work organizations. Consideration is given to such aspects of strategic and human resource planning, design and management of workteams, staffing, training and management development, organization development, compensation, and employee and labor relations. Emphasis is on the application of theory and research to the solution of personnel problems.</td>
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<tr>
<td>ILRHR 565</td>
<td>International Human Resource Management (also NBA 568)</td>
<td>Fall 1997. 3 credits.</td>
<td>H. DeCieri.</td>
<td>Prerequisite: ILRHR 260/560 or equivalent.</td>
</tr>
<tr>
<td>ILRHR 566</td>
<td>Human Resource Metrics</td>
<td>Fall 1997. 4 credits.</td>
<td>J. Boudreau.</td>
<td>Prerequisites: ILRHR 260/560 or equivalent, one course in statistics, one course in human resource studies.</td>
</tr>
<tr>
<td>ILRHR 567</td>
<td>Employer Training: Economic and International Perspectives</td>
<td>3 credits.</td>
<td>Y. Boudreau.</td>
<td>Examine the training and learning that occurs on jobs from both an economic and comparative international perspective. Will investigate the scale of the training enterprise, how it is accomplished, why some companies and nations train more than others and what impact training has on organizational performance and national competitiveness. Training will also be examined from the worker's perspective. The distinction between training and learning, how individuals influence the amount of training they receive and what determines the amount and kind of training they desire. The training institutions and customs of countries like Japan, Sweden, Germany, France, and the United Kingdom will be compared to their American counterparts and an effort will be made to understand why investments in employer training are so much more substantial in Japan and Germany than in the United States and whether there is any role for public policy in the stimulation or improvement of employer training.</td>
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<tr>
<td>ILRHR 568</td>
<td>Staffing: Employee Selection and Utilization</td>
<td>Fall 1997 and spring 1998. 4 credits.</td>
<td>J. Boudreau.</td>
<td>Limited to other courses in human resource management. Topics include recruitment, selection processes and techniques, legal issues in selection, international issues, and evaluating the effectiveness of staffing decisions.</td>
</tr>
<tr>
<td>ILRHR 590</td>
<td>Comparative Human Resource Management</td>
<td>Fall 1997. 4 credits.</td>
<td>H. DeCieri.</td>
<td>Prerequisite: ILRHR 260/560 or equivalent.</td>
</tr>
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</table>

The course surveys human resource practices in key countries and regions of the world: Germany, U.K., France, Eastern Europe, Japan, and Asia. The focus includes issues related to management of professional and managerial work force, 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., Europe 92, transformation in Eastern Europe, globalization of Japanese firms). Implications for multinational operations in these countries will also be discussed.

ILRHR 691 Human Resource Planning and Strategy
Fall 1997 and spring 1998. 4 credits. Limited. Prerequisites: ILRHR 560 or equivalent, one course in statistics, and permission of instructor. L. Dyer, P. Wright.
Covers the content of human resource strategies and the process of human resource planning. The emphasis is on developing human resource strategies that are integrated with firm business strategies. Covered are methods and techniques used to forecast and plan for organization structures and processes, work force planning, and employment forecast, and employee contribution, and employee morale. Much of the course is organized around cases and simulations in which students make policy and program decisions for fictional organizations. Decisions are based on the basis of their contributions to the organizations’ human resource and business objectives

ILRHR 692 Training the Displaced and Disadvantaged
Fall or 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 problems, its causes, and why specific programs have worked and others have not. Topics covered will 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 business, and valuation of displaced workers. 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.

ILRHR 693 Design and Administration of Training Programs
Fall 1997 and spring 1998. 3 credits. Prerequisites: ILRHR 260/560 or equivalent, also ILRST 210, 211 or 510, 511) or equivalent and permission of instructor. M. Cavanaugh.
Purpose of this course is to acquaint students with various aspects of the training and development function in organizations. Systems and training cycle approaches are used. Topics include how to determine that a training problem exists, how to conduct a training needs assessment, issues regarding the design of training programs, a review of current training techniques and management development strategies, financial and evaluation strategies, and the role that training plays for U.S. firms in trying to become more competitive in the world economy. After completion of this class, students should be familiar with current views of the Human Resource Development function and profession, contemporary conceptual models of HRD and adult learning, and the management of an effective HRD function within the current business environment.

ILRHR 694 Human Resource Information System Applications
Spring 1998. 4 credits. Limited to 22 students. Prerequisites: ILRHR 260/560 or equivalent, ILRHR 290; at least one upper-level HRS elective; basic statistics; and permission of instructor. J. Boudreau.
Explores the development, implementation and management of computerized personnel information systems and their use in human resource management. Theories and concepts relevant to the design and implementation of such systems are presented and used as the framework for hands-on experience with personal and mainframe computer systems. Students create and use applications of current popular human resource software to design their own applications and present them to the class. Where possible, student applications are based on field work in actual organizations.

ILRHR 695 Education, Technology, and Productivity
Spring 1998. 3 credits. J. Bishop.
The seminar investigates the nexus between the education and training occurring in schools and at the workplace and the technological aggressiveness, productivity and competitiveness of firms, individuals, and nations. We will investigate (1) how technological progress is changing the nature of work and what this implies for reform of education and training, (2) why United States productivity has increased so little in the past two decades, (3) how education and training contribute to the growth and competitiveness, (4) why educational achievement has declined, and (5) how the responsibility for education and training should be apportioned among individuals, firms, private nonprofit organizations, and government.

ILRHR 697 Special Topics in Resource Studies
Fall or spring. 3 credits. Staff.
The areas of study are determined each semester by the instructor offering the seminar.

ILRHR 698 International Human Resource Policies and Institutions
Fall 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, apprenticeships, employer training, and higher education. Data on the consequences of policies is 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, Japan, and the Pacific Rim nations. Another 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 760 Seminar in Human Resource Studies
Fall or spring. 3 credits. Prerequisites: ILRHR 560, ILRST 510/511, and ILRHR 669 and permission of instructor. P. Wright.
A "floating" seminar designed to give faculty and students opportunities 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 761 Research Seminar on Comparative Systems and Industrial Performance
Fall 1997. 3 credits. Prerequisite: ILR 560 or equivalent and consent of instructor. R. Bapt.
Research seminar is designed for graduate students currently developing research proposals or conducting research on innovative approaches to work organizations and human resource strategies. Course covers current theory and empirical research on the determinants of industrial performance and competitiveness at the firm and establishment levels, considering the relative importance of new technology, human resource and industrial relations strategies, and institutional constraints. It focuses heavily on formulating interesting theoretically driven research questions and utilizing appropriate qualitative research methodologies. Students attend seminars to discuss student research projects in the context of relevant theoretical and empirical literatures.

ILRHR 762 Research Methods in Human Resource Studies
Spring 1998. 3 credits. P. Wright.
Designed to build social science research skills, particularly in the area of human resource studies (HRS). Topics include measurement reliability, construct validity, design of studies, external validity, meta-analysis, critiquing/reviewing HRS research, publishing HRS research, and applications of statistical models of HRS issues.

ILRHR 763 Human Resource Strategies for Competitiveness
Review of empirical and conceptual work in the field of human resource management strategy, which proposes that HRM decisions should be directly linked with business strategy. Will consider HRM as an organizational system and how it can support a variety of business strategies. In addition to reviewing the literature on this topic, time will be devoted to applying what is learned about the field to a variety of developing issues facing businesses today. Human resource strategies to support total quality management, high technology organizations, mergers and acquisitions, downsizing, and small businesses will be studied.

ILRHR 767 Human Resource Strategies for Entrepreneurial Firms
Spring 1998. 4 credits. Open to graduate students only. ILRHR 560, equivalent, or permission of instructor. T. Welbourne.
For course description, see ILRHR 660.

ILRHR 769 Topics in Compensation Theory and Research
Fall 1998. 4 credits. Prerequisite: ILRHR 669. G. Milkovich, B. Gerhart.
Examines recent developments in theory, research, and practice related to compensation. Discussion emphasizes development 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 Department of Human Resource Studies are urged to enroll; candidates in other departments are cordially invited. Each participant will have 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.

INTERNATIONAL AND COMPARATIVE LABOR


ILRIC 332 Labor in Developing Economies (also Econ 462)
Spring. 3 credits. Prerequisite: ILRLE 240, Economics 311, or permission of instructor. G. Fields. The economic problems of labor in less-developed nations. Among the subjects included are determinants of income and wage structures in less-developed countries; labor demand and unemployment; labor supply and migration; human resource policy; and development strategy and employment growth.

ILRIC 333 Western Europe, the United States, and Japan in a Changing World Economy
Fall. 3 credits (1 additional credit may be arranged). Open to juniors and seniors. L. Turner. Offers an introduction to the contrasting national trajectories and current political economies of Germany, Britain, France, Japan, and the U.S. Emphasis will be on (a) cross-national differences and comparisons; and (b) the different capacities that contrasting institutions offer each society as it grapples with intensifying trade competition, domestic political conflict, and the need for production reorganization and “new industrial relations.”

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
Fall. 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 532 Labor in Developing Economies
Spring. 3 credits. For graduate students. G. Fields. Students in this course attend the lectures in ILRIC 332 (see description for ILRIC 332). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILRIC 332 and additional topics.

ILRIC 533 Western Europe, the United States, and Japan in a Changing World Economy
Fall. 4 credits. Graduate students. L. Turner. See description for ILRIC 333. Graduate students attend class, take the midterm and submit an analytical research paper at the end of the semester.

ILRIC 537 Special Topics:
Fall or spring. 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 631 Comparative Labor Movements in Latin America (also Government 631)
Spring. 3 credits. M. Cook. Examines the historical development of labor movements in Latin America, their role in national political and economic development, and the impact of economic liberalization, authoritarianism, and redemocratization on contemporary labor organizations in the region. Countries examined will include but are not limited to Mexico, Brazil, Argentina, Chile, Peru, and Venezuela.

ILRIC 632 Reforming Industrial Relations: A Comparative Perspective
Fall. 4 credits. Graduate seminar open to seniors with permission of instructor only. L. Turner. Examines contemporary efforts in advanced industrial democracies to reform industrial relations. The first half of the course will examine contemporary industrial relations reform efforts in the U.S., including innovative organizing strategies, new calls for union militancy, business strategies for a “union-free” environment; efforts at labor-management cooperation; and the report of the Dunlop Commission. The second half will cover Britain—the Thatcher reforms of the 1980s and the current labor-backed works council movement; France—the Auroux Laws of the 1980s and their effects; and Germany—the transformation of industrial relations in eastern Germany since 1989.

ILRIC 633 Labor, Industry, and Politics in Germany
Fall. 4 credits. Open to seniors with permission of instructor only. Not offered 1997–98. L. Turner. Is the successful postwar “social partnership” model of organized capitalism in the Federal Republic of Germany viable in the 1990s? To answer this question, you will study the works councils and codetermination, the rise of a strong postwar labor movement, the contemporary German version of social partnership, with an emphasis on current events and the new challenges for German industry and labor posed by German unification and the single European market.

ILRIC 635 Labor Markets and Income Distribution in Developing Countries
Spring. 4 credits. Prerequisite: ILRLE 240 or Economics 313 or permission of instructor. Not offered 1997–98. G. Fields. A course analyzing who benefits 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, social welfare, and economic growth-theory and evidence; poverty profiles, earnings functions, and decompositions; employment, unemployment, wages, and labor markets; and an introduction to benefit-cost analysis, with application to the economics of education.

ILRIC 636 Comparative History of Women and Work (also Womens Studies 636)
Fall. 4 credits. Permission of instructor. Not offered 1997–98. I. DeVault. Will explore 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 and factual pieces and overviews of the history of women and work, most of the course will consist of in-depth examinations of specific work situations or occupations across time and geography. Comparative examples will be taken from the United States, Europe, and the Third World.

ILRIC 637 Labor Relations in Asia
Spring. 3 credits. Permission of instructor required. S. Kuruvilla. A comparative survey of the industrial relations systems of selected Asian nations such as Japan, S. 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 will be 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 (also Government 630)
Spring. 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 in this process. Examines the origins and implica-
tions 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.

**ILRRC 730 Research Seminar on Labor Markets and Economic Development**

Fall or 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. Will address 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. Numerous presentations and written papers will be required.

**ILRRC 739 The Political Economy of Mexico**

Spring. 3 credits. M. Cook.

For course description, see ILRRC 339.

**ILRRC 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.

**ILRRC 799 Directed Studies**

For description, see the section, Collective Bargaining, Labor Law, and Labor History.

**ILRH 461 The Design of Work Systems: Comparative and Interdisciplinary Perspectives**

Fall. R. Batt.

For description, see the section, Human Resource Studies.

**ILRH 469 Immigration and the American Labor Force**

Fall. V. Briggs.

For description, see the section, Human Resource Studies.

**ILRH 656 International Human Resource Management**

Spring. V. Pucik.

For description, see the section, Human Resource Studies.

**ILRH 690 Comparative Human Resource Management**

Fall or spring. V. Pucik.

For description, see the section, Human Resource Studies.

**ILRH 698 International Human Resource Policies and Institutions**

Fall. J. Bishop.

For description, see the section, Human Resource Studies.

**ILRH 699 Contemporary European Labor Markets**

Spring. J. Bishop.

For description, see the section, Human Resource Studies.

**ILRH 761 Research Seminar on Comparative Systems and Industrial Performance**

Fall. R. Batt.

For description, see the section, Human Resource Studies.

**ILRH 769 Topics in Compensation Theory and Research**

Fall. G. Milkovich.

For description, see the section, Human Resource Studies.

**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 640 Economic History of British Labor 1750-1960**

Fall or spring. G. Boyer.

For description, see the section, Labor Economics.

**ILRLE 628 Cross-Cultural Studies in Organizational Behavior**

Spring. J. Gruenfeld.

For description, see the section, Organizational Behavior.

**INTERDEPARTMENTAL COURSES**

**ILRIR 150 Freshman Colloquium**

Fall. 1 credit. Open only to ILR freshman. S-U only. Staff.

This course is offered: a) to acquaint new freshman students with some of the issues and disciplines in the field of industrial and labor relations; b) to establish acquaintance 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.

**ILRLE 451 Science, Technology, and the American Economy**

Spring. 4 credits. Not offered spring 1998 V. Briggs.

The industrial revolution did not begin in the United States, but the nation became the world's first technological society. Attention will be given to the evolutionary confluence of science, technology, mathematics, religion, and capitalism in the formation of the U.S. economy, its institutions, and its labor force. Primary attention will be given to the post-World War II economic developments. The vantage point will be the linkage with employment, unemployment, income, and productivity in nations. Public policy issues (such as research and development policy, national defense influences, the "agricultural revolution," savings and investment rates, labor force preparedness) will be explored. Critical concerns pertaining to environmental impacts, income polarization, and consumerism will also be examined. The industrial and human resource policies of other nations as well as the implications of the globalization of technology in the future will also be discussed.

**ILRIR 452 Writing in Industrial and Labor Relations**

Fall or spring. 3 credits. J. Farley.

Will require close reading of four or five books related to the term's theme in the field of industrial and labor relations and careful writing about them. Students will also have an opportunity to practice writing about the world of work for different audiences.

**ILRIR 790 ILR M.P.S. Program**

Fall and spring. 1-9 credits.

Supervised research only for those enrolled in the ILR M.P.S. program.

**LABOR ECONOMICS**

**J. Abowd, chair; F. Blau, G. Boyer, R. Ehrenberg, G. Fields, R. Hutchens, G. Jakubson, L. Kahn, R. Smith**

**ILRLE 140 Development of Economic Institutions**

Fall. 3 credits. Prerequisite for non-ILR students: permission of instructor.

Provides students with an understanding of the historical roots of the economic system currently dominant in Western Europe and the United States. The course will focus on (a) the process of European economic growth prior to 1914, (b) the effect of industrialization on labor in Great Britain, and (c) the historical evolution of economic thought from Adam Smith to J. M. Keynes.

**ILRLE 240 Economics of Wages and Employment (also Economics 341)**

Fall and spring. 3 credits. Prerequisites: Economics 101-102 or Economics 103, Economics 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 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 481)**

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 accidents, temporary or 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 348 The Economics of Unemployment (also Econ 453)**

Fall. 4 credits. Prerequisite: ILRLE 240 or Econ 453.

This course introduces students to several issues fundamental to an understanding of unemployment: the social costs; definitional questions and measurement problems; the patterns of unemployment; and the various types of unemployment, their causes, and the policies that can or have been pursued to alleviate unemployment. The course is designed for undergraduate and graduate students who have taken a survey course in labor economics or its equivalent.

**ILRLE 441 Income Distribution (also Econ 455)**

Fall. 4 credits. Prerequisite: ILRLE 240 or Economics 341.

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 distribu-
tion, and changing income distribution and growth. Students who have taken CEH 355 may not receive credit for 441.

ILRLE 442 The Economics of Employee Benefits (also Econ 458)
Fall. 4 credits. Prerequisites: ILRLE 240 or equivalent.
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 444 Modern European Economic History
Spring. 4 credits. Prerequisite: ILRLE 240 or equivalent.
An introduction to the economic development of Europe from 1500 to 1939. Topics covered include: the establishment of an institutional framework supporting economic growth in early modern Europe; the causes of the first industrial revolution in Great Britain; the effects of industrialization on workers' living standards; the spread of industrialization to the major continental powers—France, Germany, Austria-Hungary, and Russia; and the economic causes and effects of the First World War.

ILRLE 445 Women in the Economy (also Econ 457)
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 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 Economics 314.
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; and the development of demand management policies in Great Britain and the United States after 1945.

ILRLE 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.

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: Economics 101-102 or Economics 103 or equivalent. Required of graduate students majoring or minoring in labor economics and M.I.L.R. candidates.
Applies the theoretical and elementary tools of economics to the characteristics and problems of the labor market. The course considers both the demand (employer) and supply (employee) sides of the market to gain a deeper understanding of the effects of various government programs and private decisions targeted at the labor market. Topics 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 541 Social Security and Protective Labor Legislation
Spring. 3 credits. Prerequisite: ILRLE 540 or equivalent. Required of graduate students majoring in labor economics and M.I.L.R. candidates.
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 540 Economic History of British Labor 1750-1940 (also Econ 459)
Fall or spring. 4 credits.
Will examine various aspects of British labor history from the beginning of the Industrial Revolution until World War II. Specific topics will include: (1) monetary and non-monetary changes in workers' living standards; (2) internal migration and emigration; (3) the London labor market; (4) the extent of poverty and its consequences; (5) unionism and the welfare state; and (6) the development of trade unions.

ILRLE 542 Economic Analysis of the Welfare State (also Econ 460)
Spring. 4 credits.
Includes economic rationales for government intervention and analysis of the effects of programs on economic welfare. Discusses taxes, in-kind, and cash programs. Includes some discussion of welfare states in other countries.

ILRLE 544 The Economics of Occupational Safety and Health (also Econ 461)
Spring. 3 credits.
Analyzes the problem of occupational injuries and illnesses in the United States. The first section concentrates on legal requirements, judicial interpretations, and legal implications of the Occupational Safety and Health Act; then shifts to such questions as the need for, and appropriate goals of, the act, the stringency of safety standards considered in a benefit-cost framework; the difficulties in enforcing the act; and estimates of the impact of the act.

ILRLE 647 Evaluation of Social Programs
Fall. 4 credits.
An introduction to the methodologies used by economists to evaluate the impacts of social-action programs and legislation. General evaluation methodology, cost-benefit analysis, and econometrics are discussed. Case studies are considered to illustrate the uses of these techniques, to acquaint the student with major current government programs and legislation, and to estimate these programs' economic impacts. Throughout, the primary analytic framework used by the instructor is microeconomics.

ILRLE 648 Economic Analysis of the University
Spring. 4 credits.
Seeks to illustrate the complexity of decision making in a nonprofit organization and to show how microeconomic analysis is used 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 the extensive readings will be 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 I
Fall. 4 credits.
Considers methods for the analysis of longitudinal data, that is, data in which a set of individual units are followed over time. The focus will be on both estimation and specification testing of these models. Will consider how these statistical models are linked to underlying theories in the social sciences. Course coverage will include panel data methods (including fixed effects models for both linear and non-linear systems) and, if time permits, duration analysis.

ILRLE 742 Applied Econometrics II
Spring. 4 credits.
Covers statistical methods for models in which the dependent variable is not continuous. It covers models for dichotomous response (including probit and logit) and 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), as well as sample selection issues, etc. Will also include 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 744 Seminar in Labor Economics I (also Econ 662)
Spring. 3 credits.
ILRLE 744, 745 and 746 constitute the Ph.D.-level sequence in labor economics. Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.
This introductory (survey) course considers the basic individual and group processes in labor economics. Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.

**ILRLE 746 Seminar in Labor Economics II (also Econ 643)**
Spring. 4 credits. ILRLE 744, 745, and 746 constitute the Ph.D.-level sequence in labor economics. Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.

**ILRLE 748 Economics of Employee Benefits**
Fall. 4 credits. 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 to be arranged for discussion of topics in 442 and additional topics.

**ILRLE 749 Economics of Development (also Economics 672)**
Fall. 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.

**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. Reports of the formulation, design, and execution of economic dissertations.

**ORGANIZATIONAL BEHAVIOR**


**ILRROB 171 (120) 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, we will study personality, motivation, perception, attitude formation, and decision making. On the group level, we will emphasize group dynamics, leadership, power and influence, and culture.

**ILRROB 171 (120) 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.

**ILRROB 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.

**ILRROB 325 Organizations and Social Inequality**
Spring. 3 credits. Limited. P. Tolbert. Examines the central role that organizations in industrial societies play in allocating income, status, and other resources to individuals. A variety of theoretical explanations of social inequality will be examined, and the social policy implications of each will be considered. Class assignments are designed to develop students' general writing skills, as well as substantive understanding of different theories and approaches to the problem of inequality.

**ILRROB 328 Cooperation, Competition, and Conflict Resolution**
Spring. 4 credits. Prerequisite: one course in social psychology or equivalent. Staff. An examination of theory and empirical evidence relating to the resolution of interpersonal, intergroup, and international conflict. Specific attention is devoted to studying factors that contribute to the development of cooperative or competitive bonds between parties to a conflict. The following topics are studied: the availability and use of threats, intensity, and costs of threat; fractioning and escalating conflict. Personality and situational factors that regulate conflict intensification are stressed.

**ILRROB 329 Organizational Cultures**
Fall or spring. 3 credits. Prerequisite: one or more courses in sociology. Staff. Reviews the concept of culture as it has evolved in sociology and anthropology, applying it to formal organizations in workplaces such as corporations and unions. The course first examines the nature of ideologies as sense-making definitions of behavior, concentrating on the cultural forms that carry these cultural messages, rituals, symbols, myths, sagas, legends, and organizational stories. Considerable attention will be given to rites and ceremonies as a cultural form in organizational life that consolidates many of these expressive forms into one. The course will examine 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.

**ILRROB 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 these 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 will design, execute, and analyze a research study of his or her own.

**ILRROB 371 Individual Differences and Organizational Behavior**
Fall or summer. 3 credits. Recommended: some acquaintance with the substance and methods of behavioral or social science. L. Gruenfeld. Examines personality from a comparative psychodynamic point of view. Social behavior, authority relationships, and work motivation are used to illustrate how various theories could be applied to understand behavior and experience in organizations.

**ILRROB 373 Organizational Behavior Simulations**
Fall. 3 credits. Prerequisites: ILRROB 170 and 171 or equivalent. Limited enrollment. R. Stern. Basic principles of organizational behavior as studied through readings and participation in simulation games. Simulations model traditional organizations and cooperatives. Games model executive decision making, running a company, assembly work, and cooperative decision making. Organizational design, decision making, conflict, cooperation, and power are the central topics of discussion. The contrasting bases of power in the organizations permits the study of the assimptions underlying organization structure and process.

**ILRROB 420 Contemporary Organizational Behavior Applications**
Fall or spring. 3 credits. Prerequisites: ILRROB 170 and 171 (120 and 121). Introduces students to contemporary applications of organizational behavior theory in work organizations. Will explore the frameworks of common and current organizational and managerial change interventions, review contemporary literature about them, and try to discover existing links between these processes and the theoretical OB literature. Specific topics will vary from year to year. For this year, applications include TQM, re-engineering, team development, learning organizations; world-class manufac-
uring, competing values frameworks, assessment instruments, and multiculturalism and diversity issues in the workplace.

ILROB 421 Regulating the Corporation
Fall. 4 credits. R. Stem.
Will examine public and private power from an organizational perspective. The resource-dependence approach, resource dependence theories, provides a framework for interpreting government attempts at the regulation of corporate behavior. Topics cover the structure and functioning of government regulatory agencies and corporate responses to regulation, including corporate strategy, change, and political influence. Business ethics and corporate social responsibility are considered along with the role of interest groups such as consumer or citizen organizations. Research and case materials focus on the implementation of environmental protection, occupational health and safety, equal opportunity, antitrust, securities, and consumer regulations.

ILROB 422 Organizations and Deviance
Fall. 3 credits. Enrollment limited to 60. W. Sonnensuhl.
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 within 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 will examine such contemporary cases as Exxon’s Valdez oil spill, Enron-Contragate, drug testing, and the federal savings and loan scandal. These events raise troubling questions about what it means to live and work within an organizational society, and they cannot be dismissed as instances of a few individuals gone bad.

ILROB 425 Sociology of Industrial Conflict
Spring. 4 credits. R. Stem.
The focus is on the social, economic, and political causes of industrial conflict. These causes include socialization, class relations, work-non-work effects, as well as the nature of work and employment relations. Social movement, collective organization, and individual actions are examined including such manifestations of conflict, as strikes, labor turnover, absenteeism, and sabotage, and the influence of the environments in which they occur.

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 will be 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 428 Organizational Change and Intervention
Fall. 3 credits. Limited to 25. Juniors and seniors with permission of instructor. L. Williams.
Seminar will focus on planned and unplanned change in organizations. Topics will include mergers and acquisitions, team building, self management and the role of change agents. Participants will be required to develop and present topics in addition to keeping a weekly journal and participating in exercises.

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.
Will examine 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, the management of emotion, the emergence and change of microcultures, and the role of groups in networks and organizations.

ILROB 472 Applied Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 170 and 171. S. Bacharach.
Introduces students to intermediate theory of organizational behavior. It will specifically concentrate 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 479 Technical Workers and the Social Organization of Research and Development
Spring. 3 credits. Prerequisite: ILROB 170, 171 or equivalent in sociology or anthropology. Staff.
Examines how industrial R&D is organized and seeks to impart an appreciation for the practical problems that arise when firms employ a significant number of scientists, engineers, and other technical workers. It is designed for students who have an interest in high-technology firms or who anticipate working for firms in which R&D plays an important role. The course brings relevant theoretical perspectives to bear on pragmatic issues surrounding technical innovation and the employment of scientists and engineers. Representative topics include: the organization of scientific and technical communities, the innovation process of research, the nature of scientific and technical work, strategies for fostering innovation, the careers of scientists and engineers, and the managerial problems characteristic of high-technology firms. Requirements include a take-home midterm and a final paper.

ILROB 493 Honors Program
Fall and spring (cohort long 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
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILROB 520 Micro Organizational Behavior and Analysis
Fall or spring. 3 credits. Staff.
Survey of concepts, paradigms, 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 521 Macro Organizational Behavior and Analysis
Spring. 3 credits. Staff.
Survey on concepts, paradigms, and research from sociological and organizational theory. Topics include formal structure, organizational design, organizational decision-making, demography, cross-cultural differences, power and authority. Intended to be preliminary to more intensive work in organizational behavior.

ILROB 620 Theories of Organizational Change, Innovation, and Evaluation
Spring. 4 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology. W. Sonnenstuhl.
Examines the dynamics of individual, structural, and environmental factors operating in organizational change in general, and in the implementation and use of innovations within formal organizations in particular. The role of evaluative research in assessing the effectiveness of the implementation of innovations and in determining organizational effectiveness are analyzed. Several case studies of organizational change in government, unions, and private industry are examined. The emphasis is on conceptual frameworks for analyzing organizational change and mounting evaluative research on innovations. Readings are interdisciplinary and include sociology, psychology, and political science.

ILROB 621 Organizational Diagnosis Intervention and Development
Spring. 4 credits. Prerequisites: undergraduates, ILROB 170 and 171; Graduate students, ILROB 520 and 521 or equivalent; and permission of instructor. L. Gruenfeld.
This applied course considers theories and techniques for the identification and improvement of organizational problems at the behavioral (micro) level. Methods for the implementing of change are evaluated in the light of several normative and descriptive theories of individual and group development and effectiveness. The course emphasizes
both quantitative and qualitative data processing procedures.

ILROB 623 Micropolitics in Organizations
Spring. 3 credits. Prerequisites: ILROB 170 and 171. Limited, permission of instructor. S. Buchachar.
Examines micro-political processes in organizations. Neorealism, Machiavellian, Marxian, and Weberian approaches to organizational politics will be specifically analyzed. An attempt will be made to understand how the micro-political rules of organizational games are institutionalized in change. Among the ideas to be discussed are the institutionalization of ideology and specification of the relationships among power, tactics, and strategy. Interest groups and coalition politics will be examined in terms of conflict and bargaining. Other issues to be discussed include corruption, dealmaking, and competition. Examples will be drawn from both the private and public sectors. Seminar requirements will include an in-class presentation and a major paper and/or take-home final exam.

ILROB 624 Groups in Work Organizations
Fall. 4 credits. Enrollment limited. Permission of instructor required. L. Gruenfeld.
This is an experiential learning course designed primarily for students who have a comprehensive background in the theory and methods of the behavioral sciences. Work group members study their roles and relationships to each other, the task, other work groups, and especially authorities. Students write a number of self-reflective papers in which they conceptualize their experiences and relate them to theory and method in organizational behavior and experience.

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 and power processes affect the tactics people adopt 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 overview of several theoretical approaches to conflict and bargaining (e.g., rational choice, cognitive, social exchange) and places the power perspective in this context.

ILROB 627 Leadership in Organizations
Spring. 3 credits. Prerequisites: two organizational behavior courses at the 300 level or advanced courses in sociology or psychology. L. Gruenfeld.
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, intergroup processes, interpersonal perception as well as motivation to lead and to follow will be discussed. The implications for leadership training, organization development, and action research are explored.

ILROB 628 Cross-Cultural Studies in Organizational Behavior
Spring. 3 credits. Limited. Permission of instructor before registering in course. L. Gruenfeld.
Designed for students interested in social psychological theory and research in international culture comparisons of behavior and experience in organizations. Variables such as power distance, individualism-collectivism, universalism-particularism and attitudes toward authority as well as work motivation will be examined. Upon completion of the readings and discussion of conceptual materials and consideration of several major international comparison studies, each student will prepare and present a paper on a topic of his/her own choice usually related to his/her country of origin (China, Japan, German, USA, etc.).

ILROB 629 Personality in Organization
Fall: 4 credits. Open to undergraduates with permission of instructor. L. Gruenfeld.
This advanced course considers psychodynamic theories of organizational diagnosis at the individual and group levels. Topics include leadership, authority, work motivation, intervention, and change. The topics are discussed and applied in small study groups. The professor's role is as a consultant and resource person. Class members study and research their own behavior and present their qualitative and quantitative findings to the class. Students are expected to have background and interest in both research methods and theory.

ILROB 670 Semester in Manufacturing
Spring. 15 credits. Open to master's and Ph.D. students in Industrial and Labor Relations with permission of instructor. Intended for students who want to work as professionals or who have a strong interest in the manufacturing industries. It is taught by an interdisciplinary faculty team from the College of Engineering, the Johnson School of Management, and the School of Industrial and Labor Relations. Course material will be based on plant visits and project work with local industry. Student participation will be in interdisciplinary teams with members representing the three colleges. Course content will concentrate on four major issues thought to make a competitive difference in today's economic environment: (1) the changing environment for product design, (2) rapid-response production systems; (3) organization, management, and compensation of the manufacturing team; and (4) performance measurement.

ILROB 675 Cooperative Strategies for Improving Organizational Performance
Spring. 4 credits. Will concentrate on presentation and analysis of a series of case studies involving projects using cooperative strategies to improve organizational performance. Emphasis will be given to the application in which union and management have been working together to enhance productivity and the quality of working life. Cases will be examined against a background of the research literature on improving organizational performance. Students will be responsible for a term paper.

ILROB 676 Systems of Labor Participation in Management
Fall. 4 credits. Prerequisites: senior standing and permission of instructor. Considers qualitative and psychometrically precise and systematic research methods for the study of behavior in groups and organizations. Includes a workshop that is designed to improve teamwork with the use of on-line data generated by group members. Personality, leadership culture, and group dynamics are the major focus. Students will observe, record, and videotape group and individual behavior, which will be analyzed with the help of microcomputing programs, especially SYMLOG (a system for the multiple-level observation of groups) developed by Bales (1970, 1979). In addition to lectures and discussion of research papers this course will also include a research project designed and executed by the students.
ILROB 720 Issues of Measurement in Research on Organizations (Instrumentation)  
Fall. 4 credits.  
Concerns the study of tests and measures used to assess central variables in organizational behavior and related fields. Students will learn where to find measures suitable for their research purposes and will examine the theories that define the constructs being measured; the empirical information available about different measures—construction, reliability, and validity; and the ways in which the instruments have been used in research and practice.

ILROB 721 Advanced Micro Organizational Behavior  
Spring. 3 credits. Prerequisites: ILROB 520 and 521.  
Examines the historical development of psychological theories of organizational behavior and contemporary issues in micro organizational research. The course will emphasize reading and analysis of primary source material.

ILROB 722 Advanced Macro Organizational Behavior  
Fall. 3 credits. Prerequisites: ILROB 520 and 521.  
Examines the historical development of sociological theories of organizations and contemporary issues in macro organizational research. The course will emphasize 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.  
Materials studied in ILROB 723 and 724 include (1) theoretical, conceptual, and ethical questions; (2) survey research and attitude-scaling procedures; (3) laboratory research methods; (4) participant observation and interview methods; (5) use of documents and qualitative data analysis. Provides students with an empirical background for doing research and exposes them to a well-balanced, interdisciplinary set of quantitative and qualitative research tools.

ILROB 724 Behavioral Research Theory, Strategy, and Methods II  
Spring. 3 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll.  
Course will cover (a) analysis and interpretation of quantitative data, (b) traditional problems encountered in the assessment of human and organizational characteristics, (c) the use of different methods of data analysis, and (d) an examination of the limitations imposed on data analysis and interpretation by traditional measures. Examples of topics covered in the course: the use of Chi-square, t-tests, ANOVA, simple and multiple correlation and regression, reliability and validity analyses, causal models, factor analysis, scale construction.

ILROB 725 Analysis of Published Research in Organizational Behavior  
Fall. 3 credits. Prerequisites: ILROB 520 and 521 and one year of statistics.  
An advanced research methods course that critically examines published research papers in the field of organizational behavior in terms of research design and method as well as theory.

ILROB 726 Selected Topics in Organizational Behavior  
Fall. 3 credits. Prerequisites: ILROB 520 and 521 and permission of instructor.  
An advanced seminar that seeks to develop an interdisciplinary perspective on selected topics in organizational behavior. The topics themselves will change from year to year depending on participants' interests. Course is designed to allow students and the instructor to jointly pursue significant scholarly inquiry into one or more arenas of organizational theory. Emphasis will be placed on exploring the relevance of tradition in related disciplines (anthropology, linguistics, philosophy, sociology, etc.) that may enrich our understanding of organizational life.

ILROB 727 Work and Industrial Conflict  
Spring, weeks 7-14. 2 credits.  
A concentrated examination of the sociology of industrial conflict. The seminar focuses on classic formulations of conflict theory in sociology, then the social, political, economic causes of industrial conflict. Both individual and collective forms of conflict expression are examined. Some discussion of the implications of various types of worker management of firms for industrial conflict will be included.

ILROB 728 Theories of Motivation and Leadership  
Spring. 2 or 4 credits. Prerequisites: ILROB 520 and 521.  
Two independent but sequence-connected minicourses.  
(1) Theories of Work Motivation. 7 weeks. 2 credits.  
Course will provide an introduction to basic concepts of human motivation in general, with particular emphasis on the theories that explain and predict work motivation. Students will examine the empirical research that tests the validity of the theories and shows how and under what conditions different motivation models can be used in practice in work organizations.  
(2) Theories of Leadership and Power. 7 weeks. 2 credits.  
Several current microtheories of leadership and power and related research are examined. The disciplinary perspective employed is social organizational psychology and the level of analysis emphasized is action and experience of individuals in groups.

ILROB 729 Organizational Change and Intervention  
Fall. 3 credits. Graduate students only; no exceptions.  
This seminar is concerned with planned and unplanned change in organizations. It is designed to analyze theory in practice. Particular attention will be paid to the role of internal and external change agents. Class members will be encouraged to analyze contemporary changes such as mergers and acquisitions and work force reductions. Participants will submit weekly work force journals.

ILROB 770 The Cultures of Work Organizations  
Fall. 3 credits. Open only to graduate students.  
Considers both administrative and occupational cultures in the workplace. It takes an anthropological perspective, focusing on ideologies as the main ingredient of cultures but emphasizing the role of cultural forms, e.g., myths, stories, sagas, language, rites and ceremonies, and physical settings of meaning. It pays special attention to the place of subcultures and countercultures in the makeup of administrative culture and to occupations as a major source of subcultures. The role of the environment in which organizations are embedded, and its influence on workplace cultures, is also included. Forms of cultural leadership and approaches to reading and changing cultures are also considered.

ILROB 777 Advanced Seminar in Cross-Cultural Studies of Organizational Behavior  
Fall. 3 credits. Permission of the instructor.  
Considers theory and method for the study of cross-cultural and cognitive style variables. Members participate in the conceptualization and conduct of a comparative research project.

ILROB 778 Organizational Implications of World Class Manufacturing  
Fall. 4 credits.  
Aimed at helping students develop an understanding of organizations as complex social systems, and the behavioral implications of new manufacturing initiatives. Live 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 778 is a core course in the Master of Engineering/Manufacturing Option degree program.

ILROB 779 Organizational Change and Intervention  
Fall. 3 credits. Prerequisite: ILROB 520.  
Aims at helping students manage complex, multi-dimensional organizational change. This seminar is designed to analyze theory in practice. Particular attention will be paid to the role of internal and external change agents. Class members will be encouraged to analyze contemporary changes such as mergers and acquisitions and work force reductions. Participants will submit weekly work force journals.

ILROB 780 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.
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 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 will be 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
A. Hadi, Chair; J. Angellotti, J. Bunge, T. DiCiccio, P. Velleman, M. Wells

ILRST 210 Statistical Reasoning I
Fall and spring 1997, 1998. 3 credits.
Attendance at weekly discussion section is required. J. Angellotti, P. Velleman.
An introduction to the basic concepts of statistics and data analysis. Descriptive methods, mathematical models and inference procedures for univariate and bivariate data. Basic statistical designs, an introduction to probability and applications of the Binomial and Normal distributions. Estimation, confidence intervals, and tests of significance for a population mean and proportion, simple linear regression, correlation, and two-way contingency tables. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

ILRST 211 Statistical Reasoning II
Fall and spring 1997, 1998. 3 credits.
Prerequisite: ILRST 210 or suitable introductory statistics course. J. Bunge, T. DiCiccio.
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; elements of time-series analysis; and sample-survey design. Computer packages are used throughout the course.

ILRST 310 Statistical Sampling
Spring 1997. 3 credits. Prerequisite: ILRST 211 or equivalent. J. Bunge.
Theory and application of statistical sampling, especially in regard to sample design, cost, estimation of population quantities, and error estimation. Assessment of nonsampling errors. Discussion of applications to social and biological sciences and to business problems. Course includes an applied project.

ILRST 311 Practical Matrix Algebra
Matrix algebra is a necessary tool for statistics courses such as regression and multivariate analysis and for other "research methods" courses in various other disciplines. One goal of this course is to provide students in various fields of knowledge with a basic understanding of matrix algebra in a language they can easily understand. Topics include special types of matrices; matrix calculations; linear dependence and independence; vector geometry; matrix reduction (trace, determinant, norms); matrix inversion; linear transformation; eigenvalues; matrix decompositions; ellipsoids and distances; some applications of matrices.

ILRST 312 Applied Regression Methods
Fall 1997. 3 credits. Prerequisite: ILRST 211 or equivalent course. A. Hadi.
First, the matrix algebra necessary to analyze regression models is reviewed. Then, 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. Course includes an applied project.

ILRST 313 Design and Analysis of Experiments
3 credits. Prerequisite: ILRST 211 or equivalent. Not offered 1997–98.
The statistical design and analysis of comparative experiments including completely randomized, factorials, randomized block, Latin squares, and split-unit designs including crossover and repeated measures. Application of statistical design to research problems. Analyses to compare treatment groups including ANOVA, ANCOVA, contrasts and multiple comparison procedures. Computer packages are used.

ILRST 314 Graphical Methods for Data Analysis
3 credits. Prerequisite: ILRST 211 or equivalent. Not offered 1997–98.
Classical and recently developed graphical methods for data analysis and display. Characteristics of effective graphics and honest graphs with comparison of alternative methods for understanding data. Includes study of current computer programs and methods expected to be practical in the near future: graphing of univariate data, graphs of multivariate data, graphical methods of data analysis; the specification, modification, and control of graphs; study of interaction between choice of display and underlying patterns.

ILRST 410 Techniques of Multivariate Analysis
Spring 1998. 3 credits. Prerequisite: ILRST 312 or equivalent. P. Velleman.
Techniques of multivariate statistical analysis discussed and illustrated by examples from various fields. We emphasize application, but theory will not be ignored. Deviation from assumptions and the rationale for choices among techniques are discussed. Students are expected to learn how to thoroughly analyze real-life data sets using computer-packaged programs. Participants should have some knowledge of matrix notation. Topics include: multivariate normal distribution; sample geometry and multivariate distances; inference about a mean vector; comparison of several multivariate populations; variance, and covariances; detection of multivariate outliers; principal component analysis; factor analysis; canonical correlation analysis; discriminant analysis, and multivariate multiple regression.

ILRST 411 Statistical Analysis of Qualitative Data
Fall 1997. 3 credits. Prerequisite: two statistics courses or permission of instructor. M. Wells.
An advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variables, rank-order methods, and other nonparametric statistical techniques, including those related to chi-squared.

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 1997, spring 1998. 3 credits.
J. Angellotti, P. Velleman.
A first course in statistics for graduate students in the social sciences. Descriptive statistics, probability and sampling distributions, estimation, hypothesis tests, and simple linear regression and correlation. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

ILRST 511 Statistical Methods for the Social Sciences II
Fall and spring 1997, 1998. 3 credits.
Prerequisite: ILRST 510 or equivalent introductory statistics course. J. Bunge, M. Wells.
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 610 Seminar in Modern Data Analysis
3 credits. Prerequisite: two statistics courses or permission of instructor. Not offered 1997–98.
An advanced survey of modern data analysis methods. Topics include exploratory data analysis, data re-expression, philosophy of data analysis, robust methods, statistical graphics, regression methods, and diagnostics. Extensive outside readings cover recent and historical work. Participants should have some knowledge of multiple regression, including the use of matrices, and some experience using a computer.

ILRST 611 Statistical Computing
3 credits. Prerequisites: linear algebra, knowledge of a programming language, and statistics at least through multiple regression. Not offered 1997–98.
A survey of new aspects of statistical computing. Topics include: basic numerical methods, numerical linear algebra, nonlinear statistical methods, numerical integration and approximation, smoothing and density estimation. Additional special topics may include Monte Carlo methods, statistical graphics, computing-intensive methods, parallel computation, computing environments. Designed for graduate students in the social sciences and related fields interested in new advances. Students may be asked to write programs in a programming language of their choice.
[ILRST 612 Statistical Classification Methods]
3 credits. Prerequisite: ILRST 312 or equivalent, or permission of instructor.
Not offered 1997-98.
An introduction to a variety of statistical techniques that assign objects to categories on the basis of observed characteristics of the objects. Course topics include (but are not limited to): discriminant analysis and its extensions, classification and regression trees (CART), neural networks for classification, and estimation of error of classification rules.

[ILRST 613 Bayesian and Conditional Inference]
3 credits. Prerequisites: Graduate level courses equivalent to OR&IE 670 and OR&IE 651 or permission of instructor.
Not offered 1997-98.
This course covers the following topics: loss functions and utility theory, prior information and subjective probability, coherency, basic Bayesian inference, empirical Bayesian inference, Bayesian computations, ancillarity, conditional properties of statistical procedures, and Barnardo-Nielsen's exact likelihood theory.

[ILRST 614 Structural Equations with Latent Variables]
Spring 1998. 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, we will treat them as special cases of a common model. Another goal of the course is to emphasize the application of these techniques.

[ILRST 615 Export Systems and Probabilistic Network Models]
3 credits. S-U only. Prerequisite: OR&IE 560 or an equivalent course in probability and statistics. Not offered 1997-98.
This is an interdisciplinary course for students in applied mathematics, computer science, statistics, and other related fields of applications such as medical, engineering, and social sciences. Topics include: components of expert systems, rule-based expert systems, probabilistic-based expert systems, uncertainty measures, dependency models, Bayesian and Markov networks, propagation of uncertainties, learning structure from data, and examples of applications. Students will use computer software to gain experience.

[ILRST 611 Sensitivity Analysis in Linear Regression]
Spring 1998. 3 credits. S-U only. Prerequisite: ILRST 312 or equivalent, or permission of instructor. A. Hadi.
A course on regression for students in statistical sciences and related fields. Attempts to narrow the gap between the theory and practical application of the linear regression model. Classical and recently developed statistical procedures are discussed. Students will be expected to read articles and thoroughly analyze real-life data sets using computer-packaged programs. Topics include role of variables in a regression equation, regression diagnostics (outliers, leverage points, influential observations, generalized linear models, errors in variables, and multicollinearity).

[ILRST 799 Directed Studies]
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRST 712 Theory of Sampling
3 credits. Prerequisite: calculus and at least one semester of mathematical statistics. Not offered 1997-98.
Sampling theory from the viewpoint of mathematical statistics. The first part of the course focuses on the classical or "design" approach; the second part on the more recent "model-based" approach. Attention is paid to recent progress in the field.

[ILRST 713 Counting Processes with Statistical Applications]
3 credits. Prerequisite: a course at the technical level of Math 572 and 574 or permission of instructor. Not offered 1997-98.
The statistical analysis of life history data is playing an increasing role in the social, natural, and physical sciences. We will formulate and solve some practical problems in the statistical analysis of life history data using the modern theory of stochastic processes. We will examine the martingale dynamics for point processes relevant to life history data. Both non-parametric and parametric inference for multiplicative intensity models will be considered. The large sample properties of the proposed procedures will be discussed in detail using recent extensions of functional central limit theorems for martingales.

[ILRST 714 Topics in Modern Statistical Distribution Theory]
Spring 1998. 3 credits. Prerequisite: Courses equivalent to OR&IE 651 or Math 571, and STATS 409 or OR&IE 670. J. Bunge.
Recent research has revealed vast territories of distribution theory that are unfamiliar to most statisticians. Provides an introduction to three topics underlying this "modern" theory: infinite divisibility, decomposability, and stability; characterization of distributions; extensions of univariate distributions to multivariate distributions.

[ILRST 715 Likelihood Inference]
3 credits. Prerequisite: graduate courses equivalent to OR&IE 670 and OR&IE 670. Not offered 1997-98.
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 716 Statistical Consulting]
A course in practical consulting on "real-world" statistical problems. Under the supervision of the instructor(s), students will hear problems presented by clients (usually faculty and graduate students from other fields) and will collaborate in proposing a statistical model, analyzing data, and interpreting results. Statistical computing will be used as needed.

ILRST 204 Managing Conflict
Fall or spring. 3 credits.
The purpose of this course is to provide 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 engage in applying communication, negotiation, and mediation techniques to reduce or eliminate the conflict.

ILRST 205 Oral Skills for Conflict Management
Fall or spring. 3 credits.
This course emphasizes developing the 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 as required to help the participants practice their skills.

ILRST 206 The Nature of Conflict
Fall or spring. 3 credits.
The purpose of the course is to provide students with the conceptual foundation to engage in further study of conflict management and conflict resolution. Having taken the course the students will 1) be able to identify and describe types of conflict; 2) be able to identify the various sources of conflict; 3) be able to apply a conceptual model of conflict to interpersonal, organizational, and international conflict situations; 4) be able to describe conflict situations in terms of social psychological aspects utilizing a "Person Perception" or "Attribution" theoretical orientation; 5) be able to identify their personal response styles to conflict.

ILRST 208 Workplace Negotiations
Fall or spring. 3 credits.
Will cover the theory and practice of negotiation as it applies to workplace and business situations. Students will be exposed to theoretical models of negotiation and will participate in negotiation exercises. Students will be participating in two negotiation exercises and will be asked to write a paper based on their negotiation. More weight will be given in grading to the student's ability to present a well-thought-out rationale for positions and tactics than to the outcome of the negotiation itself.
241 Arbitration 3 credits.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of matters in briefs or oral presentation, the conduct of an arbitration hearing, and the preparation of an arbitration opinion.

242 Public Sector Collective Bargaining 3 credits.
This course is designed as an introduction to collective bargaining in the public sector. The course 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 will be 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.

243 Growth of American Business and Management History 3 credits.
The growth and cycles of American business enterprise produced significant changes in education, government, work, the family, the economic composition of the population, and the landscape. As business and industry expanded, new methods evolved for managing these enterprises. This course will examine the development of managerial practices, the relationship of management to the work force, and the social ramifications of capitalist expansion.

245 Public Sector Labor Law 3 credits.
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 will examine 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 how it has been interpreted by the courts of New York State in its application. Major emphasis will be 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 3 credits.
Will help 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 will be placed on contemporary economic theories and how their proponents attempt to solve American economic problems.

248 Employment Practices Law 3 credits.
Considers laws and regulations that impact directly on managers and employers. Students will examine a wide variety of laws such as Equal Employment Opportunity, Employee Retirement Income Security Act, Federal Wage and Hour Laws, Occupational Safety and Health Act, unemployment laws and other topics. Students will 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 3 credits.
Fall or spring. There is a collective perception that the Worker’s 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. We will delve into every nook and cranny of New York Worker’s Compensation Law. The course will be entirely practical. Skills teaching, i.e., explaining how to present a case, decomm, ethics, and persuasiveness, are built into the course. Experts on how the system really works will also be used.

251 Principles and Practices of Management 3 credits.
Fall or spring. Presents the theory and processes of management with an emphasis on supervision. Managerial functions of planning, organizing, staffing, and evaluating are included. Concepts and theories are presented, and case studies are analyzed. Motivating people, exercising leadership, and effectively developing employees are emphasized.

252 Contract Bargaining 3 credits.
Fall or spring. Examines the principles of contract bargaining, including bargaining environments and structures as well as standards used in bargaining. Students will learn to prepare bargaining demands, cost economic items, draft noneconomic contract language, negotiate economic and noneconomic issues, and resolve a contract bargaining impasse. The course will consider the impact of contract bargaining outcomes on workers, unions, employers, and the public.

253 Contract Administration 3 credits.
Fall or spring. Focuses on the role of the steward in administering the union contract in the workplace. Students will evaluate grievance and arbitration contract clauses, the grievance procedure in practice, the role of the union steward, the role of local and international unions, negotiation of grievances, and preparation for arbitration. Students will analyze the impact of grievance and arbitration procedures on workers, unions, and employers.

255 Labor History 3 credits.
Fall or spring. 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, unionizing, and public employee unions. Included will be a discussion of the development of trade union institutions and leaders and the evolution of union political activities and collective bargaining. Special emphasis will be paid to the involvement of women and minority workers with unions.

256 Dispute Resolution 3 credits.
Fall or spring. 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 will be discussed. We will also look at exclusive labor management mechanisms to settle industry disputes.

257 Human Resource Administration 3 credits.
Fall or spring. Designed to provide an overview of personnel practices in the modern organization. It will focus on manpower planning, employment, training and development, motivation and compensation, and performance appraisal and communication for students who are currently supervisors or personnel practitioners or for those aspiring to those positions.

258 Organizational Behavior 3 credits.
Fall or spring. Designed to illustrate how behavioral science theory leads to research and how theory and research provide a basis for practical application in business, industry, education, and government.

259 Union Administration 3 credits.
Fall or spring. Focus is on the principles and practices of effective union administration. Students will study the dynamics of democratic organizations and the development of effective union leadership. The course explores alternative methods of decision making and lines of responsibility. The legal obligations of unions and union officials will be discussed and analyzed. The course also examines the structure and evolution of relationships inside the labor movement.

262 Project Management 3 credits.
Fall or spring. Through the process of restructuring, many companies are "flattening out" the hierarchy of management levels. This means that more responsibilities are shifting downward to employees who may not have the status (authority) of supervisor or manager, but who have the enormous responsibility of completing complex, critical projects within well-defined business constraints. In response to the shift in responsibility downward and with much more to be accomplished with limited resources, the demands for employees with effective project management skills are increasing. Employers who can successfully manage projects are and will continue to be the most marketable individuals in the work force because their skills are transferable to all disciplines, organizations, and situations.
264 Contemporary Labor Problems
Fall or spring. 3 credits.
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.

266 Professional Writing: The Power of the Written Word in Business
3 credits.
Focuses on the importance of developing effective writing skills and strategies required to be successful in business communities. Students will sharpen their writing skills, correct bad writing habits, and develop new writing habits through "real life" exercises taken from case studies and their own experiences. In addition, they will learn the importance of using rhetorical strategies such as prewriting, outlining, drafting, revising, and editing. They will learn the importance of techniques for responding, writing to a specific audience, attending to a specific purpose, choosing the appropriate language, and varying tone and style as the situation demands. Students, upon completing this course, will have the confidence and the writing skills to successfully address most situations requiring written communication. Genres include memos, proposal letters, and reports.

267 Speaking and Listening for Business and the Professions
3 credits.
The overall objective is to equip participants with the skills and knowledge they need to speak and listen effectively. By the end of the course, students will be able to accurately listen to, and interpret, oral communication; identify major causes of misunderstanding such as biases, distractions, emotions, etc.; and employ techniques for overcoming those listening barriers; speak effectively in front of an audience; describe ways to build rapport with an audience; persuade an audience; use visual aids effectively; introduce speakers, make presentations, and speak extemporaneously.

269 The Evolution of Work in America
Fall or spring. 3 credits.
Explores the evolution of contemporary business operations. Discussion will focus on historical and current theories of work organization, changes in the workplace and workforce, and future trends. The relationships between businesses and the societies in which they exist, both local and national economies, will also be examined.

343 Health in the Workplace
Fall or spring. 3 credits.
Examines the state and federal laws that affect job safety, and health, and the way workers and their unions can use legislation to promote safe and healthy working conditions. Topics include safety and health standards, the enforcement of laws and standards, the responsibilities of management; the rights of employees and their unions, including the rights to information; collective bargaining for safety and health; racial- and gender-based discrimination regarding hazardous work, and drug testing.

344 Union Strategies for Safety and Health
Fall or spring. 3 credits.
Even with OSHA, the most effective tool for change in the unionized work environment remains the collective bargaining process and collective action. This course explores specific strategies for making the workplace safer through collective bargaining, workers education, safety and health committees, joint labor-management committees, worker COSH groups, union-sponsored medical exams at occupational health clinics, and the OSHA complaint process. Case studies will consider integration of occupational health initiatives into broader union strategies such as organizing drives and industrial development planning.

345 Health Hazards Identification and Evaluation in the Workplace
Fall or spring. 3 credits.
This course builds on the knowledge acquired in both the safety hazard and health hazard courses to provide students with greater mastery of hazard evaluation and control methods. Students are encouraged to complete the health hazard and safety hazard courses before taking industrial hygiene. It will provide practical, hands-on training in evaluating potential workplace hazards. Students will learn about environmental monitoring methods such as air sampling and become familiar with the commonly used equipment. They will also learn to interpret and evaluate monitoring data provided by professional testers.

347 Safety Hazards Identification and Evaluation in the Workplace
Fall or spring. 3 credits.
Safety hazards (as opposed to health hazards) generally involve harm of an immediate and sometimes violent nature: health effects include burns, electrical shock, broken bones, and the loss of limb or sight, or hearing. With chemicals, the primary concern is their explosive, reactive, or flammable nature rather than with the toxic effects that are the focus of health hazard evaluation. Students will become familiar with site inspection and hazard identification methods and will learn about control techniques appropriate for a variety of work settings.

364 Labor, Government, and Politics
3 credits.
A survey of the ways the American political system affects labor and how organized labor affects the system through voting, political parties, and interest groups.

367 Safety and Health in the Workplace
Fall or spring. 3 credits.
To provide basic education and training in workplace safety and health. The course will focus on applicable federal and state laws, standards for safety and health, industrial hygiene, and such health concerns as asbestos, radon, and AIDS. Practical experience will be provided through workplace walk-through safety and health inspections and in use of industrial hygiene equipment that measure noise, temperature, humidity, airflow, and airborne toxics.

FACULTY ROSTER

Abowd, John M., Ph.D., U. of Chicago. Prof., Labor Economics
Bacharach, Samuel, Ph.D., U. of Wisconsin. Prof., Organizational Behavior
Bishop, John H., Ph.D., U. of Michigan. Assoc. Prof., Human Resource Studies
Blau, Francine D., Ph.D., U. of Wisconsin. Francis Perkins Prof. of Industrial and Labor Relations, Labor Economics
Boudreau, John W., Ph.D., Purdue U. Assoc. Prof., Human Resource Studies
Boyer, George R., Ph.D., U. of Wisconsin. Assoc. 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
Cook, Maria L., Ph.D., Univ. of Calif., Berkeley. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
DiGiacomo, 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
Farley, Jennie T., Ph.D., Cornell U. Prof., Extension
Fields, Gary S., Ph.D., U. of Michigan. Prof., Labor Economics
Gruenfeld, Leopold W., Ph.D., Purdue U. Assoc. Prof., Organizational Behavior
Hadi, Ali S., Ph.D., New York U. Assoc. Prof., Social Statistics
Hammer, Tove H., Ph.D., U. of Maryland. Prof., Organizational Behavior
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
Kahn, Lawrence M., Ph.D., U. of Calif. at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History
Kuruvilla, Sarosh C., Ph.D., U. of Iowa. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
Lawler, Edward J., Ph.D., U. of Wisconsin at Madison. Prof., Organizational Behavior

NDUSTRIAL AND LABOR RELATIONS - 1997-1998

Bunge, John A., Ph.D., Ohio State U. Assoc. Prof., Social Statistics
Cook, Maria L., Ph.D., Univ. of Calif., Berkeley. Asst. Prof., Collective Bargaining, Labor Law, and Labor History
DiGiacomo, 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
Farley, Jennie T., Ph.D., Cornell U. Prof., Extension
Fields, Gary S., Ph.D., U. of Michigan. Prof., Labor Economics
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Hadi, Ali S., Ph.D., New York U. Assoc. Prof., Social Statistics
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Kahn, Lawrence M., Ph.D., U. of Calif. at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History
Kuruvilla, Sarosh C., Ph.D., U. of Iowa. Assoc. Prof., Collective Bargaining, Labor Law, and Labor History
Lawler, Edward J., Ph.D., U. of Wisconsin at Madison. Prof., Organizational Behavior
Lipsky, David B., Ph.D., Massachusetts Inst. of Technology. Prof., Collective Bargaining, Labor Law, and Labor History
Milkovich, George, Ph.D., U. of Minnesota. Martin P. Catherwood Professor of Industrial and Labor Relations, Human Resource Studies
Pucik, Vladimir, Ph.D., Columbia U. Assoc. Prof., Human Resource Studies
Ross, Philip, Ph.D., Brown U. Prof., Collective Bargaining, Labor Law, and Labor History
Salvatore, Nicholas, Ph.D., U. of California at Berkeley. Prof., Collective Bargaining, Labor Law, and Labor History
Seaber, Ronald L., Ph.D., U. of Illinois. Assoc. Prof., Extension
Smith, Robert S., Ph.D., Stanford U. Prof., Labor Economics
Sonnestuhl, William J., Ph.D., New York U. Assoc. Prof., Extension and Organizational Behavior
Stem, Robert N., Ph.D., Vanderbilt U. Prof., Organizational Behavior
Stone, Katherine J. D., Harvard U. Prof., Collective Bargaining, Labor Law and Labor History
Tolbert, Pamela S., Ph.D., U. of California. Assoc. 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. Assoc. Prof., Social Statistics
Williams, Lawrence K., Ph.D., U. of Michigan. Prof., Organizational Behavior
Wright, Patrick M., Ph.D., Michigan State U. Assoc. Prof., Human Resource Studies
LAW SCHOOL

ADMINISTRATION
Russell K. Osgood, dean of the law faculty and professor of law
John A. Siliciano, associate dean for academic affairs and professor of law
Claire M. Germain, law librarian and professor of law
Anne Lukingbeal, associate dean and dean of students
Gary J. Simson, associate dean for academic development and professor of law
Charles D. Gramton, assistant dean for alumni and international affairs
Richard D. Geiger, associate dean and dean of admissions
Harry B. Ash, assistant dean for development and public affairs
Richard F. Robinson, assistant dean for administration and finance
Albert C. Neimeth, associate dean of alumni affairs emeritus
Nan A. Colvin, registrar

LAW SCHOOL

The primary function of the Law School is to prepare attorneys for both public and private practice who will render the highest quality of ethical and professional service to their clients and who will 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, and the Université de Paris I (Panthéon-Sorbonne), 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
Fall and spring. 6 credits. K. M. Clermont, B. J. Holden-Smith, R. B. Kent, J. J. Rachlinski
An introduction to civil litigation, from commencement of an action through disposition on appeal, studied in the context of the federal procedural system. Also, a detailed consideration of federalism and ascertainment of applicable law, jurisdiction, process, and venue, and former adjudication.

LAW 502 Constitutional Law
Fall. 4 credits. K. Abrams, S. L. Johnson, S. H. Shiffrin, G. J. Simson
A study of basic American constitutional law, including judicial review, some structural aspects of the Constitution as developed particularly in light of the passage of the Civil War amendments, and certain of its rights provisions.

LAW 504 Contracts
Fall and spring. 5 credits. J. Braucher, R. S. Summers
An introduction to the nature, functions, and processes of exchange; contract, and contract law. The course focuses on the predominant rules and principles governing contract and related obligation, including the substantive reasons underlying the rules and principles.

LAW 506 Criminal Law
Spring. 3 credits. S. D. Clymer, J. A. Siliciano
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 507 Legal Process
Spring. 3 credits. S. P. Garvey, R. K. Osgood
An introduction to the theoretical aspects of the practical questions of what constitutes law, how it is to be interpreted once it is ascertained, what moral and political principles or visions it presupposes, and how its aspirations and purposes on the one hand relate to its formal dimension or literal shape on the other.

LAW 508 Practice Training I
Fall. 1 credit. P. G. Court, S. E. Childs, J. M. Wenger
An introduction to legal research, focusing on strategies and information sources. Uses a variety of electronic (Internet, Lexis, Westlaw, CD-ROM) and print (books, microforms) formats. Provides practical experience in finding court decisions, statutes, and administrative materials and in evaluating information authorities.

LAW 509 Practice Training II
Spring. 2 credits.
The preparation of materials of law practice, including the drafting of opinion letters, memoranda of law, and a brief. The functions and techniques of oral and written argument.

LAW 512 Property
Spring. 4 credits. P. W. Martin, E. L. Sherwin
An investigation of the law's protection of ownership, including the beginnings of property, legal and equitable estates, concurrent ownership, and public and private regulation of land use.

LAW 515 Torts
Fall. 4 credits. J. J. Barceló III, G. A. Hay, J. A. Henderson, J. A. Siliciano
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.

UPPERCLASS COURSES

LAW 602 Administrative Law
Fall or spring. 3 credits. Limited enrollment. C. R. Farmá, J. J. Rachlinski
The powers, methods, roles, and procedures of public officials and bureaucracies. The lawmaking, law-application, and law-enforcement processes of independent regulatory and executive agencies; their place in constitutional government; and their control by judicial and other means.

LAW 604 Advanced Civil Procedure
Fall. 3 credits. R. B. Kent
A study of complex civil litigation involving multiple parties and multiple claims. Topics include joinder of parties and claims, impleader, interpleader, class actions, and intervention. There will be consideration of case management, the Civil Justice Reform Act of 1990, multidistrict transfers in the federal courts, and the use of alternative procedures for disposition of cases.

LAW 605 American Indian Law
Spring. 2 credits. Recommended Prerequisite: Administrative Law and Public International Law. J. Tahsuda
An examination of the primary themes and materials of the federal law concerning Native
American tribes and individuals. The course devotes considerable attention to the historical development of law and policy in that area and to the present division of authority over Indian country among federal, state, and tribal governments.

**LAW 609 Antitrust Law**

Spring. 3 credits. G. A. Hay.

A consideration of the basic antitrust rules enacted by Congress and amplified by the courts to protect competitive markets and limit the exercise of monopoly power. Price fixing, boycotts, and other restraint of trade; exclusionary agreements among competitors; agreements between suppliers and customers; joint ventures; attempts to monopolize and monopolization; price discrimination; and mergers.

**LAW 610 Banking Law and Regulation**

Fall. 3 credits. J. R. Macey.

The course begins by defining the roles that banks and other financial intermediaries play in the economy. It considers the claim that a specialized set of regulations governing the activities of financial intermediaries is justified by the special role banks occupy in society. In that context a variety of theoretical arguments about banking regulation are considered. The course then examines each of the major laws that govern banking activities against the background of the various regulatory theories discussed. Topics to be addressed include entry restrictions, growth and expansion of bank activities, regulation of the business of banking, expansion through the bank holding-company structure, branch banking, interstate banking, and regulation of failing or failed banks.

**LAW 613 Bankruptcy**

Spring. 3 credits. J. J. Hanks, Jr.

This course examines the principal business, legal, and accounting issues in the purchase and sale of privately and publicly held businesses. Emphasis is placed on the negotiation, structuring, financing, and documentation of the most common type of combining transaction—the acquisition of assets of a privately held company. Among the legal issues considered are the business and other reasons for selling or buying a business, the forms of business combinations, directors' duties, successor liability, securities regulation, tax, and antitrust. Additional issues surrounding acquisitions of publicly held companies (including hostile takeovers) are studied particularly for comparison. The responsibilities of transactional lawyers to persons other than their clients are also assayed.

**LAW 615 Civil Rights Legislation**

Fall. 3 credits. T. Eisenberg.

Explores in depth the history and current status of federal civil rights legislation. The course focuses on 42 U.S.C. §1983, the major statutory vehicle for vindication of constitutional rights in civil cases, and on Title VII of the Civil Rights Act of 1964, the principal federal statute covering employment discrimination.

**LAW 616 Comparative Law**

Fall. 3 credits. Prerequisite: basic common law.

The course tackles first the sources, structures, and assumptions common to the legal systems of continental Europe, Latin America, and some countries of the Far East, and then examines the enduring divisions of their private law. Particular examples are then studied: they may be grouped under a topic (e.g., the liability of the post office or the problem of the injured rescuer) or by country (e.g., English contract law, and Roman and German tort law). The course aims to demonstrate the utility of the comparative method by encouraging students to rethink their own law in the light of other approaches. This enables students to see how problems may sometimes be perceived in different legal systems and how they may be embedded in a given system, and thus to gain a better understanding of the reasons for the rules.

**LAW 619 Conflict of Laws**

Spring. 2 credits. G. J. Simson.

A study of the methods used by courts to decide the applicable law in cases that, in their parties or events, involve more than one state or country. Attention to the due-process limitations on jurisdiction, an American state's obligation under the fullfaith-and-credit clause to respect sister-state judgments, and conflicts between federal and state law.

**LAW 620 Constitutional Law II: The First Amendment**

Spring. 3 credits. S. H. Shiffrin.

A comprehensive discussion of freedom of speech, press, and association. The free-exercise-of-religion clause and the establishment clause of the First Amendment are treated less extensively.

**LAW 621 Contemporary Challenges to Traditional Jurisprudence**

Fall. 2 credits. F. E. Olsen.

Modern schools of American legal theory, such as critical legal studies, feminist legal theory, law and economics, legal positivism, critical race theory, post-modern law, and "gender-bending theory," emerged from a longer tradition of jurisprudential controversy in American and European legal thought. This course examines legal theory to situate recent developments in a broader context and consider where legal theory may go in the future. The course will look at both the philosophical roots of the jurisprudential traditions as well as emphasize the institutional practive legal theories produce. The class will meet for the first six weeks of the semester, and the final exam will take the form of a paper that may be written during the remainder of the semester. Students are encouraged to choose a paper topic of particular interest to them and to submit multiple drafts for feedback.

**LAW 622 Copyright and Digital Works**

Fall and spring. 3 credits. Prerequisite: a prior course covering the basic elements of copyright law. Year-long offering. Limited enrollment. P. W. Martin.

The application of copyright law's basic elements or concepts—coverage, protected rights, infringement and fair use—along with associated remedies and the legal issues encoded in digital form. The course will explore the major copyright issues posed by such categories of digital works as software, databases containing factual and other public-domain content, multimedia materials, computer-generated or assisted works, and audio recordings containing digital sampling. In addition the course will review the recent White Paper on Intellectual Property and the National Information Infrastructure and subsequent legislative proposals as a means of focusing on the Internet's implications for both domestic and international copyright regimes.

**LAW 624 Corporate Finance**

Fall. 3 credits. Prerequisite: Corporations. Limited enrollment. F. S. McChesney.

Course surveys various topics in corporate finance and their role in modern corporate law. Topics include valuation, individual capitalization vehicles (bonds, preferred and common stock), overall capital structure, and dividend policies, plus selected topics in mergers and acquisitions (e.g., appraisal rights). No previous study of finance required or expected.

**LAW 625 Corporations**

Fall or spring. 4 credits. Limited enrollment. J. R. Macey, F. S. McChesney.

An introduction to modern American business corporation law. Topics include corporate organization and defective incorporation, the corporation as a legal entity, corporate control and management, state and federal rules governing the solicitation of proxies, fiduciary duties of directors and controlling shareholders under state law, and antitrust and insider-trading provision under the federal securities laws.

**LAW 627 Criminal Procedure**

Fall. 3 credits. S. D. Clymer.

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 search and seizure, interrogations and confessions, pretrial identification, and on the right to counsel during the pretrial stage.

**[LAW Current Topics at the Crossroads of Law and Finance [also MBA 551]]**


Financial institutions of all kinds, whether they are formally known as insurance companies, banks, investment banks, mutual funds, or pension funds, invest money on behalf of clients in a wide variety of investment vehicles. This course will look at the way that these financial institutions are treated both in a legal and an economic perspective. Emphasis will be placed on the intersections between modern finance theory and legal analysis. Topics to be covered include insurance, bank regulation and reform, securities markets, investment banking, and pensions.
LAW 628 Death Penalty In America: A Survey
Spring. 1 credit. J. H. Blume.
The course will survey the law relating to the administration of the death penalty.

LAW 630 Directed Reading
Fall or spring. 1 or 2 credits. A two-hour directed reading may also fulfill the second writing requirement. Arrange directly with instructor. See Law School Catalog.

LAW 633 Employment Law
Spring. 3 credits. S. J. Schwab.
Survey of major laws and programs affecting the employee-employer relationship other than laws regulating unions (covered in Labor Law). One major area covered is the common law relating to privacy, drug testing, and unjust dismissal in the workplace. That area is contrasted with major statutory programs such as worker's compensation, unemployment insurance, OSHA, and ERISA. Antidiscrimination legislation will also be covered.

LAW 634 Estate and Gift Taxation
Spring. 3 credits. Prerequisite: Federal Income Taxation. L. Kahng.
This course surveys the three federal taxes imposed on wealth transfers: the estate tax, the gift tax, and the generation-skipping tax. The course uses a problem-oriented approach, with emphasis on the Internal Revenue Code, regulations, and other tax materials.

LAW 637 European Union Law
Fall. 2 credits. P. Manin.
The course will study the EU treaty, institutions, and lawmaking processes; the direct effect, supremacy, and reception of EU law in the member states, the different actions before the Court of Justice and the Tribunal.

LAW 640 Evidence
Fall or spring. 3 credits. S. D. Olyner, D. A. Nance.
The rules of evidence in civil and criminal cases with emphasis on relevance, authentication, witnesses, experts, and hearsay. The course will focus on the Federal Rules of Evidence, with some attention to how they diverge from the common law.

LAW 641 Family Law
Spring. 3 credits.
An examination of the ways in which law seeks to intervene in the family as an institution. Besides examining the usual matters surrounding the legal formation and dissolution of families, the course emphasizes issues relating to children and pressures for new legal definitions of the family arising from social changes.

LAW 643 Federal Income Taxation
Fall or spring. 4 credits. Limited enrollment. L. Kahng, M. A. Livingston.
A basic course designed to develop understanding of tax concepts and ability to work effectively with the Internal Revenue Code, regulations, cases, and other tax materials.

LAW 645 Feminism and Gender Discrimination
Spring. 3 credits. K. Abrams.
The course provides an introduction to feminist theory as it has emerged in legal scholarship and the social sciences. Several feminist legal theories are then used as a framework for analyzing a series of legal problems implicating gender. Among the problems discussed are sexual harassment, work-family conflict, divorce and child custody, surrogacy, abortion, rape, spousal abuse, and pornography.

LAW 661 Intellectual Property
Fall. 3 credits. P. W. Martin.
An introduction to the domestic and international context of intellectual property law with a review of state and federal law relating to intellectual property, principally copyright, patent, and trademark law. Intellectual property issues raised by new information technologies are emphasized throughout the course.

LAW 662 International Business Transactions
Spring. 3 credits. J. J. Barcelo III.
An examination of the unique legal features of business transactions across national boundaries. Topics include trade in goods and services, technology licensing, and private commercial law in an international setting; international dispute settlement (litigation and arbitration); government regulation of imports and exports (trade policy); international
antitrust; international agreements for the control and harmonization of national regulatory policy; and foreign investment.

**LAW 653 International Commercial Arbitration**
Spring. 2 credits. J. J. Barceló III.
A study of arbitration as a dispute resolution process for international trade and business disputes. The course analyzes ad hoc and institutional arbitration, the authority of arbitral panels, enforcement of agreements to arbitrate, challenging arbitrators, procedure and choice of law in arbitral proceedings, and enforcement of international arbitral awards. The course will give special attention to the international convention on the recognition and enforcement of international arbitral agreements and awards (New York Convention) and the UNCITRAL (U.N. Commission of International Trade Law) arbitral rules and model law. It will focus on commercial arbitration as an international phenomenon and not on arbitration under any particular national system.

**LAW 655 International Human Rights**
Spring. 3 credits. 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 substantive norms of human rights, and their philosophic basis; the mechanisms for the protection of human rights, such as the United Nations and specialized agencies, international human rights commissions, and domestic courts; and current issues such as the doctrine of humanitarian intervention, the status of indigenous peoples, and human rights during armed conflicts, illustrated where possible through case studies of current situations.

**LAW 656 International Protection of Intellectual Property**
Spring. 2 credits. Recommended prerequisite: Intellectual Property.
J. Strauss.
This course studies intellectual property rights in the international legal system. A general introduction reviews the international protection of patents, trademarks, industrial design, and copyright. The starting and focal point is the Agreement on Trade Related Aspects of Intellectual Property (TRIPS) adopted in the framework of the World Trade Organization (WTO). The international protection of intellectual property is studied through consideration of the TRIPS agreement and the several international conventions and the observation of which is made mandatory for WTO Members by TRIPS. Also examined are issues of international court jurisdiction and applicable law in the area of intellectual property.

**LAW 659 Japanese Business Law**
Fall. 2 credits. H. Oda.
This course deals with the legal aspects of investment and trade in Japan. After a general introduction to the Japanese legal system (sources of law, administration of justice, and the legal profession including foreign attorneys), basic rules of corporate law are considered. This is followed by subjects such as contracts, restrictions on unfair trade practices, mergers and acquisitions, product liability, and intellectual property. Recent reform of the foreign investment code to the securities and exchange law are also covered. Finally, problems of international commercial litigation involving Japanese companies are addressed.

**LAW 660 Labor Law**
Fall. 3 credits. K. V. W. Stone.
A study of collective bargaining, including the process of union formation, legal regulation of strikes and other economic weapons, negotiation 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 law regulating the employment contract.

**LAW 661 Land-Use Planning**
A study of the legal matrix as a method of controlling the environment in which people live and work, including public nuisance as a device to control the town environment; zoning as a control mechanism; conflict between zoning as a plan for growth and as a brake on development; subdivision controls; planning as a respectable government activity; the dynamics of planning, zoning, subdivision controls, and use and use controls; the rehabilitation of-center-city syndrome; and future prospects of maintaining a decent environment in a multicultural society.

**LAW 662 Legal Aspects of Foreign Investment in Developing Countries**
This course will study legal aspects of foreign investments in developing countries. In addition to identifying the legal issues involved, it will discuss possible approaches to the solution of the problems. The course will include a discussion of the following topics: economic development and foreign capital; obstacles to investment; guarantees to investors and investment codes; nationalization; joint ventures; transfer of technology; international protection of foreign investment; processing and adjudication of trade law and settlement of disputes.

**LAW 663 Legislation**
Spring. 3 credits. L. I. Palmer.
This course explores various theories of legislation by studying how statutes become a source of public policy, how judges interpret them, and how lawyers draft them. Drafting exercises are used throughout the course to determine to what degree legislation can be used to reform law or to remedy particular social problems.

**LAW 664 Law and Medicine**
Fall. 3 credits. L. I. Palmer.
This course considers issues related to medical care and biomedical science. Topics include constraints on access to health care, organization and financing of health services, promoting quality of care in hospitals and outpatient sites, fraud and abuse in clinical practice and biomedical research, dilemmas engendered by therapeutic applications of new technologies, and pathways to reform of the U.S. health care system. Teaching materials will include a law and medicine casebook, and scientific literature.

**LAW 665 Law and Social Change**
Fall. 2 credits. G. Skupaska.
The course critically examines the law as an instrument of social change with reference to privatization and democratization processes taking place in central and Eastern Europe, and the growing cultural pluralism in Western, multicultural societies. Then the course will explore the more complex, mutual relations between law and social processes. The course is designed to give students an understanding of law as a social phenomenon, and to elucidate the connections of legal studies with sociology, anthropology, and political science.

**LAW 666 Law and Violence against Women**
Fall. 3 credits. Limited enrollment. B. Balos, M. L. Fellows.
This course will cover battering, sexual harassment, rape, prostitution, and pornography. The readings are interdisciplinary and are designed to provide students a framework for analyzing traditional legal reasoning. They are also designed to encourage students to consider how abilism, economic exploitation, heterosexism, racism, and sexism contribute to violence against women.

**LAW 668 Lawyers and Clients**
Fall. 3 credits. Satisfies the professional responsibility requirement. S. P. Koniak.
The usual vantage point of the law student and the lawyer is one outside the system of law. Law is something we study, shape, use, attack, or act upon in one way or another. That vantage point is, however, a creation of law itself and thus an illusion. This course examines the boundaries of that illusion. It examines the content of the law that governs lawyers. Agency law, criminal law, tort law, civil procedure, and the codes of ethics. It examines the roles that law creates for lawyers and the morality of those roles.

**LAW 669 Legal Aspects of Foreign Investment in Developing Countries**
Spring. 3 credits. M. B. Ndulo.
This course will study legal aspects of foreign investments in developing countries. In addition to identifying the legal issues involved, it will discuss possible approaches to the solution of the problems. The course will include a discussion of the following topics: economic development and foreign capital; obstacles to investment; guarantees to investors and investment codes; nationalization; joint ventures; transfer of technology; international protection of foreign investment; processing and adjudication of trade law and settlement of disputes.

**LAW 670 Legislation**
Spring. 3 credits. L. I. Palmer.
This course explores various theories of legislation by studying how statutes become a source of public policy, how judges interpret them, and how lawyers draft them. Drafting exercises are used throughout the course to determine to what degree legislation can be used to reform law or to remedy particular social problems.

**LAW 673 Negotiation**
Fall. 2 credits. Limited enrollment. M. D. Pinnisi.
This course is intended to develop methods and skills required for negotiation practice. Approaches to negotiation strategy formation, preparation, and conduct will be explored through discussion of selected readings and through class exercises. Students will engage in two or more mock negotiations in situations that typically involve lawyers.
and effectiveness of international law, the establishment and recognition of states, principles concerning state sovereignty, territory, and jurisdiction, the law of treaties, state responsibility, international environmental law, and human rights. Special attention will be given to the law governing the use of force.

**LAW 681 Roman Law and Modern Civil Law Systems**

Spring. 2 credits. A. Hausmaninger. Roman law has been the most influential legal system in Western legal history. The course will focus on selected areas of Roman law, including contract, tort, and property law. No prior knowledge of Latin is required. Limited enrollment. K. V. W. Stone.

**LAW 682 Secured Transactions**

Fall. 2 credits. J. Braucher. The course explores the use of security in commercial and consumer transactions. Specific subjects include creditor remedies, default, acceleration and cure, the creation and perfection of security interests, and defenses to security claims. The objective is to see secured credit as a system for lending and recovering money. Limited enrollment. R. W. Painter.

**LAW 683 Securities Regulation**

Fall. 3 credits. R. W. Painter. This course examines the federal system of regulation of the offering, sale and distribution of securities, including the Securities Act of 1933 and the Securities Exchange Act of 1934. Emphasis is placed on the structure, regulation, and consummation of securities transactions as part of the capital-raising process. The responsibilities of securities professionals are also reviewed. Limited enrollment. M. A. Livingston.

**LAW 684 Sports Law**


**LAW 685 Statistics and the Law**

Fall. 3 credits. Not available to students with prior training in inferential statistics without permission of instructor. Limited enrollment. P. S. McChesney. An introduction to statistical methods most commonly used in the law today, which assumes no prior knowledge of statistics. The course builds sequentially from elementary notions of probability and distributions to sophisticated topics in inferential statistics, including hypothesis testing and multiple regression analysis. Use of statistics in particular cases (e.g., employment discrimination) is studied, but the emphasis is on general technique. No final exam; grades are awarded on the basis of five take-home exercises distributed during the semester and a final statistical project of the student's choosing.

**LAW 686 Supervised Teaching**

Fall or spring. 1 or 2 credits. Arrange directly with instructor. See Law School Catalog.

**LAW 687 Supervised Writing**

Fall or spring. 1, 2, or 3 credits. A two- or three-credit supervised writing program may also fulfill the second writing requirement. Arrange directly with instructor. See Law School Catalog.

**LAW 688 Taxation and Business Planning**


This course examines the federal income taxation of corporations, partnerships, and limited liability companies in the context of specific business planning problems. The emphasis is on the practical significance of different tax regimes for choice of entity and design of business transactions. The course includes a significant writing component, one or more of which projects may be completed on a group basis.

**LAW 692 Trial Advocacy**

Spring. 3 credits. Prerequisite: Evidence. Limited enrollment. G. G. Galbreath. This course is devoted to the study of the trial. Fundamental skills in the design of alternative dispute mechanisms and includes six simulation and problem solving sessions.

**LAW 686 Supervised Teaching**

Fall or spring. 1 or 2 credits. Arrange directly with instructor. See Law School Catalog.

**LAW 687 Supervised Writing**

Fall or spring. 1, 2, or 3 credits. A two- or three-credit supervised writing program may also fulfill the second writing requirement. Arrange directly with instructor. See Law School Catalog.

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**LAW 692 Trial Advocacy**

Spring. 3 credits. Prerequisite: Evidence. Limited enrollment. G. G. Galbreath. This course is devoted to the study of the trial. Fundamental skills in the design of alternative dispute mechanisms and includes six simulation and problem solving sessions.
All problem courses and seminars satisfy the first or second writing requirement. Limited enrollment.

**LAW 700 Advanced Criminal Procedure Seminar: Post-Conviction Remedies**
Fall. 3 credits. J. H. Blume.
This seminar will explore various post-conviction remedies available to state and federal prisoners, including motions for new trial, state post-conviction proceedings, federal habeas corpus, and other extraordinary writs. A paper will be required.

**LAW 701 African Americans and the Supreme Court**
Spring. 3 credits. B. J. Holden-Smith.
Beginning with its first decisions related to the slavery question, the Supreme Court has at times aided and at other times hindered efforts to afford African Americans full citizenship. This course explores the relationship between blacks and the Supreme Court by examining three of the Court's decisions affecting African Americans and attempting to understand those decisions in their historical contexts. The course begins with a review of the background and meaning of the constitutional provisions promising the status of blacks in the new nation and ends with an intensive look at Brown v. Board of Education.

**LAW 702 American Legal Theory**
Fall. 3 credits. R. S. Summers.
The fall 1997 topic for this seminar is the formality of basic types of legal phenomena such as criteria of valid law (for both publicly and privately made law), 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 formality in many important ways and a heavy price is paid for this. However, legal formality and its distinctive underlying rationales (general legal principles) generally 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 omni-competent problem-specific policies that also inform the law's content. In this seminar, there is about equal emphasis on practical skills and theory.

**LAW 704 Biblical Law**
Fall. 3 credits. 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., Ten Commandments), law and religion (e.g., inquisitions 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., Semitic law, Jewish law, and Islamic law), and the religious expression of ideas (e.g., the Bible as a book of law and the law as a book of God).

**LAW 705 Children and the Law**
Fall. 3 credits. W. A. Kell.
Strategies for, and problems of, expanding constitutional and statutory protection of children's interests. Pervasive questions include: How do we determine the interest of the child? In what circumstances can we rely on the state to define and advance the child's interests? To what extent do parental rights limit state attempts to "help" the child? Can concepts of due process developed from rights adults enjoy ever suffice to protect the most basic interests of children? The course also covers the rights of children in adoption and custody proceedings, the rights of handicapped children, the rights of abused children, the procedural rights of children charged with delinquency, and the substantive limits on states with minors' liberty. A paper and two critiques are required.

**LAW 706 Class Actions, Mass Torts and Procedural Meltdown**
Fall. 3 credits. S. P. Koniat.
This seminar will examine the problems that plague class action practice today. We will concentrate on various practices in the settlement of mass tort class actions—problems such as collusion between class counsel and the defendant, inadequate notice to class members, extortion by objecting counsel and counsel's duty to check abuse. To study these problems we will examine a number of class actions in detail, including class settlements involving asbestos claims, and consumer fraud claims. We will also examine the proposed tobacco settlements. We will consider various solutions to the problems of class action abuse and whether class action practice as it is developing poses any real danger to our legal or democratic order. A paper is required.

**LAW 710 Constitutional Law and Political Theory**
Spring. 3 credits. S. H. Shiffrin.
The purpose of the seminar is to explore theories of freedom of speech and theories of equality. How are the ideas of freedom, equality, association, and community linked in doctrine, and are they still linked? Neoliberal, liberal, radical, feminist, and Marxist writings are considered.

**LAW 711 Constitutionalism and Social Progress**
Fall. 3 credits. G. Skapska.
The course will explore the idea of constitutionalism as an important factor in the processes of liberalization and democratization with reference to the postwar Germany, the emerging "new democracies" in Central and Eastern Europe, the Russian constitutionalism, and the emerging market economies (China). The principal subjects of the discussion are the division of powers, civic and human rights, and constitutional jurisdiction. The course tackles also the problem of civic, constitutional culture.

**LAW 714 Corruption Control**
Spring. 3 credits. R. C. Goldstock.
This seminar examines the factors that facilitate and inhibit public or private corruption and analyzes the wide variety of criminal, civil, and nontraditional approaches designed to control corruption and to promote governmental and commercial integrity.

**LAW 717 Employment Discrimination**
Fall. 3 credits. T. E. Eisen.
This seminar explores contemporary problems in equal-employment law. It focuses on legal issues involving Title VII, comparable worth, wrongful discharge, disability discrimination, age discrimination, and equal pay. Students are required to submit a paper as partial fulfillment of the requirements of the course.

**[LAW Ethnic Conflict and International Law**
3 credits. Recommended prerequisite: International Human Rights or Public International Law. Not offered 1997-98.
This seminar examines the status and rights of ethnic, racial, religious, and national groups under international law, and considers the role of international law in developing an adequate response to intercommunal conflicts in Europe, Asia, and Africa. Topics include the sources of nationalism and ethnic conflict, pertinent individual and group rights, principles of humanitarian law and humanitarian intervention, the relationship between group identity and democracy, the role of international organizations in responding to ethnic conflict, and possible solutions to ethnic conflict, including secession, autonomy, and federalism.

**LAW 725 Family Law Seminar**
Fall. 3 credits. B. Colapietro.
This course is designed to familiarize the student with the practical problems facing the practitioner in family law cases. Students participate in negotiating separation agreements, presenting oral arguments of motions or a trial summation, understanding the foundations of law, and developing interviewing skills and client relationships. The philosophy of the family law practitioner and methods of dealing with clients involved in divorce, custody, and the like are covered. The emphasis is on method rather than substantive law.

**LAW 726 Federal Litigation Seminar**
Spring. 3 credits. D. Bordewieck.
This seminar is designed for students genuinely interested in being litigators. We will explore the "real world" of civil litigation in federal court, from commencement of a lawsuit through termination by some means other than trial. Particular attention will be given to local rules; complaints, answers; document requests and responses thereto; venue motions; preliminary injunction motions; discovery motions; summary judgment motions; nonparty discovery; sanctions; FRCP 26 disclosures and requirements; attorney-client privilege issues; and case management procedures and orders. Throughout we will endeavor to determine how one rationally litigates before frequently disinterested judges pursuing their own agendas and against counsel evidencing little regard for the rules or the law.

**LAW 727 Foundations of Employment Law**
Spring. 3 credits. D. Schwab.
This seminar studies labor markets to catalog ways they succeed and ways they fail, and assesses ways that labor market regulation attempts to promote market success. The seminar examines the labor law (regulation of unions) and employment law (regulation of nonunion workplace) topics are covered. Specific topics include: internal labor markets and contingent workers; the decline of unions; policies underlying the National Labor Relations Act; the erosion of the employment-at-will doctrine; and regulation of health care and pensions. To add perspective, the seminar will attempt a comparative examination of the legal systems of Canada, Japan, Germany, France, New Zealand, and Macedonia.
philosophical and legal sources will possibly include: John McDowell, Martha Nussbaum, Onora O'Neill, Ronald Dworkin, Martha Minow, Margaret Radin, Frederick Schauer, Robin West, and Duncan Kennedy.

**LAW 762 Professional Responsibility of the Business Lawyer**  
Spring. 3 credits. Satisfies the professional responsibility requirement. R. W. Painter. This seminar will focus on professional responsibility issues confronting business lawyers, with an emphasis on securities lawyers. Students will read and discuss excerpts from administrative enforcement and disciplinary proceedings, judicial opinions, novels about corporate lawyers, and testimony before Congress concerning lawyer ethics. Paper required.

**LAW 765 Selected Business Transactions Seminar**  
Fall. 3 credits. Recommended prerequisites: Corporations. Z. J. Shulman. An in-depth look at initial public offerings and acquisitions from a practitioner's point of view. With public offerings, the course will cover the applicable statutory framework, pre-offering corporate preparations (such as the implementation of poison pills and stock option plans), the due diligence process, the negotiation 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 transaction closing. Regarding acquisitions, the course will explore: financing alternatives, accounting treatment, due diligence, choosing an appropriate transaction structure (i.e., stock versus asset sale), antitakeover measures and related fiduciary duties, public company versus private company merger and acquisitions consideration, and crucial legal aspects of the acquisition, such as letters of intent, successor liability, continuity of employees and non-competition agreements.

**LAW Seminar on the Psychology of Law**  
3 credits. Not offered 1997–98. This seminar explores the implicit psychological assumptions embedded in legal doctrine and policy. The focus is primarily on various topics in tort and substantive criminal justice, such as the law's assumed ability to control human conduct through deterrent signals and its conception of reasonable behavior implicit in various doctrines of justification and excuse. The seminar seeks to compare these legal assumptions about how people think, behave, and react with actual findings from the fields of psychology and psychiatry.

**LAW 768 Separation of Powers**  
Spring. 3 credits. Prerequisite for LLM students: Constitutional Law and Administrative Law or permission of instructor. C. R. Farina. The last fifteen years have witnessed more debate about the nature and consequences of "separation of powers" than we have seen since the Founding Era. This seminar examines the ways this concept is understood and used by modern judges, legislators, executive officials, and scholars to justify, or to attempt to modify, the distribution of power within contemporary American government.

**LAW Sovereignty, Self-Determination, and Secession**  
3 credits. Not offered 1997–98. This seminar explores the evolution and meaning of the concept of statehood, the legal rules governing the formation, existence, and breakup of states, and the historical, political, and philosophical underpinnings of those rules. Topics include the conditions for statehood, the meaning of territorial integrity, the status of territorial entities other than states, the international status of peoples and their right to self-determination, possible bases for a right to secession, the legal consequences of secession, and the use of force to separate or hold together an existing state. Special attention will be given to applying these concepts to contemporary events.

**LAW 772 Tax Policy Seminar**  
Spring. 3 credits. Prerequisite: Federal Income Taxation. L. Kahng. This seminar analyzes the tax policy goals of fairness, simplicity, and economic efficiency, and examines how well the present tax system satisfies these goals. Specific topics include: progressivity of the tax rate structure, the use of the tax system to advance social policies, tax legislation in consideration of the family; comparison of income and consumption taxes.

**LAW The Religion Clauses of the First Amendment**  
3 credits. Prerequisite: Constitutional Law. Course not available to students who have already taken Civil Liberties Clinic. Not offered 1997–98. This course examines various issues relating to the First Amendment's establishment and free-exercise clauses. In the early part of the semester the seminar meets to discuss assigned readings. The later part is devoted to the presentation of seminar papers. Each student must submit a substantial paper on an approved topic and brief written critiques of two other students' papers.

**LAW Theories of Property**  
3 credits. Prerequisite: Property. Not offered 1997–98. This seminar explores the various ways that people have conceived of, or understood, property. The materials studied are eclectic and interdisciplinary. They include readings on slavery and property, women and property, community interests in property, as well as classical theories (libertarian, utilitarian, Marxian.).

**LAW 776 United Nations, Elections, and Human Rights**  
Fall. 3 credits. M. B. Ndulo. This seminar will focus on elections and human rights. To what extent is the conduct of public affairs a basic human right increasingly prized by people throughout the world. Universally the right to take part in government is proclaimed and guaranteed by the Universal Declaration of Human Rights and the International Covenant of Civil and Political Rights and is recognized in many other treaties and declarations. Sometimes free and fair elections necessitate international assistance to countries to aid them in fulfilling international human rights standards, and cooperation in establishing and strengthening the legal, technical and physical infrastructures necessary to carry out elections. This seminar will explore the basic international human rights principles relating to free and fair elections and the right to take part in government.

**LAW 777 Voting and Political Participation**  
Spring. 3 credits. Prerequisite: some previous experience with legal materials (case studies, statutes) will be helpful, but it is not required. K. Abrams. This course will explore the meanings assigned to political participation in the American political system and examine a series of instances in which the law has been used to enhance, equalize, or otherwise regulate voting and other forms of political participation. These cases may be in the state investigating the problematic rationality of political participation, examining several arguments for participation notwithstanding the low probability that any participant's vote will have an effect on governmental agencies. We will then use a brief survey of historical and contemporary denials of the franchise to shed further light on the meaning(s) of political participation. The second part of the course will turn to the question of who should have the right of the vote, examining the merits and proper scope of plebiscitary democracy, the problem of apportionment resolved and created by the "one persons, one vote" rule; and efforts to facilitate minority political participation under the Constitution and the Voting Rights Act.

**LAW 781 Capital Punishment Clinic**  
Spring. 3 credits. J. H. Blume, S. L. Johnson. This course is taught as a clinic. Two (or possibly three) cases from the South Carolina Death Penalty Project will be worked on by students. These cases may be in the state postconviction relief stage or the federal habeas corpus stage, depending on the vagaries of litigation and the needs of the South Carolina Death Penalty Project. Students will read the record, may assist in drafting the initial pleading (an application for postconviction relief or a federal habeas petition), and/or may then assist in the preparation of briefs. Students are included in discussion regarding the necessary investigation and the thought process about the case.

**LAW 782 Community Lawyering Clinic**  
Fall. 6 credits. Requires simultaneous enrollment in Legal Aid Clinic 1 or Legal Aid Clinic 2. (Six hours combined credit for both courses.) N. L. Cook. In this clinic students will both represent individual clients and engage in collaborative problem solving with community agencies. Small groups of students will work together and with local service providers to identify issues in the community and determine ways in which lawyers can assist in resolving the problems. Students will be expected to spend several hours per week at a community agency meeting with individual clients and participating in the work of the agency. Possible areas in which students may focus attention include youth/education, parenting/ criminal defense, and family violence/divorce. Seminar will stress collaboration, interdisciplinary problem-solving, creative lawyering skills, and lawyers roles in community contexts.
The course has both 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 component of the course provides an introduction to government benefits law by examining various need-based benefit programs including Temporary Assistance to Needy Families (TANF), Supplemental Security Income (SSI), and Food Stamps. Case handling involves the representation of clients in government benefits cases (public assistance, food stamps, unemployment insurance, Medicaid, SSI, etc.) involving both the Tompkins County Department of Social Services, the N.Y.S. Department of Labor and the Social Security Administration. The course also includes a lawyering skills classroom component because students are simultaneously enrolled in Legal Aid 1 or 3 (see the descriptions below).

**LAW 785 Government Benefits Clinic/Neighborhood Legal Services Externship**

Spring. 5 or 6 credits. This course is a combination of Government Benefits and the Neighborhood Legal Services Externship and either Legal Aid Clinic 1 or Legal Aid Clinic 2. Students are required to register for both courses when combined with LA1; 5 hours when combined with LA3.

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 additional details.

**LAW 792 Legal Aid Clinic 2**

Fall. 4 credits. Prerequisite: Legal Aid Clinic 1. This clinic offers multiple courses that include the LAI classroom component, and help supervise participants in Legal Aid Clinic 1. Cases are handled as described in the course description for Legal Aid 1. Students represent the clinic's clients in both federal and state courts.

**LAW 793 Legal Aid Clinic 3**

Fall or spring. 3 credits. Prerequisite: Legal Aid Clinic 1 or a clinic course that includes the Legal Aid Clinic 1 classroom component. Students handle legal aid cases, participate in a classroom component, and help supervise participants in Legal Aid Clinic 1. Cases are handled as described in the course description for Legal Aid 1. Students represent the clinic's clients in both federal and state courts.

**LAW 794 Legislative Externship**

Fall or spring. 3 credits. B. Strom. The students work with the local New York State Member of Assembly. Work involves drafting legislation, tracking legislation for constituents, legal research and writing, responding to constituent requests that particularly require legal research or an explanation of law. The emphasis is on learning about legislative process, drafting legislation, understanding the reasons for statutory ambiguity, and developing various skills. There are several informal meetings with the faculty supervisor during the semester with readings and group discussions related to the externship experience.

**LAW 795 Neighborhood Legal Services Externship**

Fall or spring. 3 to 4 credits. Requires simultaneous enrollment with Legal Aid Clinic 1, Legal Aid Clinic 2, or Legal Aid Clinic 3. Students handle legal aid cases, participate in a classroom component, and help supervise participants in Legal Aid Clinic 1. Cases are handled as described in the course description for Legal Aid 1. Students represent the clinic's clients in both federal and state courts.

**LAW 796 Public International Law Clinic**

Fall. 3 credits. Prerequisites: Public International Law or International Human Rights. D. Wippman. Students will prepare legal memoranda and policy proposals for foreign governments and international organizations. The memoranda will be prepared in coordination with the Public International Law and Policy Group, a nonprofit organization that provides pro bono advice on issues of public international law to governments, NGO's, and international organizations. Possible subject areas include minority rights, border treaties, citizenship and nationality disputes, state succession issues, and war crimes.

**LAW 797 Religious Liberties Clinic**

Fall and spring. 4 credits. Year-long offering. G. G. Galbreath, G. J. Simpson. Students work in teams on cases provided by organizations that handle Establishment and Free Exercise Clause cases. All students do substantial research and writing, and some may draft portions of briefs. To help ensure that students have the opportunity to take a case to completion (or at least to the next stage of litigation), this is a full-year course, with students required to register for both semesters for a total of four credit hours and a grade at the end. Given the nature of litigation, demands on student time may be sporadic, and students should be prepared to do some work over intersession if court deadlines so require.

**LAW 798 Women and the Law Clinic**

Fall or spring. 5 or 6 credits. Requires simultaneous enrollment in Legal Aid Clinic 1, Legal Aid Clinic 2 (6 hours combined credit for both courses), or Legal Aid Clinic 3 (5 hours combined credit). B. Balos (fall), J. M. Miner. Students will represent women clients who have legal matters primarily in the family law area (divorce, custody, support, domestic violence). Students will also participate in the lawyering skills classroom component of Legal Aid 1, 2, or 3. An additional 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 women and the law.
FACULTY ROSTER

Abrams, Kathryn, J.D., Yale U. Prof.
Alexander, Gregory S., J.D., Northwestern U. Prof.
Balos, Beverly, J. D., U. of Michigan. Visiting Clinical Prof.
Barceló, John J., III, S.J.D., Harvard U.
William Nelson Cromwell Professor of International and Comparative Law
Blume, John H., J.D., Yale U. Visiting Prof.
Braucher, Jean J., J.D., Boston U. Visiting Prof.
Clemont, Kevin M., J.D., Harvard U.
James and Mark Flanagan Professor of Law
Clymer, Steven D., J.D., Cornell U. Asst. Prof.
Cramton, Roger C., J.D., U. of Chicago.
Robert S. Stevens Professor of Law
Cripps, Yvonne M., Ph.D., U. of Cambridge.
Visiting Prof.
Eisenberg, Theodore, J.D. U. of Pennsylvania.
Henry Allen Mark Professor of Law
Farina, Cynthia R., J.D., Boston U. Prof.
Fellows, Mary Louise, J. D., U. of Michigan. Visiting Prof.
Garvey, Stephen P., J.D., Yale U. Assoc. Prof.
Edward Cornell Law Librarian and Professor of Law
Green, Robert A., J.D., Georgetown U. Assoc. Prof.
Haussmaninger, Herbert, Dr.jur., Graz. Visiting Prof.
Hay, George A., Ph.D., Northwestern U.
Edward Cornell Professor of Law and Professor of Economics in the College of Arts and Sciences
Henderson, James A., Jr., LL.M., Harvard U.
Frank B. Ingrossi 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.
Assoc. Prof.
Johnson, Sheri L., J.D., Yale U. Prof.
Kahng, Lily, J.D., Columbia U. Assoc. Prof.
Kent, Robert B., LL.B., Boston U. Prof.
Emeritus
Koniak, Susan P., J. D. Yale U. Visiting Prof.
Livingston, Michael A., J. D., Yale U. Visiting Prof.
LoPucki, Lynn M., LL.M., Harvard U. A. Robert Noll Professor of Law
Macey, Jonathan K., J.D., Yale U.
J. DuPratt White Professor of Law
Marin, Philippe, J.D., Agrégé de Droit Public.
Visiting Prof.
Martin, Peter W., LL.B., Harvard U.
Jane M. Foster Professor of Law
McChesney, Fred S., Ph.D., U. of Virginia. Prof.
Nance, Dale A., J.D., Stanford U. Visiting Prof.
Ndulo, Muna B., D. Phil., Trinity C. Visiting Prof.
Oda, Hiroshi, LL.D., Tokyo U. Visiting Prof.
Osgood, Russell K., J.D., Yale U. Prof.
Painter, Richard W., J. D., Yale U. Visiting Prof.
Palmer, Larry J., LL.B., Yale U. Prof.
Rachlinski, Jeffrey J., Ph.D., Stanford U. Assoc. Prof.
Roberts, Ernest F., LL.B., Boston C.
Edwin H. Woodruff Professor of Law Emeritus
Rossi, Faust F., J.D., Cornell U.
Samuel S. Leibowitz Professor of Trial Techniques
Ruddin, Bernard, D.C.L., Oxford U. Visiting Prof.
Schneyer, Theodore J., LL. B., Harvard U.
Visiting Prof.
Schwab, Stewart J., Ph.D., U. of Michigan. Prof.
Sherwin, Emily L., J. D., Boston U. Visiting Prof.
Shiffrin, Steven H., J.D. Loyola U. of Los Angeles. Prof.
Siliciano, John A., J.D., Columbia U. Prof.
Simson, Gary J., J.D. Yale U. Prof.
Skapska, Grażyna, Ph.D., Polish Academy of Sciences. Visiting Prof.
Stone, Katherine V. W., J.D., Harvard U. Prof.
Straus, Joseph, Dr.jur., Munich. Visiting Prof.
Summers, Robert S., LL.B., Harvard U.
William G. McRoberts Research Professor in the Administration of the Law
Prof.
Wippman, David, J.D., Yale U. Assoc. Prof.
Wolfram, Charles W., LL.B., U. of Texas.
Charles Frank Reavis Sr. Professor of Law

Lecturers

Cook, Nancy L., J.D., Georgetown U. Senior Lecturer
Galbreath, Glenn G., J.D., Case Western Reserve U. Senior Lecturer
Kell, William A., J.D., Wayne State U. Visiting Lecturer
Miner, JoAnne M., J.D., U. of Connecticut.
Senior Lecturer and Director, Cornell Legal Aid Clinic
Seibel, Robert F., J.D., Northeastern U. Senior Lecturer
Strom, Barry, J.D., Cornell U. Senior Lecturer

Academic Library Staff

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Reference librarian
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Reference librarian

Members of Other Faculties

Associated with the Law School

Carmichael, Calum M., B. Litt., Oxford U.
Prof. College of Arts and Sciences
Hyams, Paul R., D. Phil., Oxford U. Assoc. Prof. College of Arts of and Sciences

Adjunct Faculty Members

Beresford, H. Richard, M.D., U. of Colorado. Adjunct Prof.
Blyth, John E., Dr.jur., Goethe U. Adjunct Prof.
Bordewieck, Douglas, J.D., Harvard U. Adjunct Prof.
Bridges, W. Buckley, J.D., Georgetown U. Adjunct Prof.
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Goldstock, Ronald G., J.D., Harvard U. Adjunct Prof.
Hanks, James L., Jr., LL.M., Harvard U. Adjunct Prof.
Levao, Richard A., J.D., Cornell U. Adjunct Prof.
Mingle, James J., J.D., U. of Virginia. Adjunct Prof.
Pinnisi, Michael D., J.D., Cornell U. Adjunct Prof.
Shulman, Zachary, J.D., Cornell U. Adjunct Prof.
Talbott, John, J.D., Cornell U. Adjunct Prof.
Yale-Loehr, Stephen W., J.D., Cornell U. Adjunct Prof.
JOHNSON GRADUATE SCHOOL OF MANAGEMENT

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Catherine M. Davidson, managing editor
Linda Pike, managing editor

The Johnson Graduate School of Management prepares men and women for managerial careers in business. The school offers courses 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 an 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 in undergraduate study in arts and sciences, and about one-quarter in engineering. Five percent of the students begin their graduate training immediately after receiving their bachelor's degrees and the remaining 95 percent following work experience.

Combined degree programs allow highly qualified Cornell students to co-register in the Johnson Graduate School and a second undergraduate program leading to the Master of Business Administration (M.B.A.) degree. Nearly half of the students have a background in undergraduate study in arts and sciences, and about one-quarter in engineering. Five percent of the students begin their graduate training immediately after receiving their bachelor's degrees and the remaining 95 percent following work experience.

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, Malott Hall.

Students in other graduate programs and undergraduate students registered within 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
This course provides a disciplined look at the entrepreneur and small business management. It deals with the formation and the acquisition of enterprises from the viewpoint of individuals who desire to become the principal owners. Reviews include legal and tax aspects, valuation techniques, organization forms, and venture-capital sources, as well as planning techniques necessary to launch a successful venture.

NCC COMMON CORE COURSES

NCC 500 Financial Accounting
Fall. 3 credits. Johnson School core course. Enrollment limited. R. Libby, J. D’Souza.

An introductory accounting course that examines the subject from the viewpoint of users external to the organization. Topics include transactions 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. 3 credits. Johnson School core course. Enrollment limited. J. McClain, D. Wittink.

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. Some knowledge of calculus required.

NCC 502 Microeconomics for Management
Fall. 3 credits. Johnson School core course. Enrollment limited. R. Frank

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 government. The class employs a lecture format and emphasizes problem solving. Grading is based on two midterms and a final exam.

NCC 503 Marketing Management
Fall. 3 credits. Johnson School core course. Enrollment limited. D. Stayman, J. Russo.

The course addresses controllable and uncontrollable marketing variables that managers in multiproduct firms face in today's business environment. Topics include market research, consumer behavior, product planning, distribution, advertising and promotion, pricing, international and competitive strategy. Separate graduate and undergraduate sections are offered in the fall.

NCC 504 Management and Organizations
Fall, spring. 3 credits. Johnson School core course. Enrollment limited. B. Nelsen, D. Sally.

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 rearchitecture and reengineering, what firms gain and lose through pursuing core competencies, and what firms gain through strategic alliances and networks. The course makes extensive use of case materials.

NCC 506 Managerial Finance
Fall, spring. 3 credits. Johnson School core course. Enrollment limited. Prerequisites: completion of or concurrent enrollment in NCC 500 and NCC 501.

J. Hass, R. Michaely, H. Bierman.

An introduction to business finance through theory and case studies. Topics include the capital-budgeting decision, portfolio theory, the asset-pricing models, capital structure, mergers and acquisitions, costs of capital, option pricing, and international finance.

NCC 508 Operations Management
Spring. 3 credits. Johnson School core course. Enrollment limited. Prerequisite: NCC 501 or permission of instructor.

L. Robinson, M. Lojo.

Operations management deals with the problems of producing and delivering goods and services, topics that are of strategic importance.
importance in almost every organization. Production scheduling is a significant problem for manufacturing firms; smooth work flow and quality control are important in banking operations; inventory control is crucial in large retail establishments, and proper task sequencing is a major problem in the construction industry. The course deals with those and other problems, from a managerial viewpoint. The course is designed around managerial problems in the operations area. Students use case studies to improve skills in problem identification.

NBA MANAGEMENT ELECTIVE COURSES

Accounting

NBA 500 Intermediate Accounting
Fall, spring. 3 credits. Prerequisite: NCC 500 or equivalent. Staff.
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 501 Accounting for Mergers and Consolidations
Spring, first half of semester. 1.5 credits.
Prerequisite: NBA 500 or permission of the instructor. R. Libby.
The course deals with accounting problems related to equity financing, including equity restructurings, hybrid securities, intercorporate investments, consolidated reports, proforma statements for a merger prospectus, and other related financial reporting problems. The method of instruction is lecture mixed with cases. Grading is based on two exams. First half of semester. Course continues in NBA 508, Advanced Accounting, offered second half of semester.

NBA 502 Managerial Cost Accounting
Fall, spring. 3 credits. Prerequisites: NCC 500, NCC 501, and NCC 502, or the equivalent. R. Bloomfield, R. Hilton.
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-price-volume decisions, performance measurement, nonmanufacturing costs, 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
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 non-value-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 505 Auditing
Spring. 3 credits. Prerequisite: NCC 500 or permission of the instructor. M. Nelson.
The course examines the process by which financial-accounting systems are audited. Topics include ethics, the meaning of audit reports, the legal liability of auditors, the study and evaluation of internal control systems, and various approaches for testing account balances. Problems, cases, and video simulations are used to illustrate concepts.

NBA 506 Business Analysis and Security Valuation
Fall, spring. 3 credits. Prerequisites: NCC 506, NBA 500 (or concurrent enrollment), or permission of instructor. C. Lee.
The focus of this course is on using accounting-based information to make business decisions. We consider a variety of decision contexts, including strategic ratio analyses, cash flow projections, security valuation, quality of earnings assessments, equity trading strategies, M&A fairness opinions, credit decisions, bankruptcy predictions and bond ratings. Our goal is to gain an appreciation for both the usefulness and limitations of accounting date in performing these tasks. Emphasis is on practical applications and special attention is given to cultivating your analytical and communication skills.

NBA 508 Advanced and International Accounting
Spring, second half of semester. 1.5 credits.
Prerequisites: NBA 501 or permission of the instructor. J. Elliott.
The course examines advanced topics in accounting for intercorporate investments, including leveraged buy-outs, international transactions and international subsidiaries, joint ventures, spin-offs, and other related financial reporting problems. The method of instruction is lectures mixed with cases. Grading will be based on two exams. Second half of semester. Continuation of NBA 501, Acctg for Mergers & Consol. (offered first half of semester).

Economics

[NBA 520 Pricing and Strategy]
This course extends material introduced in the core microeconomics course, where the focus is on pricing decisions. The course is taught very much like the core microeconomics course; i.e., the course consists mostly of lectures and problem sets that utilize the ideas contained in the lectures. One difference is that some understanding of calculus is required. The grading for the course is based on a midterm exam, a final exam, and a paper. Specific topics covered include price discrimination, peak-load pricing, product line pricing, and demand pricing when information is asymmetric.

[NBA 522 Managerial Economics]
3 credits. Not offered 1997-98.
A. McAdams.
Students review microeconomic theory and then apply it in a number of real-world situations. They explore the relationship between micro-theory and decisions for capital investments through concrete case-study applications. Those include problems related to the appropriate timing for the insertion of new technology (for example, whether it is preferable to buy an existing tanker or to wait for the next iteration of the technology). Also explored are complex pricing decisions, including peak-load pricing. The sequential relationships among those various applications of microeconomic theory are examined. The format of the course is that of a lecture-discussion.

NBA 523 Forecasting Time Series
Fall, second half of the semester. 1.5 credits.
Prerequisite: statistics core course or the equivalent. R. Highfield.
The course will focus on statistical and econometric approaches to forecasting business and economic time series. The course provides students with a toolbox of time series forecasting methods and teaches them how to choose the appropriate one. Topics will include univariate methods such as ARIMA modeling, some multivariate methods such as transfer functions and regression, as well as the relationship of forecasting to decision making. Applications will usually involve the forecasting of financial and economic data. Although statistical theory will be covered as necessary, emphasis will be on applications. Students will be evaluated on class participation, and both individual and group projects. There are no exams.

NBA 524 Macroeconomics and International Trade
Fall. 3 credits. Prerequisite: NCC 502 or equivalent or permission of the instructor. G. Staller.
The course applies basic macroeconomic theory to such problems as inflation, unemployment, economic growth, and productivity and examines how these problems interact with international trade and finance. Students learn to be informed observers of national and international economic policies and discerning users of economic analyses and forecasts. A lecture/discussion format is used as the method of instruction.

[NBA 526 Business and Economic Forecasting]
Not offered in 1997-98. 3 credits.
Prerequisite: NCC 501 or equivalent. R. Highfield.
This course provides students with a toolbox of useful, proven time-series forecasting methods and teaches them how to choose the appropriate one. Topics include the Box-Jenkins method and more traditional forecasting methods, the prediction of turning points, combinations of methods, and the relationship of forecasting to decision making. Application, rather than theory, is emphasized.

NBA 527 Applied Price Theory (also ECON 516)
Spring. 4 credits. Letter/S-U optional grading. R. Frank.
The course emphasizes applications of the principles of price theory to a variety of problems taken from concrete, practical settings.

NBA 528 Information and Incentives in Organizations
Fall, spring. 3 credits.
R. Gibbons.
Explores the role of information, incentives, and strategic behavior in shaping the internal structure and practices of organizations.
Consists of three major sections: compensation and incentives (including performance pay, distortionary performance measures, and subjective performance assessments), human resource management for general managers (including labor market mobility, up-or-out rules, and self-managed teams), and organizational design and performance (including communication, decentralization, and reengineering). Instruction is via lectures (about 50 percent, more toward the beginning) and case discussions. The discussions often involve mathematical models that are abstract but not technical. Pedagogical strategy is to use models as coherent frameworks for organizing the welter of facts presented in each case. Evaluation is via two take-home midterms (involving problems related to models discussed in class), five 2-page case write-ups; one group project (including longer write-up and class presentation); and class participation (particularly in case discussions where no write-up is required).

**Finance**

**NBA 540 Financial Policy Decisions**

Spring. 3 credits. Prerequisite: NCC 506 or the equivalent. H. Bieman.

An introduction to basic and advanced financial decision models, developed from the viewpoint of the financial manager, for different methods of corporate financing. Topics include leases and bonds, preferred stock and convertible securities, common stock, capital structure and cost of capital, dividend policy, interest-rate swaps, leveraged buy-outs, and mergers and acquisitions. The format is lectures, discussions, and a few very brief case studies. Grades are primarily based on two examinations, but significant contributions in class are also relevant. Two to four visiting financial executives conduct classes.

**NBA 541 Economic Evaluation of Capital Investment Projects**

Fall, spring, 3 credits. Prerequisite: NCC 506 or permission of the instructor. B. Swaminathan, S. Smith.

This course deals with the evaluation of capital investment projects under uncertainty. The first part of the course focuses on traditional capital budgeting techniques using the discounted cash flow approach. This involves the estimation of cash flows, the treatment of risk and discount rates, the role of inflation and taxes, and the use of simple factor and multifactor asset pricing models in determining discount rates. The second part of the course focuses on the valuation of future investment opportunities, with an emphasis on using option pricing techniques. This includes issues such as flexibility options, options on real assets, evaluation of natural resource investments, and evaluation of new product investments. The methods of instruction are lectures, case discussion, spreadsheet exercises, statistical exercises, and seminars by practitioners. Students are evaluated on the basis of midterm and final examinations, cases, and homework assignments.

**NBA 542 Investments and Portfolio Analysis**

Fall, spring, 3 credits. Prerequisites: NCC 501 and NCC 502. Recommended: NBA 624.

This course covers the pricing of financial assets and instruments such as securities, bonds, options, and futures; the concepts of diversification, market efficiency, and risk-and-return relationships for (portfolios of) securities. The approach balances rigor and mathematical simplicity, but this is an essentially quantitative course. Students must be comfortable with statistics, regression analysis, and quantitative analysis as these tools will be routinely used from the beginning of classes. Students should also be able to perform statistical analysis on computer packages (e.g., Minitab) and program worksheet packages (e.g., Lotus or Excel). The course will give the students a good view of the paradigms of asset valuation and their implications for financial asset management.

**NBA 543 Financial Markets and Institutions**

Fall. 3 credits. Prerequisite: NCC 506. M. O'Hara.

The course develops a framework for discussing financial intermediation. It analyzes the sources, uses, and pricing of funds in the economy and the various roles of banks and other financial intermediaries. Students explore the theory of commercial banking, study how central bank operations affect financial institutions, and learn when lending can be securitized and how such markets work. They also learn how the money market and the financial futures market operate. Quantitative techniques are used in economic theory.

**NBA 544 Bank Management**


The course provides an in-depth treatment of management issues in commercial banking. Topics include management of bank assets, credit decisions and pricing, information problems, bank performance evaluation, international lending, and strategic planning. Students learn concepts through case studies and participate in a bank-simulation exercise.

**NBA 545 Corporate Financial Policy and Investment Strategies**

3 credits. Prerequisite: NCC 506. R. Michaela.

Students in the course will deal with frontier topics in corporate finance and investment strategy. The course objective is to enable students to be better aware of financial situations that may be encountered in the future. From the perspective of either a corporate financial officer or an investor (such as a money manager), the basics for understanding corporate financial products is to understand the driving forces behind their creation. We analyze the factors that may affect corporate financial decisions: (1) taxes (both corporate and individual), (2) contracting (between managers and shareholders, and between shareholders and other claim holders such as bond holders), (3) asymmetric information, and (4) transaction costs. We explore the effects of each of these factors on the decision about the optimal mix of debt and equity in the firm's capital structure and on its investments decisions. After mastering the basics, we move to more advanced topics such as leveraged buyouts, restructurings, capital structures, and mergers and acquisitions. Issues raised in the cases are addressed in student presentations and class discussions. Several topics in the course are based on studies of 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 includes both the role of financial institutions in the intermediary-client relationship and this course will look at these issues from both an economic and legal perspective. Emphasis will be placed on the intersections between modern finance theory and legal analysis.

**NBA 546 Introduction to Derivative Securities**

Fall, spring, 3 credits. Prerequisite: NCC 506 (Finance Core) or permission of the instructor. R. Gulhal, F. Diz.

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. Fixed income derivatives are covered in NBA 555. The method of instruction is primarily lectures, supplemented by guest speakers. A midterm and a final exam comprise roughly half the grade, with the remaining half determined by assignments and class participation. The course is a prerequisite for NBA 550, Advanced Topics in Derivative Securities.

**NBA 547 Applied Financial Engineering**

Also OR&IE 565

Spring. 3 credits. Prerequisites: NCC 506, NBA 546, NBA 550, NBA 544, OR&IE 523, OR&IE 523, OR&IE 521, R. Jarrow, D. Heath.

This course is designed to integrate the students' course work in engineering (computing, stochastic modeling) and finance (or quantitative analysis) in order to provide students with a solid grounding in modern finance theory and legal analysis. Emphasis will be placed on the intersections between modern finance theory and legal analysis. The course format will be a mixture of lectures by faculty, industry professionals, and students (project presentations).

**NBA 550 Current Topics at the Crossroads of Law and Finance**

Spring. 3 credits. M. O'Hara.

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 includes both the role of financial institutions in the intermediary-client relationship and this course will look at these issues from both an economic and legal perspective. Emphasis will be placed on the intersections between modern finance theory and legal analysis.

**NBA 552 Case Studies in Finance**

Spring. 3 credits. Prerequisites: NCC 506 or the equivalent. Recommended: NBA 540. Course is restricted to second-year or 12-month option students. Letter/S/U optional grading. H. Bieman.

Students study and discuss finance cases. Most of the cases deal with corporate finance, but some treat other areas such as investment banking and securities investing. Issues raised in the cases are addressed in student presentations and class discussions. Issues raised in the cases are addressed in student presentations and class discussions. Several topics in the course are based on studies of 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 includes both the role of financial institutions in the intermediary-client relationship and this course will look at these issues from both an economic and legal perspective. Emphasis will be placed on the intersections between modern finance theory and legal analysis.

**NBA 553 Finance and Accounting for Manufacturing**

Spring. 3 credits. Course intended for non-Johnson School students only. J. D'Souza.

The course focuses basic financial and cost accounting, the economic and financial
The primary perspective is that of the venture risks, developing and negotiating investment subsequent management of such ventures. NBA 557 Case Studies in Venture Topics to be studied include: the term interest rates, credit risk spreads, and structure of interest rates, interest rate swaps hedging, and risk management of fixed questions. Analysis develop research skills and illustrate assignments and a term project requiring data basic themes. These range from corporate examples, and applications from the three of the class presents a variety of problems, NBA 555 Fixed Income Securities and international diversification. The second part first part of the class outlines three basic principles to a variety of problems. The teaching methods familiarize students with key concepts in cost of capital investment projects, and 4) to make students aware of financing alternatives, their risks and benefits. The teaching methods consist of lectures and cases. Students are evaluated on the basis of exams and case presentations.

NBA 554 International Finance Fall, spring 3 credits. Prerequisite: NCC 506. W. Bailey. This course applies principles of finance to the international setting. International finance is a different perspective. Firstly, 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 on these issues and highlight how finance theory can be extended to address them. We start with basic principles of international finance, then apply those principles to a variety of problems. The course helps students to understand the ideas and research results of international finance and to adapt what they learn to the practical problems of the increasingly globalized business world beyond the classroom. The first part of the course 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, examples, and applications 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 develop research skills and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

NBA 555 Fixed Income Securities and Interest Rate Derivatives Fall, spring 3 credits. Prerequisites: NCC 506, NCC 501. R. Jarrow. 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 an integral part of the class content.

NBA 557 Case Studies In Venture Investment and Management Fall, semester 1.5 credits. Prerequisites: NCC 500 and NCC 506 or concurrent enrollment. W. Thomas. A series of cases that focus on the venture capital investment process and on the subsequent management of such ventures. The primary perspective is that of the venture capitalist in assembling and evaluating information, preparing forecasts, assessing risks, developing and negotiating investment structure and terms, and deciding whether to invest. Cases also focus on management and financial problems and policy issues and the relationship between venture capitalists and entrepreneurs. The secondary perspective is that of the entrepreneur and the techniques and skills employed in managing growing enterprises. Presentations by venture capitalists and entrepreneurs will supplement student discussion and analysis of cases. Grades will be based on written report, quality of classroom participation, and a final exam.

NBA 558 Corporate Financial Policy Fall, first half of semester. 1.5 credits. Prerequisite: NCC 506. R. Michaely. The course will deal with frontier topics in corporate finance and investment strategy. The course objective is to enable you to better analyze financial situations you may encounter in the future, as well as firms' valuation techniques. The tools developed in the course will enable you to understand (and maybe even enhance) the financial product opportunities for companies of all types and highlight how finance theory can be extended to address them. We start with basic principles of international finance, then apply those principles to a variety of problems. The course helps students to understand the ideas and research results of international finance and to adapt what they learn to the practical problems of the increasingly globalized business world beyond the classroom. The first part of the course 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, examples, and applications 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 develop research skills and illustrate academic concepts. Exams consist of computational, short answer, and short essay questions.

General Management

NBA 560 Business Law I (also ARME 320) Fall. 3 credits. 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 ARME 321) 3 credits. Prerequisite: NBA 560 or permission of the instructor. D. Grossman. The course examines business organizations and the principles of commercial law affecting businesses. Topics include secured transactions, bankruptcy, commercial-paper, antitrust, consumer-protection, security-regulation, and environmental-protection laws. Text readings and case studies are used.

NBA 562 Estate Planning (also ARME 422) Fall. 1 credit. 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 564 Entrepreneurship and Enterprise Fall, spring. 3 credits. D. BenDaniel. The course uses Cornell-developed case studies and lectures to address entrepreneurial management in start-up ventures and new-business development in existing companies.

Among the topics covered are valuation of business, planning, obtaining resources, management of growth, and cashing out. Guest lecturers speak on specialized topics such as corporate and patent law, bankruptcy and workouts, and potential sources of capital. Among the topics covered are valuation of business, planning, obtaining resources, management of growth, and cashing out. Guest lecturers speak on specialized topics such as corporate and patent law, bankruptcy and workouts, and potential sources of capital. Students team up to write and present business plans. The course attempts to integrate marketing finance, operations, and human-resource topics in the context of high-growth business ventures.

NBA 565 Strategic Management Spring. 1.5 credits. Hass, Sally, Gibbons, M. Rosen. This course is comprised of three elements. The first element is the Cornell Management Game, a computerized management simulation that integrates the functional areas of accounting, marketing, operations and finance in a competitive, business strategy framework. The second element is a team presentation at the "Board of Directors' Meeting," which occurs at the end of playing the game. At that meeting, each team makes a presentation to its BOD regarding its successes and failures, lessons learned and current strategy. Erne & Young has agreed to send a team of their consultants to judge a contest with monetary payoffs in which the best team presentation from each industry is presented to them. The third element is another simulation played by teams in a manufacturing environment over the course of one day. This simulation integrates the OB/OS materials with Operations Management in a strategic context.

NBA 567 Management Writing Fall, spring (sections offered in both first and second halves of semester). 1.5 credits. S-U grades only. B. Mink, A. Pike, M. Hittleman. Students learn to write clearly and effectively by focusing on perspective, style, organization, and tone. Students learn to analyze and critique each other's work in class. A special section, emphasizing cultural differences, is reserved for students whose native language is not English.

NBA 568 Oral Communication Fall, spring (sections offered in both first and second halves of semester). 1.5 credits. S-U grades only. B. Mink, A. Pike, C. Rosen. Students learn to write clearly and effectively by focusing on perspective, style, organization, and tone. Students learn to analyze and critique each other's work in class. A special section, emphasizing cultural differences, is reserved for students whose native language is not English.

NBA 569 Management Consulting Fall. 3 credits. A. McAdams. The course is case-study oriented and focuses on strategic consulting and contemporary business challenges. The course is case-study oriented and focuses on strategic consulting and contemporary business challenges. The 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...
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 expertise making presentations and evaluating them. In addition, students are required to write a comprehensive analytic term paper.

NBA 570 Leadership in Management
Spring. 1.5 credits. MBA students only. Dyckman, CCL.

This course is an extraordinary partnership with the Center for Creative Leadership (CCL) to provide MBA students with the self-awareness and interpersonal skills required to be effective leaders. Training will be provided by professional staff from the Center for Creative Leadership.

NBA 571 Cornell Management Simulation
Fall, second half of semester. 1.5 credits. Restricted to second-year MBA students. S. Smidt.

This computer-based simulation is played by teams of four, self-selected 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 weekly 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 simulation, each team writes a Strategic Intent paper and the instructor's evaluation of team's performance at the BOD meeting.

NBA 573 Projects in Environmental Management
Spring. 3 credits. A. McAdams.

This is a project course of interdisciplinary teams focused on environmental issues faced by real world organizations: businesses, governmental agencies, not-for-profit institutions. The project teams are to establish a "contract" with their organization to achieve mutually agreed goals during the semester, with appropriate "milestones" to be completed at intermediate stages. Project outcomes will be provided to the host organization through a formal presentation and report at the end of the semester, and result in a formal case study of the issues involved. This course is taught jointly with Professor McAdams/Advanced Consulting course, NBA 575.

NBA 575 Advanced Consulting
Spring. 3 credits. Limited to 20 students. Priority given to students who have taken NBA 579. A. McAdams.

The course investigates the efficacy of "concept maps" as tools integral to the consulting process. In the first part of the course, recent case studies, both fictional and actual, are employed to review the use of concept maps in various corporate settings. Following that, the research base documenting Professor Novak's use of concept maps in many other settings is examined. In the final part of the course, student teams undertake field projects designed to determine the potential contribution of concept maps in various business settings.

NBA 576 The World Geopolitical Environment of Business
Fall. 3 credits. Letter/S/U optional grading. R. Lind.

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 democraacy 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 of the many examples of the changing world environment of business. The course provides students with a view of those fast-paced worldwide changes. Topics covered include developments in Western and Eastern Europe, the former Soviet Union, the Pacific Rim, Central and South America, the Middle East, and Africa, 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 577 The Political, Legal, and Regulatory Environment of Business
Spring. 3 credits. Letter/S/U optional grading. R. Schuler.

The political climate, laws, regulations and government arrange 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 (e.g., the responses of Exxon to the Exxon Valdez oil spill and Union Carbide to the Bhopal, India, gas leak and the decision of AT&T to accept the division of its company in response to an antitrust suit filed by the United States government). Environmental and waste-management concerns pointing to new laws and regulations that will affect many aspects of business well into the next century, 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 Business Ethics
Spring. 3 credits. R. Frank.

Students examine actual situations in business, both in the United States and abroad, that involve ethical issues affecting individuals and organizations. They are challenged to decide on appropriate ethical positions. Guest speakers include leading scholars from throughout the university and business and government leaders.

NBA 579 Cases in Business Strategy
Fall, first half of semester. 1.5 credits. Restricted to second-year MBA students. J. Suwinski.

Cases and current problems spanning a variety of industries and situations are used to develop an understanding and appreciation for business strategy principles. The course deals with issues such as ethical behavior, managing growth, employee empowerment, managing change, and achieving innovation. In addition to cases, class sessions will deal with principles and current situations described by visiting executives.

International Management

NBA 580 Strategies for Global Competitiveness
Spring. 3 credits. A. McAdams.

Initially, students explore the role of government in several private-market industrialized nations—Japan, France, Germany, the United Kingdom, and Italy—for lessons the United States might learn and use. They investigate the impact in each of those countries of government policies on the global competitiveness of the country's firms. Special emphasis is given to differential policies appropriate to each of a range of industries, from the mature to the high tech (including computers, telecommunications, and electronics), and to stages of development in each economy. Possible lessons are then tested for less developed countries that might include Venezuela and Malaysia and newly emergent countries such as Singapore.

NBA 583 Market Transitions in Eastern Europe
Fall, spring. 3 credits. D. Stark.

The course examines the problems and prospects of the transition from state socialism to a market economy in contemporary eastern Europe. Patterns of investment, enterprise decision making, labor markets, and property rights are examined from a comparative institutional perspective. The final part of the course is organized around the research interests of the seminar participants and includes such themes as privatization of state enterprises, the role of international monetary institutions, capital markets, new financial institutions, organizational restructuring, and the relationship between citizenship rights and property rights. Although the course focuses on recent changes in Hungary, Poland, and the Czech Republic, its content should yield insights for students interested in other societies (including China and the former Soviet Union) currently undergoing the transition from state socialism. Instructional methods used are lectures and discussion. Evaluation of students will be based on short papers on readings, class participation, a final paper and student presentations.

NBA 584 Management of the Multinational Corporation
Fall, spring. 3 credits. J. Katz.

This course introduces students to analytical frameworks and skills used in international management. The first half of the class focuses on international strategies, including selection and implementation of a competitive position. The second half covers comparative management (two focus countries are chosen each semester) and cross-national management. Topics include motivation in an international context, cross-cultural communication, and multinational team operations. The course is a mixture of lectures and cases. Grading is based on term papers, individual presentations, and participation. There are no prerequisites, but a real interest in international management is needed to benefit from the class.

NBA 589 Business in Japan

The course, based primarily on case studies and lectures, focuses on the organizational
NBA 590 Managing in Developing Countries
Fall, first half of semester. 1.5 credits. Letter/S-U; optional grading. J. Katz.
This class centers on the unique features of industrializing countries as hosts for multinational business operations. It is a case-based course; each day is spent discussing one or two cases. Topics include environmental variation and how to deal with it and concentrated national power structures and their management. We cover a large number of countries spread throughout the world. Students are responsible for providing class updates on the countries discussed, because while the case content remains valid, some of the facts presented about the countries are out-of-date. Grading is based on the country update presentation, a final case write-up, and class participation.

NBA 592 Experience in International Management
Fall, second half of semester. 1.5 credits. S-U grades only. J. Katz.
The objective of this course is to combine classroom sessions and an international study trip to give students a fuller understanding of differences in national industrial structures and national management styles. All students will attend six sessions (one per week for the last half of the semester) that will provide a theoretical background of business structures, management norms, and cross-cultural communications patterns in the countries that will be visited. Each student must then join one of the January study trips (Destinations to be announced in September). On the trips, students will visit local businesses, subsidiaries of foreign multinationals, government officials, local business school students and others. Following the trips, students will be required to write a final paper integrating the material learned in the classroom with their experiences. The class will also have one debriefing meeting. NOTE: participation in a study trip is required to complete this course (fee charged).

Management Information Systems

NBA 600 Database Management
Fall. 3 credits. Prerequisite: some knowledge of computing and systems, e.g., COM S 211. L. Orman.
The course introduces the design, use, and management of computerized databases. Topics include physical and logical data structures, design issues, and retrieval, maintenance, and security problems. Students design, create, and use databases using various database management systems.

NBA 609 MIS Policy
3 credits. Prerequisite: some knowledge of computing and systems, e.g., COM S 211. Not offered 1997–98. L. Orman.
Design, use, and management of information systems are studied through examples. The seminar format places heavy emphasis on class discussion and presentations. All major technologies and organizational objectives are studied in the context of MIS Policy, planning, and implementation.

NBA 610 Thriving on the Information Revolution
5 credits. Not offered 1997–98. Rapidly advancing information technologies are breaking down longstanding barriers to business productivity, innovation, and distribution. The resulting era of transformative change is called the Information Revolution. The purpose of this course is to prepare students for two decades of turbulent, high-stakes decision making driven by the Information Revolution. To accomplish this the course provides: 1) A vision of the driving forces and developmental process of the Information Revolution; 2) An assessment of its many strategic implications to business, education, entertainment and government, and, 3) An approach to developing strategies to exploit the Information Revolution for competitive advantage.

NBA 612 Imaging and the Electronic Age
Fall. 3 credits. D. Greenberg.
The advances of computer graphics, computer processing power, network bandwidths and video compression technologies are forcing the merger of the telephone, television and computer industries. The influence of these technologies has created paradigm shifts that will drastically change the way we communicate, how we are educated, the way we work, design, and in essence, how we will live in the near future. This course will start 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 will cover the effects of these advances on several discipline-specific areas including photography and publishing, as well as the computer industry itself. One session will be devoted to the political and legal issues rising from the rapid advances in electronic communication. The course will be especially tailored to a business school and industrial concerns and will have interactive live demonstrations of the art laboratory of the Program of Computer Graphics. No prior knowledge in computer science is required.

NBA 614 Managing in the Information Age
Fall, first half of semester. 1.5 credits. A. McAdam.
This course explores a topic that is just beginning to emerge: the implications of the explosion of the Internet and interactive multimedia communications for the way managers think and manage. It will examine the origins of the Internet and some of the forces that have led to its rapid development, noting along the way why and how it has "blindsided us" as Andy Grove of Intel and Bill Gates of Microsoft candidly state. The course will focus on specific marketing techniques being used today in pioneering applications in organizations of various kinds based in part on original case studies and on guest lecturers. Throughout the semester the student will be asked to identify new and innovative uses of modern information technologies. The course itself will evolve— even in real time— with the developments in the field.

Marketing

NBA 620 Marketing Research
Fall, spring. 3 credits. Prerequisites: NCC 501 and NCC 503, or the equivalent. V. Rao, S. Srinivasan.
The course teaches students to identify information needs for developing marketing strategies and making tactical plans. They are introduced to up-to-date methods in research design and data collection, measurement, and analysis. They gain hands-on experience with such methods through problem sets and group projects. The discussion focuses on the viewpoint of researchers with that of managers who commission research.

NBA 621 Advertising Management
3 credits. Prerequisite: NCC 503. 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 theories can facilitate advertising management.

NBA 622 Marketing Strategy
Fall. 3 credits. Prerequisite: NCC 503. V. Rao.
The course balances theoretical and practical approaches to the development and evaluation of marketing strategies for new and established products and services. Recent research results are applied to decisions on product-market boundary definition, resource allocation, product positioning, and competitive reactions. It includes selected current topics such as brand equity, acquisitions, and divestitures. Students use case studies extensively to develop skills in strategy analysis and to enhance skills in assessing external threats and opportunities. They employ computer-assisted market strategy simulations to evaluate the effects of competing strategies. Guest speakers from industry provide a view of the operational aspects of marketing strategy.

NBA 623 Models and Methods for New Product Development
Fall, spring. 3 credits. Prerequisites: NCC 501 and NCC 503. D. Wittink.
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 of new products (e.g., specification of products and services) 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 an in-depth study using instrument, data collection (from at least 30 respondents) and data analysis, for a self-chosen product category. The method of instruction consists of a combination of lectures and discussion of cases and articles. Performance is evaluated primarily based on exams and the group project.
NBA 625 International Marketing
Spring. 3 credits. Recommended: NCC 503. J. Katz.
International Marketing is designed to train students to take a domestic product and expand it into international markets successfully. Market selection, international market research issues, and international marketing strategy are discussed. The term project (actually submitted in three parts throughout the term) requires that students choose some product and develop a plan for taking it abroad. The course test includes a series of short (1–3 page) cases that are used as the basis of discussions. Therefore, class preparation is essential. Grading is based on the term project, the final, and class participation. Core marketing provides a useful background, but is not a prerequisite.

NBA 626 Consumer Behavior
Spring. 3 credits. A. Isen.
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 627 Affect and Brand Equity
Spring. 3 credits. A. Isen.
The course examines ways in which affect, or feelings, can play a role in processes related to brand equity. It focuses on the influence of affect on the development, change, and maintenance of brand perceptions and brand loyalty. Topics include brand loyalty, variety seeking, product categorization, judgment, decision making, and risk preference. Those six areas are important in choices related to brand equity and brand loyalty (e.g., choosing brand-name products or value-priced ones, staying with a brand or switching).

NBA 630 Policies for Marketing Channels
3 credits. Prerequisite: NCC 503. Not offered 1997–98. V. Kadiyali.
Marketing channels are analyzed as a chain of interdependent and interlocking organizations that produce and deliver goods and services to various types of consumers. We will look at various aspects of these relationships, such as efficiency, conflict, incentives and government intervention. Instruction consists of lectures, cases and guest speakers.

NBA 631 MARKSTRAT Simulation
Fall, second half of semester. 1.5 credits.
Prerequisite: NCC 503. V. Rao.
MARKSTRAT Simulation offers an opportunity for students to make various marketing strategy decisions in a realistic, dynamic, simulated, competitive environment. Students, working in teams, will manage a portfolio of a firm’s products for several years (periods). They will learn how to make long-term decisions (introduction of new products) and will deal with various cross-functional issues related to marketing management (e.g., research and development, production design, and budgeting). Students will develop an initial strategy statement and strategic marketing plan for their firm.

NBA 635 Marketing Models
Fall. 3 credits. Prerequisite: NCC 503. V. Kadiyali.
Students learn how to use mathematical models to solve marketing problems. The objective is to develop students’ skills in evaluating marketing models and implementing them in management practice.

NBA 637 Direct Marketing
1.5 credits. Prerequisite: NCC 503
The objective of this short course is to expose MBA students to selected contemporary issues in the area of direct marketing. In addition to providing an overview of the direct marketing industry and trends in database technology, the course will address major strategic and tactical issues in the management of direct marketing. The discussion will mainly consider the perspective of a marketer interested in employing the opportunities in direct marketing as an integral element of the marketing mix for a product/service. It will also address appropriate ethical concerns with direct marketing. To acquire a flavor of various practices in the industry, students will visit one or two direct marketing firms in New York City or its vicinity toward the end of the course.

NBA 638 Analysis of Competitive Decision Making
This course brings together methods of microeconomics analysis to competitive decision making. Specifically, we will address issues relating to optimal competitive decisions for a firm interacting with current and potential rivals. We discuss how firms can, by their choice of appropriate decisions, best signal to rivals their intentions and degree of commitment to them. We also look at sustainability, flexibility, and correction of decisions choices in the context of Nash Equilibrium. Special emphasis will be put on analysis of Stackelberg games, which lead to understanding these concepts. The dimensions of competitive strategy that we look at include product proliferation, R&D and patent policies, choice of compatibility with existing products, bundling of products, investing in capacity, vertical integration, choice of channels of distribution partners, pricing, and promotions. We also discuss problems caused in the optimal choice and implementation of firm strategies when information is imperfect. Specifically, we look at issues of moral hazard and adverse selection, and how these issues affect firm choices of strategies (e.g., pricing, choice of channel partners, etc.). Instruction includes lectures and cases.

NBA 641 Logistics and Manufacturing Strategy
Spring. 3 credits. Prerequisite: NCC 508, ORIE 410, or permission of the instructor.
L. J. Thomas.
The course is about strategic management of the values 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 third 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 642 Statistical Methods in Business
3 credits. Prerequisite: good performance in NCC 501 or the equivalent. Not offered 1997–98.
Regression analysis is one of the most abused quantitative techniques in the business world. Moreover, the field of econometrics is now hard to avoid for those who want to understand the theoretical literature of many areas of business, such as finance, economics, marketing, and operations research. The course offers indispensable theoretical and practical knowledge that makes students sophisticated consumers and good practitioners of econometrics in the world of business. Topics covered are the multiple-regression-model theory of estimation and prediction, diagnosis, and the complications encountered most often, such as outliers, heteroskedasticity, multicollinearity, autocorrelation, lagged dependent variables, simultaneity, and truncated variables. Principal component analysis and probit/logit analysis, often used in business, are also covered. Heavy emphasis is placed on the analysis of datasets from the fields of business and economics. Computer packages are used throughout the course. The students must be comfortable in quantitative thinking and computer environments.

NBA 644 Quality Management
Fall. 3 credits. Prerequisite: NCC 508 or permission of the instructor. L. Robinson.
The course uses the Malcolm Baldrige National Quality Award Criteria to examine issues in managing quality in both service and manufacturing environments. Topics include an external focus on identifying and satisfying the customer, an internal focus on process redesign and improvement (including bottleneck management and the just-in-time philosophy of eliminating waste), the strategic and competitive aspects of quality improvement, human-resource issues (such as worker participation, motivation and performance measurement, and worker teams), quality and design, and selected topics in statistics and quality control (experimental design, acceptance sampling, and process control). Students will have a working knowledge of Lotus 1–2–3 or Excel software.

NBA 645 Product Development Practicum
Spring. 3 credits. J. Thomas.
This course centers on developing a major new product for firms. It will involve training in creativity by a consulting firm and readings in product development. This course will provide the opportunity to learn from many different sources, consultants, faculty, and executives.

NBA 646 Service Operations
Fall. 3 credits. Prerequisite: NCC 508. M. Lojo.
This course addresses the unique aspects of managing service operations in contrast to manufacturing enterprises. Design, marketing, evaluation, and improvement techniques will be discussed. Types of services to be examined include consumer, professional, industrial, and not-for-profit, including government and volunteer-based services. The emphasis will be on high-end, knowledge-based services that play a critical role in our economy. Traditional operations management models will be applied to services, as well as theories based in other
The course will make the necessity of homework assignments or projects, to make students take the initiative. Through facilitating this integration will be introduced. Managerial tools and useful concepts that make manufacturing for a firm's success apparent. The primary focus of the course will be on union-management productivity partnership. Students will have the opportunity, through directed readings and case discussions. The course will be offered over two full days. NBA 652 Integrating Product Design, sourcing, technology transfer and R and D issues, currency risk, and capital budgeting; operations issues affected by globalization (lead-time, just-in-time, and cost issues, including accounting practices); and international cross-functional coordination (product development in an international context, workforce management, interface with marketing, understanding the psychology of decision making to teach managers how to recognize the situations that most commonly lead to error and offers methods to control such errors. Specific applications include forecasting, pricing and promotion strategies, negotiations, the psychology of financial markets, and managerial risk taking.

NBA 650 Semester in Manufacturing Management (also ILR 670) Spring. 15 credits. Enrollment limited; permission of instructor required. J. Bradley, R. Conway, R. Matthews, T. Hammer. This is a full-time program for the semester, students will not be able to take other courses concurrently. The course is concerned with the integration of technological, human-resources, logistical, and financial considerations in producing a manufacturing enterprise that can respond quickly and effectively to market requirements. It will be taught by a team of faculty and industrial practitioners, and much of the student work will be team-oriented. There will be considerable off-campus travel for field study of a variety of manufacturing plants. Note that this course is an approved substitute for both the Production and Operations Management and Organization core courses, i.e., NCC 504 and NCC 508. Johnson School students should complete NCC 506 before taking this course.

NBA 651 Employment Relations Spring. 1 credit. T. Hammer, Batt. The course will be offered over two full days and will consist of three parts: (1) an overview of U.S. labor and employment law and its effect on today's management, (2) a case analysis of what can lead a workforce to bargain collectively over wages and conditions of employment, and (3) an examination of the psychology of decision making to teach managers how to recognize the situations that most commonly lead to error and offers methods to control such errors. Specific applications include forecasting, pricing and promotion strategies, negotiations, the psychology of financial markets, and managerial risk taking.

NBA 652 Integrating Product Design, Marketing, and Manufacturing Spring. 1 credit. J. Bradley, V. Rao, J. Thomas. The course will make the necessity of integrating marketing and manufacturing for a firm's success apparent. Managerial tools and useful concepts that facilitate this integration will be introduced. Students will take the opportunity, through homework assignments or projects, to make a more in-depth foray into the course topics.

NBA 653 Strategic Alliances: Lessons from Experience Spring. 1 credit. J. Suwinski, J. Thomas. A wide variety of strategic alliances are being used today as companies try to leverage their resources for competitive advantage. This course will overview the spectrum of alliances, examining the strategic rationale and pros and cons of each major type of alliance. The primary focus of the course will be on joint ventures as a specific form of strategic alliance, where the success rate is less than 50%. The course will develop a set of principles that have contributed to success for Corning Incorporated. The course will be taught from the perspective of the general manager of a major business unit.

Behavioral and Organizational Science

NBA 663 Managerial Decision Making Fall. 3 credits. J. Russo. All managers make decisions, usually without the aid of formal tools. Much research has shown that such intuitive decisions produce common, predictable errors. The course uses the psychology of decision making to teach managers how to recognize the situations that most commonly lead to error and offers methods to control such errors. Specific applications include forecasting, pricing and promotion strategies, negotiations, the psychology of financial markets, and managerial risk taking.

NBA 665 Managing Technology and Innovation Fall. 3 credits. Not offered 1997–98. H. Haveman. This course is designed for students who see themselves in settings where they have to develop new products or processes and for students who must implement change in existing products or processes. We discuss major issues involved in managing the introduction of new technology, including competitiveness, technology assessment, R&D strategy, and positioning. We examine how industries are transformed by new technologies and how innovations diffuse among firms. We also consider internal management issues, including such topics as the structure of innovative organizations, the design of incentive and reward systems, and the role of executive leadership. The course uses a combination of readings, lectures, discussions, case analyses, and guest lectures.

NBA 666 Negotiations Fall, spring. 3 credits. D. Sally. 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 and the psychology of decision making in a variety of settings. This course is designed to complement the technical and diagnostic skills learned in other courses at the Johnson School. A basic premise of the course is that while a manager needs analytical skills to develop optimal solutions to problems, a broad array of negotiation skills is needed for these solutions to be accepted and implemented. The course will highlight the components of an effective negotiation and teach students to analyze their own behavior in negotiations. The course will be 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.

NMI AND NRE RESEARCH AND ADVANCED STUDIES

NMI 500-502 Directed Reading and Research Fall, spring. 1, 2 or 3 credits. S-U grading only. 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. S-U grading only. Restricted to Johnson School students. M. Rosen, B. Mink. NMI 510 is a 1-credit, S-U, independent study course that is open to students whose summer internships will be in a country other than that of their citizenship or prior work experience. The goal of the course is to promote an understanding of the cultural assumptions we bring to the work environment and the effects of cultural differences on organizational interactions and productivity. Registration for the course occurs in the spring semester prior to the internship, and grades are posted in the following fall semester after completion of the course project (a 10-page paper). Students may register for the course after obtaining an internship offer and completing the paperwork for the course instructors. International students will obtain and process work authorization forms with the International Students Office. See Charlotte Rosen (Malott 558) for further details about the academic and immigration requirements for NMI 510.

DOCTORAL SEMINARS

NRE 502 Doctoral Seminar in Econometrics Fall. 3 credits. D. Wittink. 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. This course is for Ph.D. students only.

NRE 504 Doctoral Seminar in Accounting Spring. 3 credits. Staff. 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. This course is for Ph.D. students only.

NRE 507 Doctoral Seminar: Affect and Cognition 3 credits. 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). Disciplines such as social psychology and economics. courses are as follows:

COURSES 307
FACULTY ROSTER

Ainslie, Andrew; Ph.D., U. of Chicago. Asst. Prof., Marketing
e.

Babes, George; Ph.D., U. of California at Berkeley. Asst. Prof., Finance

Babiak, Peter M.; Ph.D., U. of California at Berkeley. Asst. Prof., Accounting

Bradley, James R.; Ph.D., Stanford U. Asst. Prof., Production and Operations Management

Cormier, Richard W.; Ph.D., Cornell U. Emerson Electric Co. Professor of Manufacturing Management, Prof., Information Systems

D’Souza, Julia; Ph.D., Northwestern U. Asst. Prof., Accounting


Elliot, John A.; Ph.D., Cornell U. Assoc. Prof., Accounting, Associate Dean for Academic Affairs, Director of Graduate Studies

Frank, Robert J.; Ph.D., U. of California at Berkeley. Goldman Smith Professor of Economics, Ethics, and Public Policy, Prof., Economics

Gibbons, Robert S.; Ph.D. Stanford U. Charles H. Dyson Professor of Management, Prof., Economics

Greenberg, Donald P.; Ph.D., Cornell U. Jacob Gould Schurman Prof., Computer Graphics, Prof., Management Information Systems

Gukhal, Reddy, Ph.D., Columbia U. Asst. Prof., Finance

Hass, Jerome E.; Ph.D., Carnegie-Mellon U. Prof., Finance and Business Strategy

Haveman, Heather A.; Ph.D., U. of California at Berkeley. Assoc. Prof., Organizational Behavior

Hilton, Ronald W.; Ph.D., Ohio State U. Prof., Finance

Isen, Alice M.; Ph.D., Stanford U. S. C. Johnson Prof., Marketing, Prof., Psychology

Jarrow, Robert A.; Ph.D., Massachusetts Inst. of Technology. Ronald P. and Susan E. Lynch Professor of Investment Management, Prof., Finance

Kadriyali, Vrinda, Ph.D., Northwestern U. Asst. Prof., Marketing and Economics

Lee, Charles M. C.; Ph.D., Cornell U. Assoc. Prof., Accounting

Li, Haitao; Ph.D, Yale U. Asst. Prof., Finance

Libby, Robert, Ph.D., U. of Illinois. Asst. Prof., Managerial Economics

Lind, Robert C.; Ph.D., Stanford U. Prof., Economics, Management, and Public Policy

Lojo, Maurine P.; Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Operations Management

McAdams, Alan K.; Ph.D., Stanford U. Assoc. Prof., Managerial Economics

McClain, John O.; Ph.D., Yale U. Prof., Quantitative Analysis, Clifford H. Whitcomb Faculty Fellow

Michaely, Roni, Ph.D., New York U. Assoc. Prof., Finance

Nelson, Bonaly, Ph.D., Cornell U. Asst. Prof., Organizational Behavior

Nelson, Mark W.; Ph.D., Ohio State U. Assoc. Prof., Accounting, Clifford H. Whitcomb Faculty Fellow, KMCG Peat Marwick Faculty Fellow

O’Connor, Kathleen, Ph.D., Northwestern U. Asst. 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. Assoc. Prof., Information Systems

Peterson, Randall S.; Ph.D., U. of California at Berkeley. Asst. Prof., Management and Organizations

Rao, Vithala R., Ph.D., U. of Pennsylvania. Deane W. Malott Professor of Management, Prof., Marketing

Robinson, Lawrence W., Ph.D., U. of Chicago. Assoc. Prof., Operations Management


Sally, David F., Ph.D., U. of Chicago. Asst. Prof., Organizational Behavior

Smidt, Seymour, Ph.D., U. of Chicago. Nicholas H. Noyes Professor of Economics and Finance

Stayman, Douglas M., Ph.D., U. of California at Berkeley. Assoc. Prof., Marketing

Swaminathan, Bhaskar, Ph.D., U. of California at Los Angeles. Asst. Prof., Finance

Tasker, Sarah, Ph.D., MIT. Asst. Prof., Accounting

Thomas, I. Joseph, Ph.D., Yale U. Nicholas H. Noyes Professor of Manufacturing, Associate Dean for Academic Affairs, Director, Executive Development Program

Waldman, Michael, Ph.D., U. of Pennsylvania. Prof., Economics

Wittink, Dick R., Ph.D., Purdue U. Henrietta Johnson Louis Prof., Management, Prof., Marketing and Quantitative Methods

LECTURERS

Highfield, Richard A., Ph.D., U. of Chicago. Sr. Lect. Economics, Asst. Dean, Director of the MBA Program

Kamps, Paul M. Eng., Cornell U. Lect., Management Information Systems

Katz, Jan, Ph.D., Massachusetts Inst. of Technology. Sr. Lect., International Business and Marketing

Matthews, Ronald W., Sr. Lect., Operations Management

Mink, Barbara E., M.A., Cornell U. Sr. Lect., Management Communications

Pike, Alan S., M.A., Cornell U. Sr. Lect., Management Communications

Rosen, Charlotte, Ph.D., Cornell U. Sr. Lect., Coordinator, Management Communications

ADJUNCT AND VISITING FACULTY

Diz, Fernando, Visiting Assoc. Prof., Finance


Pucik, Vladimir, Ph.D., Columbia U. Prof., Industrial and Labor Relations

Schuler, Richard E., Ph.D., Brown U. Prof., Economics, Prof. Civil & Environmental Engineering

Stark, David, Ph.D., Northwestern U. Assoc. Prof., Sociology

Suwinski, Jan H., Sr. Lect. in Operations Management

Thomas, William, MBA, Harvard. Lect., Management
DIVISION OF NUTRITIONAL SCIENCES

ADMINISTRATION
Cutberto Garza, director
Carole Bisogni, associate director for academic affairs
Gerald Combs Jr., director of graduate studies, Field of Nutrition

THE DIVISION
Nutritional Sciences draws upon the chemical, biological, and social sciences to understand the complex relationships among human health, nutritional status, food and lifestyle patterns, and social and institutional environments. Understanding these relationships includes the study of the metabolic regulation and function of nutrients, nutrient requirements through the life span, role of diet in reducing risk of chronic disease, nutritional quality of foods, and interventions and policies designed to promote nutritional health of individuals and populations.

The focus of this broad field of study at Cornell is the Division of Nutritional Sciences, which brings together specialists from many disciplines. The faculty are involved in undergraduate and graduate teaching, research, and extension of research-based knowledge throughout New York State, the nation, and the world.

The division is affiliated with both the College of Human Ecology and the College of Agriculture and Life Sciences. An undergraduate program in Nutritional Sciences is offered through the College of Human Ecology, and an undergraduate program, Nutrition, Food, and Agriculture, is offered in the College of Agriculture and Life Sciences. In 1997 a new undergraduate program in Human Biology, Health, and Society was established in the College of Human Ecology. Graduate study is administered through the Field of Nutrition, which includes faculty members throughout the university.

FACILITIES
Most of the faculty members of the division work in Savage Hall and Martha Van Rensselaer Hall. In addition to housing offices, classrooms, and seminar rooms, those buildings contain research facilities, specialized laboratories, a human metabolic research unit, and computer facilities. The division’s Learning Resource Center in Martha Van Rensselaer Hall is used by students for individual study and for small group discussions. In addition to printed and audiovisual materials, the Learning Resource Center contains two computers enabling students to have 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**, College of Human Ecology: This program provides students with strong training in chemistry and biology and a strong foundation in the broad field of nutritional sciences. Students can 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**, College of Agriculture and Life Sciences: This program is for students who desire strong training in human nutrition in combination 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 such areas as food science, animal science, plant science, advanced biology, business and economics, education, and communication. Students can prepare for a variety of career interests through this program.

**Human Biology, Health, and Society**, College of Human Ecology: Established in 1997, this program is for students who want to acquire a strong foundation in biology and 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 focus their studies on health issues of their choice through the wide array of courses offered in the College of Human Ecology. Students can explore such topics as gene expression, metabolism, disease states, biological and social aspects of growth and development, and policies and programs influencing health.

THE CURRICULUM
Undergraduate students in these three programs complete the requirements of their colleges as well as the courses required by the program of their specific interests.

All three undergraduate programs offered by the division require a strong foundation in chemistry and biology, including introductory chemistry and biology, organic chemistry, biochemistry, and physiology. A minimum competency in college algebra is required with additional math and/or statistics required for some programs and career paths. Students in the Human Biology, Health, and Society major also complete a course in physics and two additional courses in advanced biology.

The Nutritional Sciences major and the Nutrition, Food, and Agriculture program require the completion of five core courses: Nutrition and Health: Concepts and Controversies (NS 115); Social Science Perspectives on Food and Nutrition (NS 245); Nutritional and Physicochemical Aspects of Foods (NS 345); Physiological and Biochemical Bases of Nutrition (NS 351); and Methods in Nutritional Sciences (NS 352). Students in these programs also must select a minimum of nine credits in advanced courses in nutritional sciences.

The Human Biology, Health, and Society major requires a minimum of six credits from courses that integrate biology and the social sciences as they examine health issues. In addition, students must also complete nine credits of advanced electives in courses focused on human biology, health, and society.

Undergraduate students in these three programs have a faculty advisor in the Division of Nutritional Sciences. Regular student-advisor conferences are required at least twice a year. Advisers help students plan their course schedules and can suggest opportunities for individual study or experience outside the classroom.

For all three undergraduate programs, 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.

CAREER OPTIONS AND COURSE PLANNING
Requirements for the three programs are the minimum set of courses necessary for a bachelor's degree in these fields. Students should supplement the requirements with elective courses and other learning experiences that will prepare them for entry-level jobs or advanced study in their field(s) of interest. A summary of suggested areas from which students can choose electives for different career interests follows.

**Medicine and Other Health Careers:** Recommended courses for pre-med students include calculus and two terms of physics. Specific information about medical school admissions requirements can be obtained from the university’s Health Careers Office, 203 Barnes Hall. Students interested in other health careers should acquire specific information about the requirements for their interests. Courses of interest may include those related to the biological and social determinants of health, human growth, development, and behavior through the life course; interpersonal communications; advanced biology; sociology; psychology; and ethics.

**Dietetics:** Students who wish to work in the areas of clinical nutrition, nutrition counseling, sports nutrition, community nutrition, or food and nutrition management should complete the academic requirements for The American Dietetic Association (ADA). Courses in foods, nutrition and disease, microbiology, manage-
ment, statistics, and nutritional care are added to the courses required for the nutrition programs. For additional information about meeting ADA requirements see Gertrude Armbruster, 366 MVR.

Exercise, Nutrition, and Health Promotion: Students should complete a course in physiology and a course in anatomy after introductory biology. Students can complete the Applied Exercise Science Concentration at Ithaca College, which includes courses in kinesiology, exercise physiology, and biomechanics. Students who wish to apply to graduate schools to study physical therapy should complete a year of introductory physics; a course in statistics; a course in ethics; and three courses in psychology. Students should check the specific requirements for schools of interests. For information about the Applied Exercise Science Concentration, contact the DNS Academic Affairs Office, 309 MVR.

Biomedical Research/Nutritional Biochemistry: Recommended electives include calculus, physics, genetics, advanced biology and chemistry, and nutritional sciences courses related to the physiology, biochemistry, and metabolism of different nutrients and disease states.

Public Health and Community Nutrition: Recommended electives include courses in communications, education, human development, community nutrition, and International Food Economics.

Nutrition, Food, and Business: Recommended electives include courses in marketing, economics, communications, hotel administration, and food science.

Nutrition, Food, 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 in Nutritional Sciences or Human Biology, Health, and Society 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 an opportunity to study and gain field experience in New York City. All students intending to spend a term off campus in field experience or study abroad must plan their courses well in advance to be sure that all program requirements can be met.

INDEPENDENT STUDY ELECTIVES

Independent study courses (NS 400, 401, 402) can be used to obtain credit for more diverse or intensive experience than the classroom can offer, whether this involves laboratory work, library research, or field study. Any student interested in independent study should obtain the sponsorship of a faculty adviser and the approval of the associate director for academic affairs or consider applying to the honors program.

HONORS PROGRAM

The honors program, leading to a B.S. degree with honors 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 courses in designing and evaluating research, complete an original piece of research, and prepare an honors thesis. The honors project may be laboratory or field research or deal with policy and program development. For more information, students should contact Michael Kazarinoff, 230 Savage Hall.

COURSES RECOMMENDED FOR NONMAJORS

Courses in nutritional sciences can strengthen programs of study in biological sciences, biology and society, communications, food science, human development, human services, and other fields.

NS 115, Nutrition and Health: Concepts and Controversies, is open to all students. After NS 115, nonmajors with limited backgrounds in chemistry and biology may elect NS 247, Food for Contemporary Living; NS 262, Nutrients and Human Biology and Evolution; NS 306, Nutritional Problems of Developing Nations; NS 315, Obesity and the Regulation of Body Weight; NS 347, Human Growth and Development: Biological and Behavioral Interactions; NS 349, Geriatric Nutrition; NS 380, Integrating Food Systems and Human Nutrition Needs; NS 457, National and International Food Economics.

Nonmajors with strong backgrounds in chemistry and the biological sciences may consider NS 331, Physiological and Biochemical Bases of Human Nutrition, as well as many advanced nutritional sciences courses, such as NS 345 Physicochemical and Nutritional Aspects of Foods; NS 421, Nutrition and Exercise; and NS 441, Nutrition and Disease.

GRADUATE PROGRAMS

Graduate study is administered by the Field of Nutrition, a group of more than fifty 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 animal nutrition, human nutrition, international nutrition, nutritional biochemistry, foods, or general nutrition. Research is emphasized in all graduate programs. Field experience may be a component of concentrations in community, international and public-health nutrition, and nutrition education.

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 choice 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, and students in international nutrition are expected to conduct their thesis research abroad.

For more information about the graduate program, interested persons may write for the brochure Graduate Study in Nutrition, available from the Director of Graduate Studies, Field of Nutrition, Cornell University, MVR Hall, Ithaca, New York 14853–4401; phone (607) 255–4410.

COURSES

NS 115 Nutrition and Health: Concepts and Controversies


This course provides students enrolled in NS 115 individualized assistance in many skills used in NS 115 including using computers to analyze diets, using electronic mail, finding and using scientific references, and reviewing material presented in NS 115 lectures.

NS 120 Nutrition and Health: Issues, Outlines, and Opportunities

Spring. 1 credit. S–U grades only. Limited to 120 freshmen, sophomores and juniors, others by permission of instructor. C. Bisogni. W 12:20.

A course for students interested in exploring careers in the broad fields of food, nutrition, and health. Experts representing different areas will discuss their work, focusing on current issues and trends as well as the requisite knowledge and skills. This course describes the many disciplines that are drawn upon in the solution of human problems related to field, diet, and health as well as the related intellectual and career opportunities. This is not an introductory nutrition course for nonmajors.

NS 222 Maternal and Child Nutrition

Spring. 3 credits. Prerequisites: NS 115 and a college biology course or permission of the instructor. S–U grades optional. Limited to 25 students. Preregistration is required in room 309 Martha Van Rensselaer Hall. C. Garza. M W F 1:25.
Involves the study of nutritional requirements in pregnancy, lactation, infancy, and childhood through adolescence. Topics include the relationship between maternal diet and pregnancy outcome; analysis of different methods of infant feeding; and nutritional and pregnancy outcome; analysis of different biases that influence meal planning, selection, and preparation of food, such as resources available; ethnic, cultural, and behavioral considerations; food presentation, sensory quality evaluation. Safe food handling practices and storage procedures included.

**NS 245 Social Science Perspectives on Food and Nutrition**

Fall. 3 credits. Prerequisite: NS 115. Limited to nutrition majors. Letter grade only. D. Sanjuk, J. Sobal. T R 10:10-11:25. Theories, concepts, and methods from several social science disciplines will be applied to food and 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 247 Food for Contemporary Living**

Fall and spring. 3 credits. Laboratory sections limited to seniors. Laboratory preregistration during course pre-registration required in 309 Martha Van Rensselaer Hall. Laboratory coat required. Division faculty. Fall. Lec M 12:20; lab T R 2:15-4:35; spring. Lec T 9:05; labs T R 10:10-12:40 or T R 2:15-4:35. Emphasizes integration of sound nutritional practice in the scientific concepts and techniques of food preparation. Priority will be given to factors that influence meal planning, selection, and preparation of food, such as resources available; ethnic, cultural, and behavioral considerations; food presentation, sensory quality evaluation. Safe food handling practices and storage procedures included.

**NS 252 Antitoxins and Cells**

Spring. 3 credits. Prerequisites: one semester of biology and chemistry. N. Noy. M W F 9:05. The course will focus on the relationships of the cell with the environment. Examples from three general areas will be considered: 1. Mechanisms of uptake of nutrients by bacterial and by mammalian cells. 2. Intracellular outcomes of nutritional stimuli: effects on metabolism and gene expression, toxicity. 3. Pathways of neutralization: detoxification, secretion, DNA repair.

**NS 275 Human Biology and Evolution (also Biological Sciences 275 and Anthropology 275)**

Fall. S-U grades optional, with permission of either instructor. Offered alternate years. Not offered 1997-98. See BIO SCI 275 for course description.

**NS 276 Motivation (also Psychology 276)**

Spring. 3 credits. Not offered 1997-98. E. M. Blas See PSYCH 276 for course description.

**NS 300 Special Studies for Undergraduates**

Fall or spring. Prerequisites: permission of instructor. S-U grades optional. DNS faculty. Special arrangements to establish equivalency for courses not transferred from a previous major or institution. Students prepare a description of the study they want to undertake on a form available from the Student Services 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**

Fall. 3 credits. Prerequisites: NS 115. S-U grades optional. J-P. Habicht, M. C. Latham, J. D. Haas. T R 10:10. The course is designed for undergraduates interested in the nutritional problems of developing countries. Attention is given to the array of nutrition 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 Psychology 613)**

Spring. 3 credits. Prerequisites: NS 115. Psych 101. S-U grades optional. Offered alternate years. D. Levitsky. T R 1:30-3:00. This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include: the biochemistry of eating behavior, genetics of obesity, role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

**NS 321 Nutrient Control of Mammalian Gene Expression**

Spring. 2 credits. Prerequisite: college chemistry and biology, biochemistry recommended but not required. P. Stover. T R 11:15. This introductory molecular biology course focuses on the mechanisms used by mammals to alter gene expression in changing nutrient environment. Fundamental concepts of eukaryotic DNA structure, function, and gene expression are covered. Key aspects of mammalian biochemistry, metabolism, and physiological chemistry integrated, emphasizing the relationships of these processes to mammalian gene expression. Topics include the basic principles of biotechnology and the application of the techniques to experimental animal nutrition and medicine.

**NS 331 Physiological and Biochemical Bases of Human Nutrition**

Spring. 4 credits. Prerequisites: Biological Sciences 350 or 351 or equivalent. S-U grades optional. M. Stipanuk, C. McCormick. Lec M W F 10:10; disc, W or R. This course examines the biochemical and physiological bases of human nutritional requirements. The instructors use an integrated approach to cover the digestion and metabolism of the nutrients (carbohydrates, proteins, lipids, vitamins, and minerals). Metabolic and chronic diseases that are related to nutrition are discussed throughout the semester. The discussion sections provide an opportunity to examine in greater depth selected topics covered in lecture.

**NS 332 Methods in Nutritional Sciences**

Fall and spring. 3 credits. Each section limited to 18 students. Prerequisites: NS 245, NS 345, NS 331 preferred or concurrent registration. Laboratory preregistration during course preregistration required in room 309 Martha Van Rensselaer Hall. One evening prelab to be scheduled. J. T. Brenna, M. N. Kazarinoff. Fall. Lec M 12:20; lab M W 1:25-4:00 or M W 6:30-9:00 or T R 10:10-11:10. Spring. Lec M 12:20; labs M W 1:25-4:00 or T R 10:10-11:10 or M W 6:30-9:30. Laboratory introduction to principles and analytical techniques of nutritional research. Emphasis is on analytical concepts and skills required to determine nutrient function and nutritional status of individuals. Topics include methods of nutrient metabolism, sampling and enzyme analysis in body fluids, and methods for assessing individual food intake and nutritional status.

**NS 341 Human Anatomy and Physiology Lab**

Spring. 4 credits. Letter grade only. Prerequisites: college biology, NS 115 recommended. Limit 120. V. Utermoehlen. Lec W F 12:20; lab W or R or F, 9:05-11:00 or 2:30-4:25. Introduction to human anatomy and physiology with particular emphasis on aspects of relevance to nutritional sciences and health maintenance. All major organ systems will be covered. Laboratories will emphasize location, description and recognition of anatomical structures and testing of physiological function with an emphasis on tests of nutritional and medical relevance.

**NS 345 Nutritional and Physicochemical Aspects of Food**

Spring. 3 credits. Prerequisite: college course in organic chemistry or biochemistry. S-U grades optional. R. Parker, B. Lewis. T R 1:25-2:40. 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 will also be discussed.

**NS 347 Human Growth and Development: Biological and Behavioral Interactions (also Human Development and Family Studies 347 and Biology and Society 347)**

Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent. Human Development and Family Studies 115 or Psychology 101 or equivalent. Offered alternate years. Not offered 1997-98. J. Haas, S. Robertson. This course is concerned with the interrelationships between physical and psychological growth and development in humans, particularly during infancy. Intrinsic and extrinsic causes of variations in growth, development, including various forms of malnutrition, 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 factors is emphasized throughout the course.

**NS 349 Geriatric Nutrition**

Fall. 3 credits. Prerequisite: NS 115. Not offered 1997-98. Division faculty. T R 2:30-3:45. Aims of the course are to acquaint students with effects of aging on nutritional needs; to teach them methods of nutritional assessment that are appropriate for use with the elderly; and to give them information on nutritional
interventions that have been shown to have positive effects on the nutritional and health status of older individuals.

**NS 361 Biology of Normal and Abnormal Behavior**  
Fall 3 credits. Prerequisites: Biological Sciences 101-102 and Psychology 101, or permission of the instructor. A fundamental knowledge of biology and psychology is essential. S-U grades optional. Limited to juniors and seniors. B. Strupp. M W F 9:05.  
A critical evaluation of biological factors thought to influence behavior and/or cognitive functioning. Biological, psychological, and societal influences will be integrated. Topics include nutrition and behavior, psychiatric disorders, developmental exposure to environmental toxins and drugs of abuse, and 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. P. Tennant. T R 8:40-9:55.  
The application of management principles and theory to foodservice operations and nutrition services. Distribution systems and the concept of organization are emphasized. Emphasis is placed on leadership development, decision making, problem solving as related to procurement, production, distribution, and quality assurance in food and nutrition services. Recipe and menu development projects show the interrelationships of nutrition, labor, equipment, and environmental concerns. Marketing strategies and implementation are discussed.

**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. G. Combs. T R 8:40-9:55.  
A student-centered course that employs case studies to address concepts linking human nutrition and health issues to those involving systems of food production and distribution. Student teams will investigate new and existing technological options within food systems to address domestic or international human nutrition needs.

**NS 398 Honors in Nutritional Sciences**  
Fall. 1 credit. Limited to students admitted to the division honors program. S-U grades only. M. Kazarinoff. T 12:20.  
Research design. Analysis of research papers on selected topics.

**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 student or for study on an experimental basis with a group of students in a field of nutritional sciences not otherwise provided through course work in the division or elsewhere at 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 Student Services Office, is filed at course registration or within the change-of-registration period. To ensure review before the close of the course registration or change-of-registration period, students should submit the special-studies form to the associate director for academic affairs as early as possible.

**NS 400 Directed Readings**  
For study that predominantly involves library research and independent reading.

**NS 401 Empirical Research**  
For study that predominantly involves data collection and analysis or laboratory or studio projects.

**NS 402 Supervised Fieldwork**  
For study that involves both responsible participation in a course-related 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**  
For study that includes assisting faculty with instruction.

**NS 421 Nutrition and Exercise**  
Spring. 3 credits. Prerequisites: Bio S 311 or NS 361 and NS 115 or NS 331. S-U grades optional. Division faculty. M W F 11:15.  
This course will acquaint students with the interaction between nutrition, exercise, and athletic performance. Topics will cover the biochemistry of nutrient requirements to the cellular mechanisms that regulate the adaptive responses to exercise. Students will learn nutritional counseling techniques in educating the recreational and professional athlete, coach, and trainer.

**NS 441 Nutrition and Disease**  
Fall. 4 credits. Prerequisites: NS 331 and a human physiology course. S-U grades optional. V. Uhrmochlon. M W F 10:10; F 8:00.  
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. Limited enrollment. Prerequisites: NS 380 or concurrent registration in NS 441 (or equivalent background in either course). Laboratory preregistration during course preregistration required in room 309 Martha Van Rensselaer Hall. S-U grades optional. Division faculty. Lec M W F 9:05; lab 1 T 2:30-4:20; lab 2 R 11:15-1:10.  
Development of skills necessary to implement nutrition care plans: interviewing and analysis of the major economic factors and requirements for amino acids. A critical evaluation of biological factors thought to influence behavior and/or cognitive functioning. Biological, psychological, and societal influences will be integrated. Topics include nutrition and behavior, psychiatric disorders, developmental exposure to environmental toxins and drugs of abuse, and biopsychology of learning, memory, intelligence, and related cognitive disorders.

**NS 457 National and International Food Economics**  
Spring. 3 credits. Limited to 27 students. Prerequisites: NS 378, Micro 286 or equivalent. Laboratory preregistration required in room 309 Martha Van Rensselaer Hall. White lab coat is required. Approximately $25.00 will be needed for special supplies/activities. P. Tennant. Lec M W 9:05; labs, M T W 1:30-6:00. Students will gain experience in facility design; equipment selection, use, and care; job analysis and evaluation; human resources planning; management of financial resources; menu planning, recipe development, volume food production; computer-assisted management; employee training; applied safety and sanitation standards and will develop other skills required to operate/manage a foodservice program. The application of total quality management in food service operations and general facility management is stressed. Laboratories will be arranged through Cornell Dining.

**NS 488 Applied Dietetics in Foodservice Systems**  
Spring. 3 credits. Limited to 27 students. Prerequisites: NS 378, Micro 286 or equivalent. Laboratory preregistration required in room 309 Martha Van Rensselaer Hall. White lab coat is required. Approximately $25.00 will be needed for special supplies/activities. P. Tennant. Lec M W 9:05; labs, M T W 1:30-6:00. Students will gain experience in facility design; equipment selection, use, and care; job analysis and evaluation; human resources planning; management of financial resources; menu planning, recipe development, volume food production; computer-assisted management; employee training; applied safety and sanitation standards and will develop other skills required to operate/manage a foodservice program. The application of total quality management in food service operations and general facility management is stressed. Laboratories will be arranged through Cornell Dining.

**NS 498 Honors in Nutritional Sciences**  
Spring. 1 credit. Limited to students admitted to the division honors program. S-U grades optional. Division faculty. Lee M W 9:05; labs, M T W 11:15-1:10.  
Juniors (Mondays). Discussion of research opportunities in nutrition and orientation to research facilities. Delineation of honors research problems in consultation with faculty mentors. Seniors (Fridays). Workshop sessions on honors thesis and oral presentation preparation.

**NS 499 Honors Problem**  
Fall and spring. Credits to be arranged. Limited to graduate students recommended by their chair and approved by the instructor in charge. S-U grades optional. Division faculty. An independent literature, laboratory, or field investigation. Students should plan to spread the work over two or more semesters.

**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 on independent advanced work. Experience in research laboratories in the division may be arranged.

**NS 601 Proteins and Amino Acids (also Animal Science 601)**  
A course emphasizing the dynamic aspects of protein digestion and absorption, amino acid transport, and amino acid and nitrogen metabolism and their relationships to the requirements for amino acids.

**NS 602 Lipids (also Bio Sci 619)**  
Fall. 2 credits. A. Bensadoun. T R 11:15.  
Advanced course on biochemical, metabolic, and physiological aspects of lipids, more specifically lipid transport. Topics covered include lipid methodology, structure of plasma lipoproteins, molecular biology and cell biology of apolipoproteins, lipoprotein
receptors, lipid transfer factors, lipolytic enzymes, and 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. X. G. Lei, G. F. Combs, Jr. M W 10:10. Offered alternate years, next offered 1998-99.

Course emphasizes the metabolic roles and environmental impacts of mineral nutrition in animal, human, and food systems. Team-taught lectures include general biochemical and physiological aspects of mineral metabolism and specific mechanisms of gene expression and regulatory steps in mammal health disorders associated with individual elements. Methodology and facility of mineral research is also discussed.

NS 604 The Vitamins (also An Sc 604)
Fall. 2 credits. G. Combs. T R 10:10.

Text-based discussion sessions on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

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. Kazarinoff, J-P. Habicht, and Division faculty. M W F 10:10.

An overview course for beginning graduate students in nutrition and related disciplines to introduce them to the full breadth of nutritional science disciplines, including quantitative and qualitative sciences. Also suitable for seniors as an integrating course. The course presents concepts and paradigms of molecular biology, biochemistry, clinical nutrition, epidemiology, anthropology, economics, program planning and administration, policy development, and ethics. This semester the course uses Vitamin A as the example. Emphasis will be placed on the integration of fundamental knowledge to solve nutrition problems in human societies.

NS 611 Molecular Toxicology (also Toxicology 611)
Spring. 3 credits. Prerequisite: Toxicology 610 and a full-year 400-level course in biochemistry or equivalent. S-U grades only. S. Bloom, R. Dietert. TBA. Not offered 1997-98.


[NS 612 Methods of Assessing Physical Growth in Children]

A laboratory course to train students in methods and techniques used to assess the physical growth and development of children.

The methods explored are those applicable for field, community, and clinical studies and cover anthropometry, body composition, skeletal age, manurial indices, physical fitness, and energy expenditure.

NS 614 Topics in Maternal and Child Nutrition
Fall. 3 credits. Prerequisites: NS 331, and 222 or 347, Biological Sciences 311, and permission of instructor. K. Rasmussen. T 8:30-9:55.

Advanced course on the role of nutrition during pregnancy and lactation. Feeding and growth of infants and children in health and disease is considered. Critical evaluation of current literature is emphasized via lecture, discussions, and a term paper.

NS 617 Teaching Seminar
Fall or spring. 0 credit. Limited to division graduate students and students who have permission of the instructor. S-U only. C. Bisogni, D. Way.

Individualized instruction focusing on development of teaching skills for guiding classroom learning in lecture, discussion, and laboratory settings. Preparation of content, presentation, and interaction techniques and evaluative methods are emphasized in relation to the student's specific teaching assignment. Videotape simulations provide opportunity for practice and analysis of teaching behaviors.

NS 618 Teaching Experience
Fall or spring. 0 credit. Limited to division graduate students and students who have permission of instructor. S-U only. C. Bisogni.

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 Animal Science 619)
Fall or spring. 0 credit. S-U only. Faculty and guest lecturers. M 4:00.

Lectures on current research in nutrition.

NS 620 Food Carbohydrates (also Food Science 620)
Spring. 2 credits. Prerequisites: Biologica Sciences 330 or equivalent. Letter grades only. Offered alternate years. J. Brady, B. Lewis. T R 10:10.

A consideration of the chemistry of carbohydrates, including sugars and complex carbohydrates (starches, pectins, hemicelluloses, gums, cellulose, and glycoconjugates). Emphasis is on intrinsic chemistry, functionality in food systems, and changes occurring during food processing and storage.

NS 626 Special Topics in Food
Fall. 2 credits. B. Lewis. TBA.

Current research related to basic concepts of foods and health issues.

[NS 635 Mechanisms of Metabolic Regulation and Mammalian Gene Expression (also BioBM 638)]

Molecular mechanisms by which sensory, hormonal, and nutritional inputs cause changes in enzyme activity in order to regulate metabolic transformations. Gene expression, protein modification, and allosteric effects will be emphasized using examples from mammalian systems. Identification and characterization of regulatory steps in metabolism will be considered from both theoretical and practical aspects.

NS 636 Integration and Coordination of Energy Metabolism (also Biological Sciences 637)
Fall. 3 credits. Prerequisites: Biological Sciences 330 and 331, or equivalent. M W F 9:05.

The dynamics of energy metabolism in humans and higher animals are developed through characterizations of how the metabolic components support the structure and function of the individual tissues. Mechanisms that control and coordinate basic energy metabolism within and between organs are analyzed in the context of selected physiological and pathological stresses.

NS 637 Epidemiology of Nutrition
Spring. 3 credits. Limited to graduate students. Prerequisites: Biometry 601 and concurrent registration in Biometry 602 or NS 641 or equivalent knowledge about the nutritional aspects of growth and development and about nutritional biochemistry. J-P. Habicht. TBA.

Course covers principles of nutritional epidemiology, impact assessment of nutrition intervention programs, and nutritional surveillance. Teaching principles of using nutritional information for decision making, including the levels of evidence about nutrition and health and making decisions. The course shows how the biochemistry and physiology of nutrition can be related to epidemiological assessment and research strategies.

[NS 639 Epidemiology Seminar (also Statistics and Biometry 639)]
Spring. 3 credits. Offered for credit. Limited to graduate students planning field intervention studies; by permission of instructor. Prerequisite: NS 637. J-P. Habicht. TBA.

Covers the meta-analysis, design, measurement, and analytic issues involved in developing, implementing, and analyzing studies of field interventions with nutritional impact.

NS 639 Epidemiology Seminar (also Statistics and Biometry 639)
Spring. 0-1 credit. Limited to graduate students, others by permission of instructor. Contact Department of Biometry 255-7551 for permission and credit information. S-U grades only. P. Cassano. M 12:20. Not offered 1997-98.

This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.
The goal of the course is to help students gain an understanding of the statistical models and methods that are used in research on nutritional interventions. The seminar program covers varied topics in nutrition intervention, including methodologies for assessing the impact of nutrition interventions and the importance of nutritional interventions in developing countries. Presentations of original articles pertinent to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study on a agreed topic. Because the topics change, the course may be repeated for credit.

This option is designed for graduate students, mainly those with a concentration in international nutrition, who wish to become familiar with some specific topic related to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study. Topics covered include methodologies for assessing the impact of nutrition interventions and the importance of nutritional interventions in developing countries. Presentations of original articles pertinent to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study. Topics covered include methodologies for assessing the impact of nutrition interventions and the importance of nutritional interventions in developing countries. Presentations of original articles pertinent to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study.

A discussion of the most current developments in various areas of toxicological research and testing. Faculty and students will participate jointly in evaluating research findings and provide seminars and discussion of such material. For information regarding topic, instructor, and credit, contact the Office of the Graduate Field of Environmental Toxicology.

This seminar is designed for students who want to become familiar with some specific topic related to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study. Topics covered include methodologies for assessing the impact of nutrition interventions and the importance of nutritional interventions in developing countries. Presentations of original articles pertinent to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study. Topics covered include methodologies for assessing the impact of nutrition interventions and the importance of nutritional interventions in developing countries. Presentations of original articles pertinent to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study. Topics covered include methodologies for assessing the impact of nutrition interventions and the importance of nutritional interventions in developing countries. Presentations of original articles pertinent to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study. Topics covered include methodologies for assessing the impact of nutrition interventions and the importance of nutritional interventions in developing countries. Presentations of original articles pertinent to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study.
The goal of this course is to provide an integrative capstone learning experience for advanced graduate students with majors or minors in nutrition. Groups of students will focus on a series of special problems in nutrition drawn from those currently faced by nutrition professionals. Special problems may involve assuming the role of consultants, expert committee members or peer-reviewers who are charged with answering questions or formulating recommendations related to research, programs, or policies.

**NS 899 Master’s Thesis and Research**
FALL OR SPRING. CREDIT TO BE ARRANGED.
PREREQUISITE: PERMISSION OF THE CHAIR OF THE GRADUATE COMMITTEE AND THE INSTRUCTOR. S-U GRADES OPTIONAL. DIVISION GRADUATE FACULTY.

**NS 999 Doctoral Thesis and Research**
FALL OR SPRING. CREDIT TO BE ARRANGED.
PREREQUISITE: PERMISSION OF THE CHAIR OF THE GRADUATE COMMITTEE AND THE INSTRUCTOR. S-U GRADES OPTIONAL. DIVISION GRADUATE FACULTY.

**FACULTY ROSTER**

Arion, William J., Ph.D., U. of N. Dakota. Prof.
Armbruster, Gertrude, Ph.D., Washington State U. Assoc. Prof.
Bensadoun, Andre, Ph.D., Cornell U. Prof., Nutritional Sciences/Physiology
Bisogni, Carole, Ph.D., Cornell U. Assoc. Prof. and Associate Director for Academic Affairs
Brenna, Thomas, Ph.D., Cornell U. Assoc. Prof.
Campbell, T. Colin, Ph.D., Cornell U. Jacob Gould Schurman Professor of Nutritional Biochemistry
Chen, Junshi, M.D., Peking Medical College, China. Adjunct Prof.
Combs, Gerald F. Jr., Ph.D. Cornell U. Prof.
Devine, C., Ph.D., Cornell U. Asst. Prof.
Dorosh, P., Ph.D., Stanford U. Assoc. Prof.
Garza, Cutberto, M.D., Baylor College; Ph.D., MIT. Director and Prof.
Gillespie, Ardyth, Ph.D., Iowa State U. Assoc. Prof.
Haas, Jere D., Ph.D., Pennsylvania State U. Prof.
Habicht, Jean-Pierre, Ph.D., Massachusetts Inst. of Technology. James Jamison Professor of Nutritional Epidemiology
Jonsson, Urban, Ph.D., Chalmers U. Tech. (Sweden). Adjunct Prof.
Kazarinoff, Michael N., Ph.D., Cornell U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Levitsky, David A., Ph.D., Rutgers U. Prof.
Lewis, Bertha A., Ph.D., U. of Minnesota Assoc. Prof.
McCormick, Charles, Ph.D., North Carolina St. U. Assoc. Prof.
Nesheim, Malden C., Ph.D., Cornell U. Prof.
Noy, Noa, Ph.D., Tel-Aviv U. (Israel). Assoc. Prof.
Olson, Christine M., Ph.D., U. of Wisconsin. Prof.
Parker, Robert S., Ph.D., Oregon State U. Assoc. Prof.
Pearson, Thomas, Ph.D., Johns Hopkins U. Adjunct Prof.
Pelletier, David, Ph.D., The Pennsylvania State U. Assoc. Prof.

Rivera, Juan, Ph.D., Cornell U. Adjunct Asst. Prof.
Sahn, D., Ph.D., M.I.T. Assoc. Prof.
Sanjur, Diva M., Ph.D., Cornell U. Prof.
Schal, Jaffery, Ph.D., U. of Pennsylvania. Assoc. Prof.
Stephenson, Lani, Ph.D., Cornell U. Assoc. Prof.
Stipanuk, Martha H., Ph.D., U. of Wisconsin. Prof.
Stover, Patrick, Ph.D., Med. College of Virginia. Asst. Prof.
Strupp, Barbara, Ph.D., Cornell U. Assoc. Prof.
Thorbecke, Erik, Ph.D., U. of California. H. E. Babcock Professor of Economics and Food Economics
Utermöhlen, Virginia, M.D., Columbia U. Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology

**Other Teaching Personnel**

Fisher, Amy, M.S., Rush U. Lecturer
Frongillo, Edward, Jr., Ph.D., Cornell U. Senior Research Associate
Kendall, Anne, Ph.D., D.D., Cornell U. Lecturer

**Joint Appointees**

Appar, B. Jean, Visiting Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/ Nutritional Sciences
Bauman, Dale, Prof., Animal Science/ Nutritional Sciences
Blass, Elliot, Prof., Psychology/Nutritional Sciences
Miller, Dennis, Prof., Food Science/Nutritional Sciences
Van Campen, Darrell R., Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/ Nutritional Sciences
**OFFICER EDUCATION**

Military instruction began at Cornell University in 1868 under the provisions of the Morrill Act of 1862. Since that time, officer education has been highlighted by the construction of Barton Hall in 1914 and the establishment of a formal Reserve Officers Training Corps (ROTC) unit in 1917. The program continually evolves to keep pace with latest changes while placing an emphasis on the development of leadership and managerial skills. Throughout the years, Cornell’s program of officer education has produced many outstanding civilian and military leaders.

The programs of officer education allow the student to prepare 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 John M. Keefe, Engineer, United States Army, Professor of Military Science and Commanding Officer, U.S. Army ROTC instructor Group

Captain Mark Coomes, Infantry, United States Army

Captain Karen Ward, Engineer, 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 special 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 six-week summer camp at an Army installation), and the opportunity to participate in a number of extracurricular activities. The 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 in which the student is commissioned upon graduation.

**Requirements for Enrolling**

Applicants must be citizens of the United States prior to being commissioned as lieutenants. (Noncitizens may enroll in selected portions of the program.) Students must meet Army medical requirements.

Overall sound mental and physical condition is essential, and students are required to undergo periodic physical fitness tests. Enrollment and continuation in the program is subject to the approval of the professor of military science.

Enrollment in 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 purposes of commissioning assessments 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 professor of military science, sophomores in a five-year degree program. Veterans of the Armed Forces of the United States and students entering Cornell with AROTC credit from secondary or military schools (Junior Division AROTC) may receive advanced standing.

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 twelve credits of military subjects is taken. In addition, academic-enrichment courses are required in such fields as written communications, math logic, computer science, human behavior and military history.

All cadets attend a six-week camp, with pay, between the junior and senior years. All cadets participate in physical fitness training three days per week. Each year cadets are sent to the Army’s Airborne School, Winter Survival School, and Air Assault Course, dependent upon number of slots and the students’ standings within the ROTC program.

**Basic Course (Mil S I and Mil S II)**

Students in the first year of the Basic Course take one classroom course in military science in the fall and spring semesters, for which they receive academic credit depending upon their college. These courses include study of the U.S. organization for defense and principles and techniques of leadership and management.

Students also participate in leadership modules that include rappelling, orienteering, drill and ceremony, physical training, winter survival, rifle marksmanship, historical site visits, land navigation, interpersonal communication, and individual tactical training. These modules are designed to promote personal development and enrichment. While they do not receive academic credit for these activities, students receive physical education credit. Typical freshman participation in Army officer education is 48 1/2 program-related hours.

During the fall of the second year, students take a one-credit course in map reading and spend approximately two hours a week in practical leadership training, land navigation, and military skills. In the spring, students take a one-credit course in the basic principles of small organizations.

**Advanced Course (Mil S III and Mil S IV)**

The Advanced Course of the Four-Year Program is open to students who have successfully completed the Basic Course and are accepted by the Professor of Military Science for further enrollment. It is also open to students who have gained appropriate advanced standing through either successful completion of a six-week summer camp or prior military training. Students entering the Advanced Course must have two years of academic work remaining at Cornell or another degree-granting institution. Students must pass required physical and aptitude tests. In addition, the past performance and desire of each student is evaluated to determine potential for eventual commissioning.

When students are accepted for the Advanced Course or accept a scholarship, they execute a written contract with the U.S. government. Under terms of the contract, they agree to complete the Advanced Course and to accept a commission if tendered. Concurrently with the signing of the contract, students enlist in the United States Army Reserve for control purposes.

Classroom study in the Advanced Course includes one military science course each semester on such subjects as leadership and management, small-unit tactics, and command and staff organization and functions. The two hours a week of practical leadership training continues, and between the junior and senior years all cadets attend a six-week advanced summer camp currently conducted at Fort Bragg, North Carolina.

**Scholarships**

Scholarships are awarded on the basis of merit and are 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 from $15,000 to $20,000 toward tuition and mandatory fees. Scholarship cadets and Advanced Course cadets also receive $150 a month for up to ten months a year. Scholarship cadets receive $450 per year to defray the cost of books and may be reimbursed up to $400 per year for lab fees.

**Commissioning**

All students who successfully complete the Advanced Course, including the advanced summer camp, are commissioned as second lieutenants in the United States Army Reserve or Regular 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 ten to sixteen 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.

Non-scholarship cadets accepting an Army commission serve a minimum of three years on active duty followed by five years in reserve status. They may elect to go into the Army Reserve after commissioning as opposed to active duty.

Scholarship cadets 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, Special Forces, Corps of Engineers, Signal Corps, Military Police, Military Intelligence—in which they prefer to serve.

They are notified in the spring, before commissioning, of the branch to which they are assigned. The likelihood of 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 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 $150 a month for up to ten months a year. While attending the advanced summer camp (between the junior and senior years), each cadet receives approximately $700 and an allowance for travel to and from camp. A cadet in the Two-Year Program receives the same payments as cadets in the Advanced Course and, in addition, receives approximately $700 and travel costs 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 United States Organization for Defense and Security
Fall. 1 credit. Required. Staff.
Students examine the U.S. defense structure in terms of organization, mission, personnel, and relationships among military forces and between the 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 Leadership Theory
Spring. 1 credit. Required. Staff.
This course allows students to develop a basic understanding and appreciation of theories of social and organizational psychology and behavior as they apply to the military setting. Attention is given to leader types, the source and exercise of authority, and the impact of varying styles of leadership, resource management, motivation, and organization effectiveness. The student is introduced to the concepts of integrity, ethics, and professionalism. Classes on historical events and strategy will be presented.

Sophomore Year (Mil S II)
Mil S 221 Mapping: Land Navigation
Fall. 1 credit. Required. Staff.
This course 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 from physical, social, and climatic factors. Portions of the course offer experience in land navigation and orienteering.

Mil S 222 Small Organizational Operations
Spring. 1 credit. Required. Prerequisite: Mil S 102 or instructor approval. Staff.
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.

Junior Year (Mil S III)
Mil S 331 Theory and Dynamics of the Military Team
Fall. 2 credits. Required. Staff.
After an initial introduction to techniques of presenting briefings, students are provided with a broad understanding of the principles and application of teamwork in military organizations. Particular emphasis is given to leadership responsibilities of the commander as the team coordinator. Additionally, students have an opportunity to develop an understanding of the roles and contributions of the various branches of the Army in support of the military team.

Mil S 332 Leadership in Small-Unit Operations
Spring. 2 credits. Required. Prerequisite: Mil S 331 or instructor approval. Staff.
This course provides an understanding of 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; the processes of planning, coordinating, and directing the operations of military units through operation plans and orders.

Senior Year (Mil S IV)
Mil S 441 Contemporary Military Environment I
Fall. 2 credits. Required. Staff.
An overview of the functions, responsibilities, and interrelationships among small-unit leaders, the commander, and the staff. Detailed discussions focus on actions of small-unit leaders, communication skills, the military justice system, and the logistical support of the army in the field.

Mil S 442 Contemporary Military Environment II
Spring. 2 credits. Required.
A continuation of Mil S 441. Conferences and seminars examine the techniques of effective military leadership with special attention given to professionalism and ethical considerations in the armed forces during peacetime and armed conflict.

Practical Leadership Training
All Army Officer-Education Students
As with many laboratory periods, no credit is given, and participation is required for successful completion of the AR/ROC program. Students may 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. Staff.
Mil S 151 Mil S 152
Spring.

Mil S 5 Cadets meet for two hours each week to learn a variety of military skills including rappelling, first aid, drill and ceremonies, military skating, and weapons familiarization.

Mil S 11 Leadership Laboratory II
Fall. 0 credits. S/U. Staff.
Mil S 251 Mil S 252
Spring.

Mil S Cadets meet for two hours each week as members of the cadet organization to participate in practical leadership exercises. Types of practical activities include rifle marksmanship, orienteering, drill and ceremonies, signal communications, physical fitness training, first aid, tactics and field exercises.

Mil S III Leadership Laboratory III
Fall. 0 credits. S/U. Staff.
Mil S 351 Mil S 352
Spring.

Mil S Cadets meet for two hours a week and some weekends to prepare for a six-week summer camp that follows the junior year. Emphasis is on the development of individual skills in leadership techniques and practical skills. Cadets rotate through leadership positions to develop an ability to apply decision-making processes to a myriad of situations. Cadets also acquire technical expertise and proficiency in signal communications, physical fitness, drill and ceremonies, rappelling, orienteering, tactics, water survival, and other military skills.
The objective of the Naval Officer Education Program is to prepare selected students for careers as commissioned officers in the United States Navy or United States Marine Corps by supplementing their undergraduate education with instruction in essential concepts of naval science and fostering development in the qualities of leadership, integrity, and dedication to their country and the naval services. The program is compatible with most undergraduate major fields of study, including five-year baccalaureate degree programs on a case-by-case basis.

The objective is achieved through a broad program, normally covering four years, that combines specific courses in naval science and specified academic subjects to supplement the various professional leadership programs in which the practical aspects of naval science and leadership procedure are stressed. It also includes at least one summer-at-sea period.

Non-naval officer education students:

- Those interested in serving in the Naval Science Institute in Newport, R.I.
- Those interested in serving in the Marine Corps

The United States Marine Corps is an integral part of the Naval Services and is commanded by the Commandant of the Marine Corps. The Marine Corps has a postgraduate training program midshipmen commissioned in the Navy or Marine Corps Reserve have a scholarship, students also receive money for textbooks, uniforms, and a $150-a-month stipend for a maximum of forty 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:

First, by applying for the national competition each year. This process entails filling out and submitting an application; being interviewed; having a physical examination; and applying to, and being accepted by, one of the colleges or universities throughout the country. NROTC program midshipmen commissioned in the Navy or Marine Corps Reserve.

Second, 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.

Third, by entering through the Two-Year Scholarship Program.

College Program

There are two College Programs available:

- Both lead to a commission in the Naval or Marine Corps Reserve.

Each of these programs provides textbooks for naval science courses, uniforms, and a subsistence allowance of $150 a month from the beginning of the junior year.
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 given to applied leadership as it relates to their Navy counterparts.

A study of fundamental aspects of naval science, including its contributions to sea power, factors and different warfare communities involved in the physical development of naval forces, resources that must be managed, and prospects for the future. Naval uniforms, customs, and traditions are covered.

Freshman Year (Navy and Marines)
Nav S 101 Fundamentals of Naval Science
Fall. No credit.
A study of fundamental aspects of naval science, including its contributions to sea power, factors and different warfare communities involved in the physical development of naval forces, resources that must be managed, and prospects for the future. Naval uniforms, customs, and traditions are covered.

Nav S 102 Sea Power and Maritime Affairs
Spring. 3 credits.
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 gives a historical perspective throughout the course.

Nav S 157 Principles of Sailing
Fall and spring. Physical education credit. Instruction in basic sailing skills and safety principles. Students sail small boats on Cayuga Lake. Focus is on U.S. Navy Class B inshore skipper certifications.

Sophomore Year (Navy and Marines)
Nav S 201 Organizational Behavior and Small Group Processes
Fall. 3 credits.
The theme of the course is the "evolving role of the manager, organizational decision maker, and leader." The course will begin by briefly studying the theoretical principles of management and will progress through practical skills of managers and leaders. Lectures, reading assignments, films, and discussions should provide students with an excellent opportunity to wrestle with 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 assigned responsibilities leading men and women in today's demanding and increasing "hi-tech" naval environment.

Nav S 202 Naval Ship Systems I (also Mechanical and Aerospace Engineering 101)
Spring. 3 credits. Two lecture classes each week.
An introduction to primary ship-systems and their interrelationship. Basic principles of thermodynamics, propulsion, mechanical operation, internal communications, electronics, ship structure, and other marine systems.

Junior Year (Navy)
Nav S 301 Principles of Navigation (also Agricultural Engineering 305)
Fall. 4 credits. Four classes each week (lecture-recitation-project work).
An introduction to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

Nav S 302 Naval Operations
Spring. 3 credits.
The course covers the application of the nautical rules of the road 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.
The principles and theories used in the development of naval weapons systems are examined. Theoretical, extensive study is made of detection systems, especially radar and sonar, followed by discussions of ancillary and instruction for computing, stabilizing, tracking, and weapons control and delivery.

Nav S 402 Leadership and Ethics
Spring. 3 credits.
A variety of topics important to the naval officer for both professional and managerial development are reviewed. The material is tailored for the midshipman to provide 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 will learn various aspects of Navy leadership and ethical decision-making. Marine-option students also take this course.

Junior or Senior Year (Marine Options)
Nav S 310 Evolution of War
Fall. 3 credits.
A study of warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and national political realities and values; 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.
The history of the development, theory, techniques, and conduct of amphibious operations from 490 B.C. to the present. Special emphasis will be on amphibious operations conducted in the central Pacific during World War II and the future of amphibious operations.

Other Required Courses

Naval Science Courses
All Navy and Marine midshipmen take one naval science course each semester during their freshman and sophomore years. Navy-option students continue to take a naval science course each semester during their junior and senior years. Marine-option students have slightly different curriculum requirements for their junior and senior years.

Naval Professional Laboratories
Nav S 141-142, 241-242, 341-342, or 441-442
All students in the program participate in one ninety-minute professional development session each week. The session is held from 2:30 until 4:00 on Wednesday afternoon. This period consists of both drill and professional information briefings. Students gain experience in actual leadership situations and at the same time learn the fundamentals of seamanship, military formations, movements, commands, discipline, courtesies, and honors. During information briefings special emphasis is given to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

NAVAL SCIENCE 319
for a commission in the U.S. Marine Corps or U.S. Marine Corps Reserve. Marine-option students take the same naval science courses and naval professional laboratories as Navy-option students for the freshman and sophomore years. During the junior and senior years, Marine-option students have slightly different naval science course requirements than their Navy-option students counterparts. Two semesters of courses (a minimum of 3 hours each) in the subject area of American Military Affairs or National Security Policy are required. One semester of a modern foreign language must be completed.

Extracurricular Activities
The NROTC midshipman at Cornell is offered a broad range of activities, including sail training and a comprehensive intramural sports program. The unit has won the Independent Division All Sports Trophy for fifteen of the last twenty-one years. Midshipmen participate in a myriad of social events, including the annual Navy/Marine Corps Birthday Ball.

DEPARTMENT OF AEROSPACE STUDIES
Colonel Larry L. Wheeler, United States Air Force, Professor of Aerospace Studies and Commander, Air Force ROTC Detachment 520
Captain Scott L. Wilcox, United States Air Force
TBA, United States Air Force
TBA, United States Air Force

The objective of the Air Force officer education program at Cornell is to prepare men and women for positions as officers in the United States Air Force. The program is designed to teach students about the mission and organization of the Air Force, the historical development of airpower, leadership, and management. Students study national security policy and the role of the military in a democratic society. This program includes specific courses in aerospace studies and practical leadership laboratories.

Requirements for Enrollment
The Air Force officer education program is open to any qualified undergraduate or graduate student enrolled in any major field of study.

Applicants must be United States citizens. Noncitizens may enroll and will receive certificates acknowledging completion of the course but cannot receive a commission.

All applicants receive physical examinations at no cost and must meet certain physical requirements to be accepted. Students who are interested in qualifying for flying categories (pilot or navigator) must meet more stringent physical requirements. In addition, students enrolled in the commissioning program must meet specified physical fitness requirements.

Though the program is designed to prepare future Air Force officers, 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 after coordination with the AFROTC staff. Students in a five-year program may enroll in their freshman, sophomore, or junior year.

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 scholarship cadets, the first year of the GMC carries no military commands. Students may withdraw at any time. For nonscholarship cadets, both years of the GMC carry no military commitment, and students may withdraw at any time.

General Military Course
Students in General Military Courses (GMC) take a one-credit Aerospace Studies course each semester. During the freshman year, the student examines the organization and mission of the United States Air Force and the environment of the Force officer. In the sophomore year, the student studies the history and development of American air power. In both years, officer and professionalism within the United States Air Force are emphasized.

Students also spend 2 hours a week in a leadership laboratory. Leadership laboratory provides cadets with the opportunity to put into practice those skills they learn 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-hour 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 2 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 six-week summer training course preceding enrollment.

The Two-Year Program is open to all qualified students with two years of academic study remaining at Cornell (graduate or undergraduate) or at schools supported under a crosstown agreement. Applicants are accepted from October through April of the academic year preceding the applicant's planned entry into the program. Selectees are then required to complete a six-week summer training program at government expense.

Scholarships
The Air Force offers 4-year scholarships to high school seniors and 2- and 3-year scholarships to college students. Four-year scholarships are offered on a competitive basis in specified majors 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, or from AFROTC/RROO, Maxwell AFB, AL 36112-6663, 1-800-522-0033, extension 1903. 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.

Schools for 2 and 3 years. Applications for these scholarships shall be made to the Professor of Aerospace Studies during the freshman or sophomore 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. Scholarship amounts range from $2,000 per year to full tuition, fees, and books, and provide a $150 monthly non-taxable allowance during the school year. Scholarships do not include the cost of room and board.

Fees
An initial uniform deposit of $50 is required on entry into AFROTC. Two subsequent $50 uniform payments are due, one on entry into the POC and one before commissioning, at which point the cadet can purchase the uniform with the deposits.

Benefits
All cadets in the advanced program (POC)—whether they are on scholarship or not—receive a $150-a-month, nontaxable subsistence allowance during the academic year. During the four- or six-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 six-week course for Two-Year Program applicants. Students in these programs normally attend field training between their sophomore and junior years.
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; social actions program; and supplemental training. The six-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 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 bachelor's degree, tendered a commission, and enter the Air Force as second lieutenants.

Second lieutenants commissioned in nonflying categories are required to serve on active duty for four years. Pilots are required to serve on active duty for eight years after completing flying training. Navigators 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, astronautics, the biological sciences, computer design and maintenance, meteorology, space, or other engineering and scientific fields. Graduates in the nontechnical category can anticipate assignments in manpower management, information management, logistics, law enforcement and investigation, intelligence, personnel, transportation, accounting and finance, and other career fields. They may use their educational backgrounds in positions of responsibility and be given the opportunity to further their development in leadership and management skills.

Any undergraduate major is suitable for those who are qualified and interested in becoming pilots or navigators. 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 Introduction to the Air Force Today, Part I**

*Fall. 1 credit.*

An introductory study of U.S. Air Force mission and organizational structure, with emphasis on officer and basic communications skills.

**Air S 162 Introduction to the Air Force Today, Part II**

*Spring. 1 credit.*

A study of U.S. Air Force mission and organizational structure with an emphasis on professionalism, officer and communications skills, and the principles of leadership.

### Sophomore Year

**Air S 211 American Air Power**

*Fall. 1 credit.*

This course studies the development of American air power. It concentrates on the evolution of thought on the proper way to employ air power to meet national security objectives and addresses the many factors that influenced air-power thinking. This course also emphasizes communications skills training and practical application.

**Air S 212 Introduction to Leadership**

*Spring. 1 credit.*

This course examines several topics that prepare cadets to succeed at field training. Subjects include effective communications, leadership, management, and problem-solving skills.

### Junior Year

**Air S 331 Air Force Leadership and Management**

*Fall. 3 credits.*

This course is divided into three major parts. Part I is an introduction to effective written and oral communication skills. Communication skills are practiced and developed throughout the course. Part II focuses on leadership and management principles. The final part addresses ethics, values, and the standards of conduct expected of and practiced by military members. Student-run seminars, case studies, and oral and written assignments are required.

**Air S 332 Management in the Armed Forces**

*Spring. 3 credits.*

This course focuses on Total Quality Management (TQM) and its role in today's Air Force. Written and oral communication skills are emphasized. Primary topics of discussion and analysis include the history and development of management thought, the fundamentals of TQM, TQM in the Air Force—Quality Air Force (QAF), and QAF application through team problem solving. Student-run seminars, case studies, Quality Improvement Team participation, and oral and written assignments are required.

### Senior Year

**Air S 401 National Security Forces in Contemporary American Society I**

*Fall. 3 credits.*

This is an advanced course on U.S. national security policy and processes, and current international political-military issues affecting American security interests. Primary topics of discussion include the role of military forces in the post-cold-war era, national security decision-making, and specific issues such as military operations other than war, alliances, international forces, peacekeeping, arms control, and terrorism. Roles of the U.S. Air Force in support of U.S. national security objectives are also examined.

**Air S 402 National Security Forces In Contemporary American Society II**

*Spring. 3 credits.*

This is a second-semester study of American national security policy, process, actors, and strategies. This course focuses on military law and officerhip and explores Air Force issues relevant to future officers. Throughout the course, writing and public speaking exercises are directed at improving students' communication skills.

**Leadership Laboratory Courses**

All Air Force cadets spend 2 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 an evening 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.

Field trip to a local military installation.

**Air S 241-242 Intermediate Military Experiences**

Develops skills in giving commands for drill and ceremonies. Introduction to the Air Force base environment in which the Air Force officer functions. Includes a look at career areas available based on academic majors. Students participate in leadership situations through military drills and ceremonies. Field trip to a local military installation.

**Air S 341-342 Junior Officer Leadership**

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 gain insight into the general structure and progression patterns common to 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, basic 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 the administration of Cornell University. For current fee information on physical education courses call 255-4286; for Outdoor Education courses, call 255-6415 (ext. 2).

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 physical education course registration or may be found on "Bear Access," a package of software for accessing a variety of network services at Cornell, or on the World Wide Web (at http://www.cornell.edu/Academic.html#Class). 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.

Aquatic Courses

Lifeguard Courses

Lifeguard Training
Fall and spring. Fee charged. Prerequisites: swimming test consisting of 500 yards, demonstrating three strokes, treading water without the use of hands, and retrieving a brick from seven feet of water. Three 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, 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. Two classes a week.

American Red Cross lifeguarding instructor and CPR/RPR 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
Fall and spring. Fee charged. This course is offered during intersession periods. Scuba diving 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)
Fall and spring.

Ideal for all who have taken one term of Beginning Swimming, regardless of whether the test was successfully completed. Areas of special emphasis are the crawl stroke and rotary breathing, back crawl, elementary backstroke, diving, treading water, and underwater swimming. The primary objective is to strengthen the student's confidence and competence.

Swimming, Intermediate (ARC)
Fall and spring.

Practice of basic skills and five basic strokes; front crawl, back crawl, elementary backstroke, breaststroke, sidestroke.

Swimming, Advanced (ARC)
Fall and spring.

Practice of nine strokes: front crawl, back crawl, elementary backstroke, breaststroke, sidestroke, overarm sidestroke, trudgeon, and butterfly.

Swimming Conditioning
Fall and spring. Prerequisite: good swimming ability. Introduction to, and practice of, different training methods. Final objective: to swim 2,500 yards during class period. Primarily a conditioning and not an instructional course.

Water Safety Instructor
Fall and spring. Fee charged. Prerequisites: passing of written and water tests, which are given on the first day. American Red Cross water safety instructor certification is awarded on satisfactory completion of the course. This is not a course for casual participant. Approximately 45 hours of work is required.

Water Safety Instructor Refresher Course
Spring. Fee charged.

Selected sessions of the water safety instructor certification course.

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 some advanced courses, since they require the mental and physical ability to perform more complex phrases in various styles.

African Dance
Fall and spring.

Ballroom Dancing
Fall and spring and summer. Fee charged. One class a week, Helen Newman Hall. Students and their partners must sign up at course registration. Includes instruction in the waltz, swing, cha cha, calypso, tango, and others.

Belly Dancing
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 while putting them together in dance to music of the Middle East.

Country Line Dancing
Fall and spring. Fee charged.

No partners are needed. Most dances are done in parallel lines, with a few done in large circles. Once you learn a few basic steps, the possibilities are endless. Most dances have a fixed pattern and are simply different combinations of a few basic steps.

Exploration in Movement (A & B)
Fall and spring.

Interactive World Dance
Fall and spring. Fee charged.

This course consists of an interesting selection of popular, traditional dance forms that come from diverse cultures around the world. These include line, circle, set, trio, individual, and partner dances. No partner necessary.

Modern Dance I (also Theater Arts 124)
Fall and spring.

Modern Dance II (also Theater Arts 232)
Fall, spring, and summer (6 weeks).

Modern Dance III (also Theater Arts 306)
Fall and spring.

Modern Dance IV (also Theater Arts 308)
Spring.
Salt Water Fly Fishing
Fall. Fee charged.
Learn the special techniques necessary for salt water fly fishing. This course includes 4 hours of classroom instruction and 4 days of fishing over fall break.

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.

Body Sculpting
Fall and spring. Fee charged.

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 will cover running and stretching techniques. A rigid attendance and participation requirement of supervising children.

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.

Wellness and Fitness
Fall and spring. Fee charged. Designed to acquaint students with the components of, and conditioning for, triathlon (running, swimming, and bicycling).

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 develop the student's physical fitness status, blood cholesterol levels, and overall lifestyle health habits. Each student will receive an individual exercise prescription and attend the Resident Cardiac Rehab Program.

Golf, Recreational
Fall and spring. Limited to students who are experienced golfers. Fee charged. Students must provide their own clubs. A minimum of ten 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 emphasis on conditioning and will focus upon basic skills and is open to both male and female participants.

Ice Skating Courses

Skating, Introduction to
Fall and spring. Fee charged. Involves mastery of the basic skills of forward, backward, crossovers, turns, and spirals.

Figure Skating, Introduction to
Fall and spring. Fee charged. Includes many of the first aid skills taught in a basic EMT class.

Martial Arts—Self-Defense Courses

Boxing, Introduction to
Fall and spring. Fee charged. Involves mastery of the basic skills of forward, backward, crossovers, turns, and spirals.

Fencing, Introduction to
Fall and spring. Fee charged. Includes warm-up exercises and defensive movements. Equipment furnished.

Fencing, Intermediate
Fall and spring. Fee charged. Prerequisite: Introduction to Fencing or the equivalent. Includes many of the first aid skills taught in a basic EMT class.

Fencing, Classical
Fall and spring. Fee charged. Includes warm-up exercises and offensive and defensive moves. Equipment furnished.

Judo, Introduction to
Fall and spring. Fee charged. Involves mastery of the basic skills of forward, backward, crossovers, turns, and spirals.

Judo, Intermediate
Fall and spring. Fee charged. Involves mastery of the basic skills of forward, backward, crossovers, turns, and spirals.

Karate, Introduction to
Fall and spring. Fee charged. Involves mastery of the basic skills of forward, backward, crossovers, turns, and spirals.

Karate, Advanced
Fall and spring. Fee charged. Involves mastery of the basic skills of forward, backward, crossovers, turns, and spirals.

Figure Skating Courses

Skating, Introduction to
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves. Equipment furnished.

Figure Skating, Introduction to
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves. Equipment furnished.

Figure Skating, Intermediate
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Figure Skating, Classical
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Figure Skating, Advanced
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Figure Skating, Professional
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Figure Skating, Olympic
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Figure Skating, World Cup
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Judo, Introduction to
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Judo, Intermediate
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.

Judo, Advanced
Fall and spring. Fee charged. Includes warm-up exercises and decorative moves.
Kung Fu
Fall and spring. Fee charged. Exploration of conditioning and fitness procedures used in the major martial arts, such as karate and 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 emphasis on high and powerful kicks. Intermediate-level kicking, punching, and blocking are emphasized.

Tae Kwon Do, Advanced
Fall and spring. Fee charged. A Korean martial art distinguished by its emphasis on high and powerful kicks. Advanced-level kicking, punching, and blocking are emphasized.

T'ai Chi Chuan, Introduction to and Intermediate
Fall and spring. Fee charged. Introduction to T'ai Chi, a system of graceful, exercises that aim at nurturing relaxation, deep breathing, and improved circulation.

Outdoor Education Program
See the brochure for the Cornell University Outdoor Education Program at registration for more information about courses.

Climbing Courses
Basic Rock-Climbing
Fall, spring, and summer. Fee charged. Seven afternoons climbing inside on the Lindseth climbing wall.

Basic Rock-Climbing, for Women
Fall, spring. Fee charged. Seven afternoons climbing inside on the Lindseth climbing wall taught by and for women.

Basic Rock-Climbing, for 25 and Over
Fall, spring. Fee charged. Non-credit course. Four evenings climbing indoors on the Lindseth wall for people age 25 or older.

High Adventure 101
Fall, spring, and summer. Fee charged. Six afternoons at local parks and wilderness areas, some classes on indoor Lindseth climbing wall.

Continuing Rock-Climbing
Fall, spring. Fee charged. Seven afternoons of advanced climbing techniques on the Lindseth climbing wall.

Ice Climbing
Spring. Fee charged. Four outings to local state parks and gorges.

Outdoor Top Roping
Fall, spring. Fee charged. Two outings (nights) on the Lindseth climbing wall and two outings at local climbing areas.

Shawangunks Rock-Climbing
Fall, spring. Fee charged. Four-day climbing camp at the Shawangunks.

Backpacking Courses
Natural History of the Finger Lakes
Fall, spring. Fee charged. Backpacking skills with a strong environmental focus.

Backpacking in the Finger Lakes
Fall, spring. Fee charged. Classes lead to two full weekends on the trail.

Southwest Backpacking
Spring. Fee charged. Spring break trip to the SW deserts and canyons.

Trail Maintenance
Fall, spring. Fee charged. Work with the local trails club to maintain trail systems.

Wilderness Skills
Fall, spring. Fee charged. Break trip focusing on wilderness travel and living skills.

Wilderness Survival Skills
Fall, spring. Fee charged. Primitive living skills taught in three classes and a weekend backpack trip.

Biking Courses
Bike and Hike
Fall, spring. Fee charged. Four full days exploring local countryside.

Bike Repair, Beginning
Fall, spring. Fee charged. Non-credit. Two evenings of hands-on repair work.

Bike Repair, Intermediate
Fall, spring. Fee charged. Non-credit. One evening of hands-on repair work.

Mountain Biking
Fall. Fee charged. Four full days exploring local countryside.

Canoeing Courses
Canoeing, Adirondacks
Fall. Fee charged. A sampler of beginning canoeing and kayaking.

Canoe/Camping, Flatwater
Fall, spring. Fee charged. Four full days paddling local waterways including an overnight.

Canoeing, Moving Water
Fall, spring. Fee charged. Includes a full weekend of river paddling.

Caving Courses
Caving
Fall, spring. Fee charged. Four days in the fall and two weekends in the spring in Pennsylvania caves.

Hiking Courses
Day Hiking
Fall, spring. Fee charged. Day outings in the Finger Lakes Region.

Snowshoeing
Spring. Fee charged. Day outings in the Finger Lakes Region.
Expanding Awareness
Fall and spring. Fee charged. Provides the opportunity to explore a variety of ancient and modern methods designed to bring one to the state of meditation.

Health Issues for Student Athletes
Fall and spring.
To promote and encourage lifestyle choices on the part of student athletes that will help them establish and maintain high levels of all-around health, and thereby contribute positively to their academic and athletic achievement. NOTE: This is an NCAA requirement open to sophomore athletes only.

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. 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.

Shiatsu Massage
Fall and spring. Fee charged. Gain an experiential 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.

Racket 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 eye wear required.

Squash, Introduction to, Intermediate
Fall, spring, and summer. Fee charged. Classes for appropriate level of play. Equipment is furnished. Protective eye wear required.

Tennis, Introduction to
Fall, spring, and summer. Fee charged. Basic skills taught include forehand, backhand, serve, and volley. Scoring methods taught.

Tennis, Intermediate
Fall, spring, and summer. Fee charged. Review basic strokes plus topspin and underspin. Doubles strategy emphasized.

Tennis, Advanced
Fall, spring. Fee charged. Advanced strokes and doubles play emphasized. Recommended for tournament players or those with previous team experience.

Tennis, Indoor-Recreational
Fall and spring. Fee charged. Play is conducted at the new Reis Tennis Center. Players must have high school or college tournament experience and 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
Board Sailing (Wind Surfing)
Fall, spring, and summer (6 weeks). Fee charged. A Mistral Board Sailing Academy certificate is awarded on successful completion.

Catamaran, Introduction to
Fall, spring, and summer (6 weeks). Fee charged. Learn unique skills necessary for sailing multi-hull catamarans.

Small-Boat Sailing, Introduction to
Fall, spring, and summer (6 weeks). Fee charged. Learn basic skills necessary to sail small sailboats and basic keelboats safely.

Small-Boat Sailing, Competitive
Fall and spring. Fee charged. Vanguard 420 sailboat used for the course. USYRA Rules Book used as a text for the course. Fee includes one-year membership in university sailing team program.

Skilling and Snow Boarding
Downhill Skiing and Snowboarding
Spring. Fee charged. Transportation, instruction, ski-lift fees, and skiing time are offered in a package deal. Greek Peak and Song Mountain personnel are present at registration to explain the program and accept fees. Bus transportation to Greek Peak is provided six afternoons a week for six weeks.

Cross-Country Skiing—See Outdoor Program.

Target Shooting Courses
Archery, Introduction to
Fall and spring. Fee charged. Two classes a week. Instruction in the care of equipment; seven basic steps for shooting; scoring; practice shooting at twenty, thirty, and forty yards.

Archery, Intermediate
Fall and spring. Fee charged. For those who have basic experience.

Pistol, Introduction to
Fall, spring, and summer (6 weeks). Fee charged. Instruction in use of pistol in the three modes of fifty-foot competitive target shooting—slow fire, timed fire, and rapid fire. Emphasis on safety and responsibility while firing.

Riflery
Fall and spring. Fee charged. Instruction and practice in the techniques of target riflery from various shooting positions.

Trap and Skeet
Fall, spring, and summer (6 weeks). Fee charged. Includes lectures and shooting at the Tompkins County Rod and Gun Club range. Guns and shells are furnished.

Team Sports Courses
Basketball
Fall and spring. Fundamental drills in passing, shooting, and dribbling. Scrimmages each class session.

Ice Hockey, Introduction to
Fall and spring. Fee charged. Stick handling, passing, and shooting are stressed. 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
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 strategy; scrimmages in class.

Volleyball, Advanced
Fall and spring. Offensive and defensive team strategy is emphasized in class scrimmages.

Weight Training Courses
Nautilus
Fall, spring, and summer. (6 weeks) Enrollment limited to capacity of facilities. Fee charged. Advanced weight lifting on specifically designed apparatus. Ten stations in the room.

Olympic 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
Fall and spring. Independent study is designed for those who have difficulty fitting any of the regularly scheduled courses into their academic program. Class activities will be based on personal fitness programs. A term paper is required. Permission to enter this program must be granted by the program director.
The School of Continuing Education and 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, New York 14853-2801; call 607/255-4987; e-mail info@sce.cornell.edu; or fax 607/255-8942; unless indicated otherwise below. You may also visit us on the Web at http://www.sce.cornell.edu/.

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Diane E. Sheridan, director, finance and administration

CORNELL UNIVERSITY SUMMER SESSION
The Cornell University Summer Session provides unique and unusually attractive opportunities for study and recreation at a time when the Cornell campus and the Finger Lakes region of central New York are at their loveliest and the Ithaca weather is at its best. Participants may choose from a wide spectrum of courses scheduled during three-, eight-, and six-week sessions. Although admission is open to persons of all ages, the majority of summer session participants are matriculated Cornell students. Classes meet daily and are usually kept small to foster a close association between students and teachers.

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 noncredit weekend and weeklong short courses. Programs can also be designed to respond to the needs and interests of corporations, professional societies, and other groups. These programs take place on the Cornell campus, on site, and at other locations worldwide. For information call 607/255-7259; e-mail sp@sce.cornell.edu; or fax 607/255-8942.

SUMMER COLLEGE PROGRAMS FOR HIGH SCHOOL STUDENTS
High school sophomores, juniors, and seniors attend regular university courses through Cornell University Summer College and may earn college credit. They also explore career options through specially designed workshops. 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 607/255-6203; e-mail cau@sce.cornell.edu; or fax 607/255-8942.

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, week-long 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, 626B Thurston Avenue, Ithaca, New York 14850-2490; e-mail cau@sce.cornell.edu; or call 607/255-6260.

EXTRAMURAL STUDY
Cornell undergraduate or graduate students whose studies have been interrupted may find it appropriate to resume their studies by taking classes on a part-time basis. Area residents 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.

WINTER SESSION
Cornell undergraduate and graduate students, as well as employees and area residents, can earn three 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.

CONTINUING EDUCATION INFORMATION SERVICE
This service provides free information, counseling, and referral to people who have been out of school for several years and want to resume their education. It also provides information about short courses, workshops, professional updates, and executive programs offered by the university to people inside and outside Cornell.

SUMMER 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. The summer session catalog is published in February. A preliminary course roster is available beginning in late November and current course offerings are listed and updated on the Web from November through June.

African Studies
AS&RC 205 African Civilizations and Culture
A program in African languages is also offered. Consult the department for a complete listing.

Agricultural, Resource, and Managerial Economics
ARME 220 Introduction to Business Management
ARME 221 Financial Accounting
ARME 310 Introductory Statistics
ARME 320 Business Law I

Anthropology
ANTHR 101-102 Introduction to Anthropology
ANTHR 201 Lost Tribes and Sunken Continents
ANTHR 257 American Indians in Film

Archaeology
ARKEO 100 Introduction to Archaeology
ARKEO 201 Lost Tribes and Sunken Continents
ARKEO 319 Underwater Archaeology
ARKEO 358 Field Archaeology in Honduras
ARKEO 360 Field Archaeology in Greece
ARKEO 361 Summer Program in Etruscan Archaeology at La Planta

Other field study opportunities are usually available through this department.

Architecture
ARCH 110 Introduction to Architecture: Design Studio
ARCH 130 An 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.
CONTINUING EDUCATION - 1997-1998

Basic Engineering Probability and Dynamics
Thermodynamics
Introduction to Scientific Computation
Mechanics of Solids
Introduction to Digital Systems
The Computer Age
Computers and Programming

Education
EDUC 420 Field Experience
EDUC 445 Curriculum Design Workshop
EDUC 497 Individual Study in Education
EDUC 501 Communication Workshop
EDUC 513 Psychology of Human Interaction
EDUC 523 Food and Fiber Across the Curriculum
EDUC 620 Internship in Education
EDUC 621-622 Work-Experience Coordinator Certification Course
EDUC 632 Teaching Agricultural, Extension, and Adult Education
EDUC 644 Curriculum Theory and Analysis
EDUC 594 Special Topics in Education
EDUC 800 Master's-Level Thesis Research
EDUC 900 Doctoral-Level Thesis Research

Electrical Engineering
ELE E 231 Introduction to Digital Systems
ELE E 232 Practicum in Digital Systems

Engineering
General Interest Courses
ENGRG 101 The Computer Age
Distribution Courses
ENGRD 202 Mechanics of Solids
ENGRD 203 Dynamics
ENGRD 211 Computers and Programming
ENGRD 221 Thermodynamics
ENGRD 222 Introduction to Scientific Computation
ENGRD 231 Introduction to Digital Systems
ENGRD 270 Basic Engineering Probability and Statistics

The Engineering Cooperative 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 280 Creative Writing
ENGL 286-289 Expository Writing
ENGL 327 Shakespeare
ENGL 477 Children's Literature

English as a Second Language
ENGLF 101-102 English as a Second Language
ENGLF 211 English as a Second Language
ENGLB 215 English for Later Bilinguals

Floriculture and Ornamental Horticulture
FRDR 210 Sketching in Watercolor
HORT 436 Tree Climbing and Arboricultural Skills

French Literature
FRLIT 201 Introduction to French Literature

Geological Sciences
GEOL 101 Introductory Geological Science
GEOL 104 The Sea: An Introduction to Oceanography
GEOL 213 Marine and Coastal Geology
GEOL 417 Geologic Field Mapping in Argentina
GEOL 475 Bioacoustical Oceanography
GEOL 491 Undergraduate Research

Government
GOVT 111 Introduction to American Government and Politics
GOVT 131 Introduction to Comparative Government and Politics
GOVT 161 Introduction to Political Philosophy
GOVT 181 Introduction to International Relations
GOVT 331 The Political Environment of International Business

History
HIST 101-102 Introduction to American History
HIST 151-152 Introduction to Western Civilization
HIST 268 A History of Rome from Republic to Holy City
HIST 314 History of American Foreign Policy, 1912 to the Present
HIST 340-341 Recent American History
HIST 371 World War II in Europe
HIST 415 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
ART H 261 Introduction to Art History: Modern Art

Hotel Administration
H ADM 165 Managerial Communication: Writing Principles and Process
H ADM 174 Microcomputing
H ADM 210 The Management of Human Resources
H ADM 364 Advanced Business Writing
H ADM 450 Principles of Real Estate
H ADM 651 Principles of Real Estate

Human Development and Family Studies
HDFS 115 Human Development
HDFS 216 Human Development: Adolescence and Youth
HDFS 440 Internship with Young Children

Human Ecology
HE 406 Fieldwork in Diversity and Professional Practice: Summer in the City

Human Service Studies
HSS 210 The Elements of Helping
HSS 315 Human Sexuality
HSS 380 Community Mental Health
HSS 492 Human Service Processes: Leadership and Community Services

Industrial and Labor Relations
Collective Bargaining, Labor Law, and Labor History
ILRRCB 100 Introduction to U.S. Labor History: Nineteenth Century
ILRRCB 201/501 Labor and Employment Law
ILRRCB 300 Collective Bargaining
ILRRCB 499 Summer Employment Research
ILRRCB 608 Special Topics

Human Resource Studies
ILRHR 266 Personal Computer Basics
ILRHR 468 Human Resources Management Simulation

International and Comparative Labor
ILRIC 635 Labor Markets and Income Distribution in Developing Countries

Organizational Behavior
ILROB 170/520 Introduction to Microorganizational Behavior and Analysis: The Social Psychology of the Workplace

Social Statistics
ILRST 210-211 Statistical Reasoning
ILRST 510-511 Statistical Methods for the Social Sciences

Jewish Studies
JWST 103 Elementary Modern Hebrew
JWST 104 Continuing Modern Hebrew
JWST 201-202 Intermediate Modern Hebrew I and II
JWST 301-302 Advanced Modern Hebrew I and II

Landscape Architecture
LARCH 600 Site Grading Workshop

Linguistics
LING 101 Theory and Practice of Linguistics

Management
NBA 580 Business Law I
NBA 584 Management of the Multinational Corporation
### Marine Science
Consult related department listings for summer offerings in marine science.

### Mathematics
- **MATH 101** History of Mathematics
- **MATH 103** Mathematical Explorations
- **MATH 105** Finite Mathematics for Biologists
- **MATH 106** Calculus for Biologists
- **MATH 109** Precalculus Mathematics
- **MATH 111-112** Calculus
- **MATH 171** Statistical Theory and Application in the Real World
- **MATH 192-193** Calculus for Engineers
- **MATH 293-294** Engineering Mathematics

### Mechanical and Aerospace Engineering
- **M&AE 221** Thermodynamics

### Modern Languages
#### Chinese
- **CHIN 160** Introductory Intensive Chinese (Mandarin)
- **CHIN 201-202** Intermediate Chinese

#### French
- **FRDML 101** French Basic Course I
- **FRDML 203-213** Intermediate Composition and Conversation

#### Italian
- **ITALA 101** Italian Basic Course I
- **ITALA 123** Continuing Italian

#### Japanese
- **JAPAN 160** Introductory Intensive Japanese
- **JAPAN 203-204** Intermediate Japanese Conversation
- **JAPAN 403** Teaching of Japanese as a Foreign Language

#### Nepali
- **NEPAL 160** Intensive Nepali (odd-numbered years)

#### Russian
- **RUSSA 121-122** Russian Elementary Course

#### Sinhala (Sinhalese)
- **SINHA 160** Intensive Sinhala (even-numbered years)

#### Spanish
- **SPAND 101** Spanish Basic Course I
- **SPAND 123** Continuing Spanish
- **SPAND 203** Intermediate Composition and Conversation

### Music
- **MUSIC 105-106** Introduction to Music Theory
- **MUSIC 331** Sage Chapel Choir

### Natural Resources
- **NTRES 215** Environmental Disruption and Regulation
- **NTRES 230** Environment and Society
- **NTRES 270** Conservation of Birds
- **NTRES 271** Conservation of Birds Laboratory
- **NTRES 306** Coastal and Oceanic Law and Policy
- **NTRES 417** Wetlands Resources
- **NTRES 471** Management of Terrestrial Habitats

### Near Eastern Studies
- **NES 103** Elementary Modern Hebrew
- **NES 104** Continuing Modern Hebrew
- **NES 201-202** Intermediate Modern Hebrew I and II
- **NES 301-302** Advanced Modern Hebrew I and II

### Operations Research and Industrial Engineering
- **OR&IE 270** Basic Engineering Probability and Statistics

### Philosophy
- **PHIL 101** Introduction to Philosophy
- **PHIL 131** Logic, Evidence, and Argument
- **PHIL 145** Contemporary Moral Issues

### 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 202** The World According to Physics—The Way Things Work
- **PHYS 213** Physics II: Heat/Electromagnetism
- **PHYS 214** Physics III: Optics, Waves, and Particles
- **PHYS 400** Informal Advanced Laboratory
- **PHYS 500** Informal Graduate Laboratory
- **PHYS 510** Advanced Experimental Physics
- **PHYS 520** Projects in Experimental Physics

### Psychology
- **PSYCH 101** Introduction to Psychology: The Frontiers of Psychological Inquiry
- **PSYCH 123** Introduction to Biopsychology
- **PSYCH 128** Introduction to Psychology: Personality and Social Behavior
- **PSYCH 205** Perception
- **PSYCH 214** Issues in Cognitive Psychology
- **PSYCH 265** Psychology and the Law
- **PSYCH 350** Statistics and Research Design
- **PSYCH 380** Community Mental Health

### Religious Studies
- **RELST 101** Understanding the Religions of the World
- **RELST 250** Introduction to Asian Religions

### Rural Sociology
- **RSOC 101** Introductory Sociology
- **RSOC 324** Environment and Society
- **RSOC 436** Successful Aging: Issues and Social Policy in the 1990s

### Science and Technology Studies
- **S&TS 322** From Hippocrates to Health Maintenance Organizations: An Introduction to the History of Medicine
- **S&TS 447** Seminar in the History of Biology: Evolution, Ethics, and Meaning In Life

### Sociology
- **SOC 101** Introduction to Sociology

### Textiles and Apparel
- **TXA 114** Introduction to Computer-Aided Design

### Theatre Arts
- **THETR 211** Dance Movement Workshop
- **THETR 223** The Comic Theater
- **THETR 287** Summer Acting Workshop

### Theoretical and Applied Mechanics
- **T&AM 202** Mechanics of Solids
- **T&AM 203** Dynamics
- **T&AM 293-294** Engineering Mathematics

### Writing
- **WRIT 134** An Introduction to Writing in the University
ADMINISTRATION

Donald F. Smith, dean
David Robertshaw, acting associate dean for academic programs
Douglas D. McGregor, associate dean for research and graduate education
Hollis N. Erb, secretary of the college
John A. Lambert, assistant dean for administration
Gloria R. Crissey, director of student records, services
Katherine M. Edmondson, director of administration
Nita L. Irby, director of student support services

DEPARTMENT CHAIRS

Anatomy: C. Farnum
Clinical Sciences: M. White
Diagnostic Laboratory: D. Lein
Microbiology and Immunology: R. Avery
Pathology: B. Pauli
Pharmacology: G. Sharp
Physiology: J. Woottton, acting department chair

THE COLLEGE

The College of Veterinary Medicine offers a professional program that requires four years of full-time academic and clinical study of the normal and abnormal structure and function of the animal body and the diagnosis, treatment, and prevention of animal disease. Graduates of the college receive the Doctor of Veterinary Medicine (D.V.M.) degree, which is recognized by licensing boards throughout the world. Graduates generally enter private practice, 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 contained in the Catalog of the College of Veterinary Medicine, which may be obtained by writing to the college.

The College of Veterinary Medicine has revised its professional curriculum; the new course requirements apply to the class that matriculated in the fall of 1993 and to subsequent classes. Courses in the revised professional curriculum are designated with the prefix "VTMED," and consist of two categories of courses: foundation courses and distribution courses.

The Professional Curriculum

FOUNDATION COURSES

In foundation courses I, II, III, IV, and V (VTMED 510, 520, 530, 531, 540, 550, and 551), 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. On average, 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 situating 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 facilitates case-based exercises.

Note: Courses listed in brackets [ ] are approved courses that are not offered during the 1997-98 academic year.

VTMED 510 The Animal Body

Fall. 12 credits. Limited to first-year veterinary students. Letter grades only. S. S. Suarez (course leader) and others.

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 and abnormal structure 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 VII)

Fall. 1 credit. Limited to first-year veterinary students. Letter grades only. One fee of approximately $10 is charged for the course guide. J. E. Saidla (course leader) and others.

This course is the correlate for VTMED 510 The Animal Body. This is a laboratory-based course that teaches the physical examination of four species (dog, cat, cow, and horse). The class is divided into smaller groups and each group meets for two hours each week during the first eleven weeks. The skills of auscultation, percussion, palpation, and observation are taught along with clinically related diagnostic procedures.

VTMED 520 Genetics and Development (Foundation Course II)

Fall and spring. 8 credits. Limited to first-year veterinary students. Prerequisite: VTMED 510 The Animal Body. Letter grades only. D. M. Noden (course leader) and others.

This course emphasizes cellular and genetic control mechanisms operating during mammalian development and adulthood. Four basic processes—cell proliferation, cell movement, cell differentiation, and morphogenesis—are essential to all living systems but may be regulated differently in embryonic and mature cells and tissues. Tutorial cases are used to initiate explorations of the mechanisms that regulate these processes in embryonic, normal adult, and transformed (cancer) cell populations. Tutorial sessions are complemented by lectures, laboratories, minicase discussions, and modules.

VTMED 521 Neuroanatomy and Clinical Neurology

Spring. 3 credits. Limited to first-year veterinary students. Letter grades only. A. de Lahunta.

Fundamentals of functional neuroanatomy and diseases of the nervous system are taught so that each student is competent in the diagnosis of clinical neurologic disorders of domestic animals. This is a vertically integrated course that includes dissection of the central nervous system of the dog, 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. Films and videotapes of clinical patients are used to demonstrate the clinical signs produced by the various diseases. Slides of gross and microscopic lesions are used to emphasize the clinical and neuroanatomic relationships and to stress characteristic features of representative conditions.
VTMED 527 Animals, Veterinarians, and Society: Part B (Foundation Course VIII)

This course begins in the last part of fall semester and finishes at the end of Winter Session. Limited to first-year veterinary students. Prerequisite: VTMED 517 Animals, Veterinarians, and Society: Part A. Letter grades only. A fee of approximately $7.00 is charged for the course guide. J. E. Saidla (course leader) and others.

This course is the correlate for VTMED 520 Genetics and Development. It enters into a study of ethical issues related to animal use, animal welfare, clinical genetics, clinical application of genetics, genetics counseling, and clinical day-to-day ethics. The course meets for one 2-hour session each week.

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. B. J. Cooper (course leader) and others.

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 pathophysiology 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. B. J. Cooper (course leader) and others.

A continuation of VTMED 530 Function and Dysfunction: Part I.

VTMED 537 Animals, Veterinarians, and Society: Part C1 (Foundation Course VIc)

Spring. 1 credit. Limited to first-year veterinary students. Prerequisite: VTMED 527 Animals, Veterinarians, and Society: Part B. Letter grades only. A fee of approximately $9.00 is charged for the course guide. J. E. Saidla (course leader) and others.

This course is the correlate for VTMED 530 Function and Dysfunction: Part I. The central goal of this course is to provide students with the interpersonal skills and techniques necessary to communicate effectively with clients. In addition, students will be offered an opportunity to study the human-animal bond, animal death, and grief counseling. This course also provides opportunities to practice client interviewing skills and to participate in a home or farm visit.

VTMED 538 Animals, Veterinarians, and Society Part C2 (Foundation Course VIc, continued)

Fall. 1 credit. Limited to second-year veterinary students. Prerequisite: VTMED 537 Animals, Veterinarians, and Society: Part C1. Letter grades only. A fee of approximately $6.00 is charged for the course guide. J. E. Saidla (course leader) and others.

This course is the correlate for VTMED 531 Function and Dysfunction, Part II. This course provides for understanding the importance of the medical record, the diversity of clients, employees, and society in general, and a session on alternative medicine and its various practices. Students will be encouraged to critically read and evaluate clinical studies and journal articles is also provided.

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. J. T. Blue (course leader) and others.

This course is divided into six sections: the host response, intracellular environment, extracellular environment, somatic environment, external environment, and surrounding environment. Using this approach, students develop an understanding of the host response to insult; a familiarity with groups of important pathogens; an understanding of how pathogens manipulate the host and how the host defends itself against attacks; and an understanding of the roles played by both the external environment and human intervention in the epidemiology of infectious organisms.

VTMED 547 Animals, Veterinarians, and Society: Part D (Foundation Course VIIa)

Fall. 1 credit. Limited to second-year veterinary students. Prerequisite: VTMED 538 Animals, Veterinarians, and Society: Part C2. Letter grades only. A fee of approximately $12.00 is charged for the course guide. J. E. Saidla (course leader) and others.

This course is the correlate for VTMED 540 Host, Agent, and Defense. This course will emphasize maintaining health in both individuals or populations of animals and humans. Topics will include animal bites, nosocomial infections, rabies control programs, vaccines and vaccine reactions, zoonotic diseases, and integrated health maintenance programs.

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. O. Gilbert.

This course integrates the clinical sciences of medicine, surgery, anesthesiology, radiology, and theriogenology, which are themselves integrated subjects, with systems pathology and relevant aspects of applied pharmacology. The course will be 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 will be used to establish a cognitive framework and knowledge of the most important diseases. This course will provide a sound foundation for clinical rotations in Foundation Course VI. It builds upon 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 will be used, including case presentations in which interaction is encouraged, laboratories, demonstrations, case discussions, and autotutorials.

VTMED 551 Animal Health and Disease: Part II

(Foundation Course V, continued)

Fall. 20 credits. Limited to third-year veterinary students. Prerequisite: VTMED 550 Animal Health and Disease: Part I. Letter grades only. R. O. Gilbert (course leader) and others.

A continuation of VTMED 550 Animal Health and Disease: Part I.

VTMED 557 Animals, Veterinarians, and Society: Part E (Foundation Course VIIe)

Spring. Limited to second-year veterinary students rolling over into fall semester for the then third-year veterinary students. 1 credit. Prerequisite: VTMED 547 Animals, Veterinarians, and Society: Part D. Letter grade only. A fee of approximately $14.00 is charged for the course guide. J. E. Saidla (course leader) and others.

This course is a correlate with Foundation Course V, Animal Health and Disease. The course will examine governmental regulation of the veterinary profession, including proper drug usage, extra label drug use (ELDU), controlled substances (DEA), substance abuse, professional liability and malpractice insurance, professional and unprofessional conduct, hazardous waste in the workplace (OSHA), and environmental issues (EPA). Also included will be sessions relating to controlling and preventing the spread of animal diseases and the role of USDA and specifically APHIS in these regulatory functions.

VTMED 561 Community Practice

Service-Medicine

2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. W. E. Hornbuckle (coordinator) and others.

The Community Practice-Medicine Service is structured to provide supervised clinical experience in the practice of small companion animal medicine. The course is conducted in the Small Animal Clinic of the Veterinary Medical Teaching Hospital. 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 Community Practice

Service-Surgery and Anesthesiology

2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. H. J. Harvey (coordinator) and others.

Basic principles of anesthesiology and surgery are emphasized in the clinical rotation. Under direct staff supervision, students will anesthetize and perform surgical procedures on patients presented to the Small Animal Clinic for neutering and minor elective procedures. Students will be responsible for all aspects of patient care during their hospital stay and will be expected to fully participate 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 course open to second-semester third-year and all fourth-year veterinary students; not open to others. Letter grades only. S. C. Barr, S. A. Center, J. F. Randolph (coordinator), K. W. Simpson.
The Small Animal Medicine Service is structured to provide supervised clinical experience in the practice of companion small animal medicine. The course is conducted in the Small Animal Clinic of the Companion Animal Hospital. Students interact directly with clients presenting their pets for primary or referral medical care. Under the supervision of the clinical faculty and staff, the students are expected to formulate and carry out plans for the diagnostic evaluation and medical management of those patients. After review, students explain their plans to the clients and provide follow-up care and management of those patients.

VTMED 564 Small Animal Surgery Service
Fall, winter, spring, and summer.
4 credits. Required of all third- and fourth-year veterinary students; not open to others. Letter grades only. E. J. Trotter (coordinator) 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 ovariohysterectomy or castration. Client communications and the basics of efficient practice are also emphasized.

VTMED 565 Ambulatory Medicine Service
Fall, winter, spring, and summer.
4 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. C. L. Guard (coordinator) and others.
A clinical service rotation in which students accompany ambulatory clinicians on farm and stable calls and learn the skills and procedures necessary for operation of a modern veterinary practice offering primary care to large animal clients. Routine herd health visits are conducted for cattle, horses, sheep, goats, and swine. Reproductive evaluations (including pregnancy and fertility examinations), nutritional evaluation, and disease prevention are stressed. Herd health programs also include vaccinations, parasite control, mastitis prophylaxis, 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 visits, 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. W. C. Rebhun (coordinator) and others.
Students assigned to this service will assist the faculty and house staff of the Large Animal Medicine service in the diagnosis and care of patients admitted to the service. It is hoped that students working on this service will 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. R. P. Hackett (coordinator) and others.
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 Large Animal Clinic. Training through patient care is supplemented by formal rounds and by 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 (coordinator), J. W. Ludders, P. F. Moon and others.
This course is designed to provide clinical experience in the use of anesthetics in large animal medicine. The students participate in selecting suitable anesthetic techniques for patients in the Veterinary Medical Teaching Hospital and then implement those techniques under the supervision of residents and faculty. The goal is for students to learn the skills 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. D. W. Scott (coordinator) and others.
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. Riis (coordinator) and others.
This course combines clinical experience with focusing skills in diagnostic ophthalmology. Students learn how to apply the ophthalmic diagnostic tests. The feeling of performing a good ocular examination is the goal of this rotation. Confidence in using direct and indirect ophthalmoscopy, tonometers, gonioscopes, conjunctival cytology, and surgery comes with practice introduced in this rotation. Students are required to review the introductory orientation videotapes in the Autovision Center entitled "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. J. M. King (coordinator) and others.
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 hematology and cytology slides, perform urinalyses, and discuss case studies.

VTMED 572 Radiology Service
Fall, winter, spring, and summer.
2 credits. Required component of Clinical Rotations (Foundation Course VI). Letter grades only. N. L. Dykes (coordinator) and others.
A two-week clinical rotation in the Radiology Section of the Veterinary Medical Teaching Hospital. Students will use radiographic, CT, ultrasonographic, and nuclear medicine imaging techniques to evaluate animal patients under treatment in the Veterinary Medical Teaching Hospital. With guidance of radiology faculty and technical staff, students obtain and interpret radiographic and ultrasonographic studies of patients. Laboratory sessions are given to allow hands-on experience in patient positioning and radiographic technique. An interactive teaching film is used to familiarize students with radiographic examples of common diseases of large and small animal species. Group discussions are scheduled to present and discuss current cases. Radiation safety aspects regarding the veterinary practitioner are emphasized.

VTMED 573 Fourth-Year Seminar
Fall and spring. 1 credit. Required of all fourth-year veterinary students. 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 give the student the responsibility and opportunity of conducting a short-term, clinically oriented research project under the direction of a faculty member. In either case, an oral report will be presented at a weekly seminar. A written report will be 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 will emphasize clinical specialties, whereas others will integrate basic science disciplines with clinical medicine and will be 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 the instructor. C. F. Farnham.

Carnivore anatomy is studied by detailed systematic and regional dissection of the dog and cat, supplemented by the use of X-projections. The lectures augment the laboratory dissection. Students will complete an independent dissection or research project in an area of particular interest to them and present their project in a seminar format.

VTMED 602 Anatomy of the Horse
Spring. 3 credits. Letter grade. Prerequisite: VTMED 510 The Animal Body or permission of instructor. M. S. Hackett.

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 will be emphasized in the regional approach to dissection. Structural-functional correlations that are unique or important in the horse will be the area of emphasis for most lectures. Microscopic anatomy will be 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 will be supplemented by skeletal materials, radiographs, models, preserved pre-dissected specimens and fresh specimens when they are available.

VTMED 603 Anatomy of the Ruminant
Spring. 3 credits. Letter grade. Prerequisite: VTMED 510 The Animal Body or permission of the instructor. J. W. Hermanson.

The regional anatomy of several ruminant species will be covered using dissection laboratories, lectures, and large-group discussions. Functional consequences of structural modifications and anatomical features directly relevant to clinical practice will be emphasized. Microscopic anatomy will be correlated with gross anatomy when appropriate to relate structure to function and provide a foundation for later study in pathology.

Student dissection material will be supplemented by skeletal materials, radiographs, models, preserved specimens, and postmortem specimens. Students will be required to complete an independent study project on a relevant subject of their choice.

VTMED 604 Mechanics of Animal Movement
Spring. 2 credits. Open to veterinary students, graduate students, and qualified undergraduates with permission of the instructor. C. E. Farnham.

This course explores the mechanical factors that influence how movement occurs within animals. A conceptual approach to understanding the relationship between the animal and its performance is emphasized. The main focus will be on an analysis of whole animal locomotion and an exploration of the functional basis of gait and its abnormalities. This will be followed by investigation of functional features of the anatomical components that are involved with providing the capabilities for movement (both mechanical and physiological). The class operates in a discussion format, meeting two evenings per week. Four hands-on labs demonstrating how biomechanical research is conducted are distributed throughout the eight-week course. Assessment involves weekly short quizzes and a final term paper.

VTMED 605 Comparative Anatomy: Pattern and Function

The goal of this course is to remove the confusion surrounding anatomical variability among amniote species (mammals, birds, and reptiles). This is accomplished by reducing the anatomy of major organ systems in each species to a common basic pattern and relating the differences to functional and historical considerations. Six major systems will be explored (integumentary, locomotory, neurosensory, cardiovascular, respiratory, digestive, and urogenital) in a variety of species as available.

VTMED 606 Advanced Clinical Neurology
Spring. 1 credit. Letter grade. Prerequisite: VTMED 521 Neuroanatomy and Clinical Neurology. A. deLahunta.

The objective of this course is to further the experience and confidence of the student 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. Students who are not covered in the foundation course will be considered here. The course is entirely based on case examples that are presented on videotapes or 16mm film and slides.

VTMED 607 The Literature and Subject Matter of Natural History
Spring. 1 credit. Letter grade. H. E. Evans.

This course is an introduction to classic and current literature of life on earth. Materials relating to the earth sciences and the biology of plants and animals from around the world will be shown and discussed. Students will be required to show and discuss a book that concerns natural history. A recommended text for this course is The Cambridge Illustrated Dictionary of Natural History by R. J. Lincoln and G. A. Boxhall, 1990.

VTMED 608 Anatomy and Histology of Fish
Spring. 2 credits. Minimum enrollment: 5; maximum enrollment: 10. Veterinary students or permission of the instructor. S-U or letter grade. P. R. Bowser.

This course provides an overview of the diversity of anatomy and histology of fish. Students will participate in lecture, discussion and laboratory exercises to review the major organ systems. Extensive use of library resources for assigned readings will be expected. Each student will prepare a term project and make one oral presentation.

VTMED 610 Introduction to Avian Biomedicine
Spring. Even-numbered years. 2 credits. Letter grade. Minimum enrollment: 10; maximum enrollment: 60. G. V. Kollas.

An introduction to avian biology for veterinary students. The course will include lectures and laboratories involving avian evolution, anatomy, physiology, and pathology. Emphasis will be on the development of a strong foundation in avian biology that will be applied in VTMED 616 Diseases of Birds and VTMED 652 Avian Medicine and Surgery.

VTMED 611 Fish Health Management
Spring, weeks 8–14. 1 credit. Minimum enrollment: 8; maximum enrollment: 16. Veterinary students or permission of instructor. S-U or letter grade. P. R. Bowser.

This course will present a summary of important diseases of fin fishes. Diseases covered will be those of commercial aquaculture as well as those encountered by the tropical fish hobbyist. The course is designed to provide the students with a knowledge base and hands-on diagnostic experience in diseases of fish.

VTMED 612 Management of Aquarium Systems
Spring, weeks 2–7. 1 credit. Minimum enrollment: 8; maximum enrollment: 16. Veterinary students or permission of instructor. S-U or letter grade. P. R. Bowser.

This is a lecture and laboratory course dealing with procedures and practices involved in management of aquarium systems. Topics include water quality, types of aquarium filtration systems, fish health, fish nutrition, and general fish biology. The course will require independent work in aquarium system management.

VTMED 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. Minimum enrollment: 24 students from Cornell University, the University of Pennsylvania, and other U.S. colleges and schools of veterinary medicine. By permission of the instructor. S-U grade 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 of the National Marine Fisheries Service. It is designed to introduce veterinary students to aquatic animal medicine. The marine environment is described and visited on field trips in the Woods Hole area. Specific aspects of the comparative anatomy, physiology, nutrition, microbiology, pathology, and medicine of a variety of marine and freshwater species are discussed. 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 fish, and marine mammals. The course is taught
by an invited faculty of thirty-five individuals who are leaders in their respective fields of aquatic animal medicine. Students present seminars on appropriate topics.

**VTMED 614 Aquatic II: Comparative Pathology of Aquatic Animals**

Two weeks of full-time instruction at Woods Hole, Massachusetts, immediately after the spring term. 2 credits. Maximum enrollment: 18. Prerequisites: formal course work in diseases of aquatic animals or appropriate experience and permission of the instructor. S-U or letter grade.

Course fee required. F. R. Bowser. This course is sponsored by Cornell University, the University of Pennsylvania, and three marine science institutes at Woods Hole: the Marine Biological Laboratory, Woods Hole Oceanographic Institution, and Northeast Center of the National Marine Fisheries Service. It is an advanced course in the comparative pathology of aquatic invertebrates and vertebrates commonly used as laboratory animals. The material presented will consist 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 twelve individuals who are leaders in their respective fields of aquatic animal medicine.

**VTMED 615 Veterinary Medicine in Developing Nations**

Spring. Offered alternate years. Offered spring 1997 and 1999. 2 credits. Maximum enrollment: 20. Primarily for veterinary students; others by permission of instructor. Letter grade. E. A. Schat. Veterinary medicine has an important role to play in developing nations in (a) developing and providing economical sources of animal proteins for human consumption and (b) protecting ecological resources. The seminar course will provide interested veterinary students with information on and insight in the multitude of complex issues facing U.S. veterinarians working in developing nations.

**VTMED 616 Diseases of Birds**

Spring. 2 credits. Second-, third-, and fourth-year veterinary students. Enrollment by 10 minimum; 80 maximum. S. Naqi and G. V. Kollia.

This course is designed to introduce second- and third-year veterinary students to a basic and practical knowledge of the most common infectious and non-infectious diseases affecting a variety of avian species. The course will emphasize the latest diagnostic and control approaches. The course format will be a combination of didactic lectures and discussions.

**VTMED 619 Pathogenesis of Viral Disease**


Emerging viruses like Ebola and equine morbillivirus have much to "learn" about how to survive long term in the real world. The goal of this course is to explore the mechanisms by which viruses cause disease and identify the ways in which successful virus pathogens perpetuate themselves in host populations despite our best efforts to eradicate them. Specific topics will include discussions of: (i) the mechanisms by which different viruses elicit disease and the evolution of the virus/host relationship; (ii) the mechanisms underlying the establishment of latent and persistent infections, and (iii) methods used by viruses to evade host responses. Consideration of these issues will lead to discussions of how some of these agents might eventually be eradicated.

**VTMED 620 Molecular Biology and Immunology of Host-Parasite Interactions (also VTM 702)**


The primary objective of this lecture course is to make the student aware of the most important areas of research in contemporary parasitology. Lectures will focus on a broad range of parasites, with an emphasis on those of medical importance. Recently published research articles and reviews will be used as the basis to explore the issues of host invasion, evasion of host defense mechanisms by parasites, chemotherapy, drug resistance, vector biology, and molecular diagnosis. Biological processes especially well understood through work on parasites, such as RNA editing and cytokine anchor biosynthesis and structure, will be covered in detail.

**VTMED 622 Foreign Infectious Diseases of Animals**


**VTMED 623 The Pathogenesis of Significant Bacterial Infections of Large Domestic Animals**


This course will require three contact hours per week for eight weeks thus: One contact hour in a lecture format to summarize the current canon of important, selected information about significant bacterial diseases of large domesticated animals and to emphasize the pivotal events in pathogenesis, including, where appropriate, ecology, colonization, virulence, invasion, evasion, host reaction, lesion production, and resolution. Two additional contact hours will be used as follows: 50 percent—a local expert with focus on an important aspect of the above, e.g., treatment, clinical findings, diagnosis, current problems, etc., to bring reality and expertise to bear on the subject. 50 percent—a group of students will present the results of their original explorations into one specific aspect of the course this week's infection. This might include an update of information, an in-depth look at one aspect of pathogenesis, or an intellectual attack on the current dogma about pathogenesis, treatment, or diagnosis.

**VTMED 624 Feline Infectious Diseases**

Spring. 1 credit. For second-, third-, and fourth-year veterinary students. Letter grade. Microbiology faculty.

This course will provide an opportunity for the student to understand and discuss the etiology, transmission, diagnosis, treatment, and prevention of various feline infectious diseases that are important to practicing veterinarians. Diseases to be discussed include feline panleukopenia, feline respiratory diseases, feline leukemia, feline immune deficiency virus, feline infectious peritonitis, rabies, toxoplasmosis, and various bacterial infections.

**VTMED 625 Osteoarthritis**


This course provides a basis in the molecular, cellular, and tissue levels for understanding the function of mammalian diarthrodial joints. It includes a description of a diarthrodial joint and the detailed composition and metabolism of bone, articular cartilage, ligaments, meniscus, capsule, and synovium. The interrelationship of synovium, synovial fluid, joint lubrication, articular cartilage, simple biomechanical considerations, and enervation are described to address joint function. A comprehensive discussion of the osteoarthritis that inextricably is associated with hip dysplasia in dogs serves as a basis for the etiopathogenesis of this disease. Osteoarthritis in joints of cats, dogs, horses, pigs, sheep, and cows also are discussed in detail as is osteochondrosis.

Consideration also is given to infectious arthritis and also human joint diseases such as gout and pseudogout. The role of pain receptors, a brief discussion of therapy such as the role of nonsteroidal anti-inflammatory drugs, glucocorticoids, and mention of possible corrective surgery procedures are included.

**VTMED 626 Epidemiology of Infectious Diseases**

Spring. 1 credit. Second-, third-, and fourth-year veterinary students. Enrollment maximum 8. H. Mohammed and others.

This course will provide an introduction to epidemiologic methods used in the infectious disease investigations. The importance of surveillance systems in detecting modern epidemics and in the development of effective disease prevention and control strategies will also be discussed. An emphasis will be placed on understanding the relationships between the host, the agent and the environment as they relate to disease causation. The course will explore contemporary epidemiologic methods applicable to old diseases that remain real or potential problems, newly emerging infectious diseases, and nosocomial infections. Selected epidemics will be discussed to clarify the role of epidemiology in understanding the pathogenesis of infectious processes in individuals and groups of animals. The students will have the opportunity to apply these methods they learned to actual disease problems and write an epidemiologic report that might lead to a publication in a peer reviewed scientific journal.

**VTMED 630 Clinical Biostatistics for Journal Readers**


This course will provide an introduction to biostatistics necessary for proper evaluation of research in professional journals.
The student will become familiar with the statistical methods commonly used in veterinary clinical articles and will be able to recognize obvious misuse of those methods.

VTMED 632 Senior Seminar
Fall and spring. 1 credit. S-U grade. Senior Seminar Committee. Attendance at fourteen of the senior seminar sessions presented during the academic year constitutes acceptable completion of this course.

VTMED 633 Introduction to Nontraditional Companion and Laboratory Animals
Spring. 1 credit. No minimum or maximum enrollment. Letter grade only. J. E. Saidla (course leader) and others. This course is both laboratory and lecture based and deals with a wide variety of nontraditional species that might be brought into a small animal practice other than a dog or cat. 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 nontraditional animal management information is provided for each species. This is followed, where practical, by laboratory sessions for observation, restraint, and physical examination.

VTMED 634 Introduction to Large Animal Ambulatory Practice
Fall, winter, spring, and summer. 1 credit. Letter grade only. D. F. Smith. This course introduces veterinary students to primary care large animal ambulatory practice and herd health management through direct exposure to the Large Animal Ambulatory and Production Medicine Clinic Service of the Veterinary Medical Teaching Hospital. Students observe and assist with restraint, examination and routine treatment of animals, and communication with clients. Successful completion requires satisfactory participation during five days of clinical service.

VTMED 635 Introduction to the Professional Literature
Spring. 1 credit. Minimum enrollment: 6. Maximum enrollment: 20. Letter grade. C. L. Guard (coordinator). This course introduces veterinary students to the professional and biomedical literature, including development of critical reading and research skills. Students will become familiar with the broad range of professional and biomedical literature and will be encouraged to develop a rigorous approach to journal and scientific article review. Secondary emphasis is on developing skills in library and bibliographic search techniques.

VTMED 637 Introduction to Community Practice Service
Fall, spring, and summer. 1 credit. W. E. Hombuckle. This course introduces veterinary students to primary care small animal clinical practice through direct exposure to the Community Practice Service of the Veterinary Medical Teaching Hospital. Students observe and assist with restraint, examination and routine treatment of pets, and communication with clients. Successful completion requires satisfactory participation during ten half-days of clinical service.

VTMED 638 Physiological Nutrition
Spring. 1 credit. Minimum enrollment: 10; maximum: 90. For second-year veterinary students; others by permission of instructor. A. J. Reynolds. This course will provide information on the evaluation and formulation of rations for large and small animals. These concepts will be applied in discussion on the nutritional requirements of these animals during maintenance, gestation, lactation, growth, stress, and aging. The course is recommended for all second-year veterinary students who do not have a strong background in ruminant, equine, canine, and feline nutrition. This course, or its equivalent, will be necessary for comprehension of clinical nutrition concepts in Foundation Course V.

VTMED 639 Veterinary Dentistry (Distribution Course)
Spring. 1 credit. Limited to second-, third-, and fourth-year students. Letter grade only. J. E. Saidla (course leader) and others. This is an introductory-level course in small animal dentistry. It is a laboratory course that meets for two hours, twice a week for 16 sessions. Basic concepts and practical topics in dentistry will be reviewed.Potential topics include dental anatomy, oral/dental examination, routine dental care, including prophylaxis, recording, keeping, and breed differences, feline-specific dental disease, occlusion/malocclusion, periodontics, endodontics, restorative and orthodontic procedures, and orthodontics are presented. Basic instrumentation and materials used in dentistry are stressed. The class will use prepared specimens for all sessions.

VTMED 640 Veterinary Aspects of Captive Wildlife Management
Spring. 2 credits. Letter grade. All years. G. V. Kollias. This course will concentrate on principles of captive wildlife management, both clinical and nonclinical. Students will be challenged to learn and integrate a variety of disciplines that are essential to successfully managing wildlife 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) zoologic, and toxicological problems, (5) manual restraint and anesthesia, (6) preventive medicine, and (7) medical and legal ethics.

VTMED 641 Approaches to Problems in Canine Infectious Diseases
Spring. 1 credit. Maximum enrollment: 80; minimum: 10. For second-, third-, and fourth-year veterinary students. Letter grade. S. C. Barr. The course consists of two 50-minute discussion/lecture periods a week for seven weeks. In the 8th week, students will work through cases in infectious diseases using a specifically designed computer software program. The letter grade will be obtained entirely from the result of a written examination given in the final period. The course will emphasize the approach to clinical medical problems generally and infectious diseases specifically. 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 clinicopathology data and diagnostic materials (radiographs, ultrasounds), treatment plans, and prevention. The course expands knowledge gained in Foundation Course IV 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 encountered in practice. A basic level of computer literacy is advised but not required.

VTMED 642 Management of Fluid and Electrolyte Disorders
Spring. 2 credits. Minimum enrollment: 20. For second-, third-, and fourth-year veterinary students. Letter grade. D. F. Smith. Students will focus on clinical manifestations and the pathophysiologic mechanisms associated with fluid, electrolyte, and metabolic acid base disturbances in domestic animals. The course is divided into segments dealing with salt and water imbalances, potassium abnormalities, metabolic acidosis, metabolic alkalosis, and mixed acid-base disturbances.

VTMED 643 Fundamental Aspects of Embryo Transfer
Spring. 1 credit. Maximum enrollment: 16. Third- and fourth-year students. S-U grades only. R. G. Craven. This course provides an introduction to 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 Techniques in Equine Surgery
Winter. 1 credit. Limited to third- and fourth-year veterinary students. S-U grades only. S. L. Furini (coordinator) and others. This course consists of five laboratories. 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 intercession.

VTMED 645 Techniques in Food Animal Surgery
Winter. 1 credit. Limited to third- and fourth-year veterinary students. S-U grades only. S. L. Furini (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 intercession.

VTMED 646 Techniques in Food Animal Surgery
Winter. 1 credit. Limited to third- and fourth-year veterinary students. S-U grades only. S. L. Furini (coordinator) and other large-animal surgeons. This course consists of five laboratories. Performing surgical procedures on sheep, calves, cadaver specimens, and adult cattle. It is the intent of this course not to make the students proficient in these procedures but to familiarize them with surgical techniques and to make them more enlightened referring practitioners. The course, therefore, is intended for those students anticipating food animal practice after graduation. This course
is offered during a one-week period over winter intersession.

VTMED 646 Llama Tutorial
Fall, spring, and summer. 1 credit.
Limited to third- and fourth-year veterinary students. M.A. Smith.
This autoritorial or group tutorial course covers common problems of llamas and alpacas. Each week, participants will be provided with a brief case description and a set of sample study questions. Reference will be made to textbooks, journal articles, videotapes, and, if available, a teaching llama to assist students in finding the answers to the questions efficiently. Grading is based on an oral exam.

VTMED 647 Poisonous Plants
Fall. 1 credit. All years. Students from other colleges by permission of the instructor. S-U grade. M. 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 are considered in detail. The course are nitrates, cyanide, oxalates, photodynamic agents, alkaloids, and mycotoxins.

VTMED 648 Clinical Management of Native Wildlife
Fall, spring, and summer (credit given for fall). 1 credit. All years. Letter grade. Enrollment not to exceed 42 students per semester. G. Kollias and staff.
This course introduces veterinary students to primary native wildlife care and to wildlife issues that face practicing veterinarians on a daily basis. Students are responsible for the assessment, physical examination, and medical care of native wildlife presented to the Veterinary Medical Teaching Hospital by the public and local wildlife rehabilitators. Student activities are directly supervised and assessed by faculty wildlife clinician in a daily basis. Successful completion of the course requires 40 hours of satisfactory supervised participation per semester in the clinic. Clinic times will be appropriately scheduled throughout the semester. Students are required to attend organized rounds one hour per week and submit three case summaries before the end of the semester.

VTMED 649 Introduction to Equine Practice
Spring, 0.5 credit. All years. Enrollment: no minimum; maximum 18. 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 will include horse breeds and colors, housing facilities and fencing, and overview discussions of the racing, showing, and breeding industries. Laboratories will emphasize basic equine handling and restraint as well as feeds and bedding.

VTMED 650 Veterinary Parasitology (Large Animal)
Spring. Offered alternate years. 1 credit. All students. Letter grade. D. Bowman.
This course provides a basic introduction to large animal parasites of veterinary importance, concentrating mainly on the biology, control, and diagnosis of protozoan and metazoan parasites. Emphasis will be given to parasites representative of significant disease processes or of significant economic importance to veterinarians, clients, and producers. The course will elaborate on the biology and pathogenesis of these major pathogens with the ultimate goal being to maximize the recognition of the major disease manifestations induced through examples of each of the different groups of organisms.

VTMED 651 Veterinary Parasitology: Small Animals
Spring (Jan-Feb—4 weeks, Apr-May—4 weeks). 1 credit. Letter grade only. All years. D. Bowman.
This course provides a basic introduction to small-animal parasites of veterinary importance, concentrating mainly on the biology, control, and diagnosis of protozoan and metazoan parasites. Emphasis will be given to parasites representative of significant disease processes or of significant clinical importance to veterinarians and pet owners. The course will elaborate on the biology and pathogenesis of these major pathogens with the ultimate goal being to maximize the recognition of the major disease manifestations induced through examples of each of the different groups of organisms.

VTMED 652 Avian Medicine and Surgery
Spring (Mar-May—8 weeks odd years, or as advertised). 1-2 credits. Third- and fourth-year veterinary students. Enrollment: 20 minimum; 80 maximum. Letter grade only. G. Kollias and others.
This course is designed to introduce third- and fourth-year veterinary students to the principles and practice of avian medicine and surgery. The course will be taught in a basic didactic lecture and discussion format with laboratories that will reinforce concepts presented in the lectures.

VTMED 653 Advanced Equine Lameness
Spring (Apr-May—4 weeks). 1.5 credits. Third- and fourth-year veterinary students. Enrollment: 20 minimum; 100 maximum. S-U grade only. N. Ducharme, A. Nixon, and others.
This course is designed to help students understand the methodology and to develop the manual skills necessary in examining in horses. Emphasis will be on developing diagnostic skills. Specifically, the student will be expected to develop proficiency in the identification of clinical characteristics associated with recognized lamenesses and to localize the origin of the lameness. Teaching aids will include video modules outlining various gait abnormalities. In addition, horses with specific gait abnormalities will be available for physical, radiographic, and ultrasonographic examination.

VTMED 654 Current Therapy in Equine Reproduction
Spring (Jan-Feb—4 weeks). 2 credits. Lecture portion: 1 credit; laboratory portion: a) Jan-Feb 1/2 credit, b) Feb-Mar 1/2 credit. Enrollment: lecture, no limit; laboratory exercises, 12 minimum; maximum 24. Third- and fourth-year veterinary students. Letter grade only. D. Dabel.
This course will cover aspects of physiology and therapy of equine reproduction. The purpose of the course is to prepare the student for equine broodmare practice.

VTMED 655 Production Animal Theriogenology
This course deals with specific reproductive conditions of production animals as well as reproductive management of production units. Content includes reproduction of production animals, economic considerations, and medical and surgical approaches to management of reproductive disorders. Laboratory sessions are tailored to acquisition of specific skills fundamental to the practice of theriogenology of production animals. Emphasis is on dairy cows.

VTMED 656 Special Problems in Equine Medicine
This course is intended for students who plan to or may enter equine practice. In-depth study of important diseases, review of recent literature, health management, and hands-on procedures or demonstrations will be the core of this course.

VTMED 657 Disorders of Large Animal Neonates
Spring. 1 credit. Enrollment: minimum, 10; maximum, 100. All years. D. Ainsworth.
The common medical problems of foals and calves, with emphasis placed on the neonatal period, are discussed. Specific topics examined in detail include disorders affecting the respiratory, gastrointestinal, and musculoskeletal systems. Students will also spend several hours in the neonatal intensive care unit providing medical care of hospitalized patients under staff supervision.

VTMED 658 Small Animal Orthopedic Surgery
Spring (Feb-Apr—4 hours). 0.5 credit. Enrollment: no minimum; maximum 100. Prerequisite: Block 3. Third- and fourth-year veterinary students. Letter grade. E. Trotter.
This course is essentially a laboratory course utilizing inanimate models (Sawbones) and appropriate orthopedic equipment. Working in pairs, students perform a variety of surgical techniques for both the external and internal fixation of fractures under the direct supervision of board certified orthopedic surgeons. No live animals are used. Canine bone models provide an appropriate and inexpensive alternative to live animals. Utilizing these models and various surgical implants and power equipment, students should further develop their orthopedic surgical skills outside the operating room setting as a supplement to didactic instruction in the reduction and fixation of fractures in small animals.

VTMED 659 Equine Soft Tissue Surgery
This course, intended for students anticipating equine practice after graduation, will build upon material presented in the foundation courses to provide supplemental instruction in surgical disorders of the horse. Lectures will be case based and emphasize those disorders likely to be encountered in equine practice.
This course will provide students with a special interest in dairy practice the opportunity for in-depth discussions of special problems in bovine medicine and surgery. Emphasis will be on case discussions, physical examination techniques, and ethical and practical matters. The course will emphasize individual case treatment.

VTMED 668 Practice Management
Spring. 2 credits. Limited to third-year veterinary students. The number of sections will be determined by the enrollment. Letter grades. J. E. Saidla. 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 organization, leadership styles, career planning, communication skills, facility management, human resource management, maintenance of standards, marketing and merchandising, building and maintaining clients, practice growth, finances, computing systems and information management, money management, legal issues and insurance, professional relations and responsibility, and maintaining an acceptable quality of life, including stress management. The managers of three area veterinary practices will speak to the group about their very different successful practices, concentrating on management and organization skills.

This course will discuss 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 will be supplied. Economically important contagious or metabolic diseases will be discussed in depth. The diagnostic evaluation and differential diagnoses for common clinical presentations such as skin disease, neurologic disease, lameness, and mastitis will be considered. Herd monitoring of economically important parameters and necropsy diagnosis of abortions and neonatal losses will be addressed. Breeding systems, pregnancy diagnosis methods, and correction of dystocia will be discussed and demonstrated in optional laboratory sessions.

VTMED 670 Drug Handling in the Body
Spring. 0.5 credit. Maximum enrollment: 60. For second-, third-, and fourth-year veterinary students. Letter grade. R. A. Cerione and G. A. Weiland. This course will provide an in-depth consideration of the pharmacological principles of administration, adsorption, distribution, metabolism, and elimination of drugs. Emphasis will be on the conceptual basis of the pharmacokinetic considerations in the therapeutic use of drugs. The course will build on the pharmacological and physiological principles learned in Foundation Course III.

VTMED 671 Autonomic Pharmacology
Spring. 0.5 credit. Maximum enrollment: 50. For second-, third-, and fourth-year veterinary students. Letter grade. G. A. Weiland. This course will provide an in-depth consideration of the pharmacological and physiological principles of autonomic pharmacology. Molecular, cellular, and organ system mechanisms will be emphasized. The course will explore in more detail the fundamental pharmacological and physiological principles of the effects of drugs on autonomic organs covered in Foundation Course III.

VTMED 672 Antimicrobial Drug Therapy in Veterinary Medicine
Spring. 1 credit. For second-, third-, and fourth-year DVM students. Letter grade. W. S. Schwark. The objective of this course is to familiarize students with antimicrobial drugs used in veterinary practice. The course will build on the fundamental pharmacological and microbiological principles covered in Foundation Courses III and IV and will consider antibacterial, antifungal, antiparasitic, and anticancer drugs from the point of view of unique pharmacokinetic properties, therapeutic use for clinical use, and potential toxicities as the basis for rational use.

VTMED 673 Growth Factor-Coupled Signal Transduction
Spring, even-numbered years. 0.5 credit. Letter grade. R. A. Cerione. This course will present information regarding the regulation of cell growth and differentiation. The emphasis will be on the signal transduction pathways that are responsible for translating growth factor binding at the cell surface into cellular responses and mitogenesis. The course should complement cases covered in Foundation Course II and tie together the biochemical pathways underlying cell growth.
with biological processes such as wound healing and disease states such as cancer.

VTMED 674 Physiology and Pharmacology in the Understanding and Treatment of Diabetes
Spring, even-numbered years. 1 credit. Maximum enrollment: 24. Letter grade. G. Sharp.

This course will cover the basic causes of the manifestations of diabetes, signal transduction mechanisms controlling insulin secretion and insulin action, and the principles underlying current and potential future treatment for this group of diseases. The course will stress the value of basic research into cellular and molecular mechanisms for the treatment and cure of disease.

VTMED 675 Fundamental Principles of Vertebrate Central Nervous System Pharmacology
Spring. 0.5 credit. Enrollment: 6 minimum; maximum open. Second-, third-, and fourth-year veterinary students. Letter grade. Linda M. Nowak.

This course will include up-to-date knowledge of physiological and pharmacological aspects of the main central nervous system neurotransmitter receptors and provide a basis for rational understanding of the drugs used during surgery and in treatment of neurological disease.

VTMED 676 Clinical Ophthalmology
Spring (Feb-Mar—4 wks). 0.5 credit. Enrollment: no minimum/maximum. Third- and fourth-year veterinary students. R. Biss and T. Kern.

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 activity 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 will be introduced to the dominant software currently used in dairy management. Local dairy herds will serve as additional laboratories for class projects.

VTMED 677 Dairy Production Medicine
Fall. 2 credits. Enrollment: 6 minimum; maximum 14. Third-, and fourth-year veterinary students. Letter grade. 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 activity 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 will be introduced to the dominant software currently used in dairy management. Local dairy herds will serve as additional laboratories for class projects.

VTMED 678 Small Animal Theriogenology
Spring (Feb-Mar—4 wks). 0.5 credit. Third- and fourth-year veterinary students. R. Gilbert.

This is a discussion course in a lecture-based format designed to complement the knowledge gained in the theriogenology component of Foundation Course V. Animal Health and Disease. Content includes discussion of breeding management, infectious and non-infectious causes of infertility and pathology of the male and female reproductive tracts, their diagnosis and management. The emphasis of the course will be on conditions affecting dogs and cats, but some conditions of other common pet species will be discussed.

VTMED 679 Clinical Pharmacology

This course is offered after Blocks I-V and formal exposure to pharmacology coursework is completed. The course is designed to familiarize students with drug use in the clinical setting and utilizes ongoing cases in the teaching hospital as a teaching tool. Pharmacological concepts are emphasized, with a focus on the rationale for drug choice, alternative drug choices available, pharmacokinetic considerations, and potential drug interactions/toxicity. This course is offered at the time students are about to embark on their clinical rotations. It is designed to emphasize practical aspects of pharmacology in the clinical setting, utilizing basic concepts obtained during formal coursework. The onus will be placed on the student to explain/rationalize drugs employed in clinical cases in the teaching hospital.

VTMED 680 Behavior Problems of Horses

The goal of this course is to give veterinary students the ability to treat the behavior problems of horses. History-taking, counseling, diagnostic tests, follow-up, the importance of cooperation with the referring veterinarian, prevention of behavior problems, training techniques of value to the practitioner, and socialization of foals will be presented.

VTMED 681 Behavior Problems of Small Animals

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 will be presented. Each student will have the opportunity to participate in client cases. Behavioral and pharmacological treatments for behavior problems will be presented.

VTMED 684 Thermal Regulation and Exercise (also Blop 713)
Fall. 1 credit. Offered alternate years. Next offered fall 1999. Letter grade. D. Robertshaw.

An examination of the competing demands on the body of exercise and heat exposure with particular emphasis on the cardiopulmonary system and integration of thermoregulatory reflexes.

VTMED 685 Physiology of Pregnancy

This course is presented in lecture fashion, with weekly assignments consisting of one major reference per lecture related to that week’s work to review. Subjects covered are placental function, fetal growth, central nervous system development, fetal breathing, biorhythms in maternal and fetal physiology, parturition, and adaptations to newborn life.

VTMED 687 Topics in the Physiology and Pathophysiology of the Digestive Tract: Simple Stomached Animals

A seminar course in which topics relevant to clinical problems will be considered at a fundamental level based in the current literature. A mix of brief lectures, student reports on research papers, and discussion by the group. Primarily gastrointestinal problems of dogs, cats, and pigs. Examples are gastric secretion and the gastric mucosal barrier (Why doesn’t the stomach digest itself?), biorhythms in maternal and fetal physiology, placental function and pancreatitis (Why doesn’t the pancreas digest itself?). The enteric nervous system and ileus (How can the intestines become paralyzed?)?

VTMED 688 International Animal Agriculture
Spring, alternate years (next offered spring 1999). 2 credits. Letter grade. D. Robertshaw.

This course will introduce students to the role of disease in the efficiency of animal production systems in developing countries from a basic science viewpoint. Agriculture is fundamental to the economy and economic stability of virtually all of these countries, and animal agriculture is an integral part of their systems ranging from the modest small-ruminant farmer to large parasitised beef-dairy operations. The focus will be on the peasant farmer since the large operations are usually relatively well managed but represent only a very small component of the total agricultural economy. The scope will be broad and will serve only as an overview of the subject, but will provide a rational basis for any intervention to improve production efficiency. The breadth of the suggested readings will provide those who are interested with an avenue for individual exploration.

VTMED 689 Fundamentals of Ruminant Digestion

This course is designed for the student with little or no previous course work in ruminant digestive physiology. It will consist primarily of lectures surveying the functional aspects of: control of feed intake; salivation; reticulo-rumen motility, including rumination and eructation; microbial flora and fauna; fermentation in reticulolumen (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 the lower tract; and a brief consideration of the functions of omasum, abomasum, small and large intestines. Emphasis will be on the differences of the ruminant digestive processes from those of the simple-stomached animals.

VTMED 690 Molecular and Genetic Basis of Metabolic Disorders in Animals
Spring, every other year. Offered spring 1998. 2 credits. All years. Enrollment: 5 minimum; 15 maximum. Letter grade. J. Ray.

This course introduces the molecular basis of metabolic diseases in domestic animals. Topics include several inherited metabolic defects causing systemic malfunctions;
VTMED 695 Genetic Basis of Eye Diseases
This course covers the topic of 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. Specific course content and focus will be based on the level of students. The course will be 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 the class discussions and for the paper.

VTMED 696 Fundamental Principles and Anesthetic Techniques for Small Animal Practice
This course is designed for the veterinary student with interest in small animal practice. It will consist of lectures, case discussions, and anesthetic protocols for routine and complicated cases. Subjects covered in the course will include: management of anesthesia for elective surgery, management of the high-risk patient, fluid therapy, drug interactions, pain management, treatment of respiratory complications, treatment of cardiovascular complications, cardiopulmonary resuscitation, and post-anesthetic management.

VTMED 697 Fundamental Principles in Anesthetic Techniques for Equine or Mixed Animal Practice
Spring. 1 credit. Enrollment: 15 minimum; maximum open. Third- and fourth-year veterinary students. C. Short.
This course is designed for the veterinary student with interest in equine or mixed animal practice. It will consist of lectures, case discussions, and anesthetic protocol development for routine and complicated cases. Subjects covered in the course will include: management of anesthesia for elective surgery, management of the high-risk patient, fluid therapy, drug interactions, pain management, treatment of respiratory complications, treatment of cardiovascular complications, cardiopulmonary resuscitation, and post-anesthetic management.

VTMED 698 Special Projects in Veterinary Medicine
Fall, winter, spring, summer. Variable credit. Letter grade. Tenure track faculty, College of Veterinary Medicine.
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 credit. Letter grade. Tenure track faculty, College of Veterinary Medicine.
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.

VTMED 700 Theriogenology Service
Spring. 2 or 4 credits. Enrollment min/max. Third- and fourth-year veterinary students. R. O. Gilbert and others.
This clinical service rotation is offered to provide additional hands-on experience in all phases of theriogenology. Equine reproductive experience is gained in teasing, rectal palpations, ultrasound scanning, semen collection and evaluation, natural breeding, and artificial insemination. Additional techniques emphasized include taking and evaluating endometrial biopsies, endometrial culturing, and collecting and evaluating endometrial cytology smears. Bovine experience includes weekly trips to the slaughterhouse, where rectal palpations and semen findings can be compared to actual structures present in recovered tracts. Additional experience in rectal palpation is gained by following cyclic changes in assigned cows in the college dairy herd. Students participating in herd-health palpations. Trips to the Department of Animal Science sheep and swine barns allow observation of breeding programs and provide experience in castration, docking, vulvar teeth, and notching ears. Weekly seminars are presented on current topics in theriogenology.

VTMED 701 Cardiology Service
Fall and spring. 2 credits. Enrollment min/max. Third- and fourth-year veterinary students. Letter grades.
S. Moise.
The purpose of the cardiology rotation is to provide the student with the opportunity to put into practice what they have learned in the foundation years. The management of the most common cardiac diseases will be emphasized including congestive heart failure, arrhythmias, and secondary cardiac diseases. All species will be examined, large and small, although the majority will be small animals. Diagnostics including cardiovascular physical examination, electrocardiography, radiography, and echocardiography will be taught. The rotation includes clinical work, didactic teaching, and self-initiated digging for information. A written report concerning a clinical case study will be required for completion of this rotation.

VTMED 702 Laboratory Animal Medicine
Fall and spring. 2 or 4 credits. Enrollment min/max. Third- and fourth-year veterinary students. Letter grades.
F. Quimby and others.
The practice of laboratory animal medicine requires a sophisticated understanding of animal care programs, clinical skills, knowledge of various species’ biologies, familiarity with research methodology, and acquaintance with state and federal regulations. This course is offered as a two-week introduction to that specialty. Students accompany laboratory animal veterinarians on clinical rounds of Cornell's research animal housing and participate in laboratory diagnostic work. Review sessions are conducted on the biology, medicine,
pathology, and husbandry of rodents, rabbits, and primates and on current legislation regulating the care and use of research animals. The course may include a field trip to the research animal facilities of Rockefeller University, the Cornell University Medical College, Marshall Farms, and the Laboratory of Experimental Medicine and Surgery in Primates.

**VTMED 703 Clinical Wildlife and Exotic Animal Medicine**

Fall, winter, spring, and summer. 2 credits. Enrollment min/ max 1 per rotation/max 3 per rotation. Third- and fourth-year veterinary students. Letter grades. G. V. Kollias and others. This course introduces students to primary medical care of non-traditional pet species including birds, reptiles, amphibians, ferrets, rabbits, and other small mammals. Students are responsible for the assessment, physical examination, and medical management of exotic animal species presented to the veterinary teaching hospital. Other opportunities available to assist in the development of clinical skills in wildlife and exotic animal medicine include the wildlife clinic cases, and ongoing wildlife research and service projects. Successful completion of the course requires satisfactory participation during this 14-day clinical rotation.

**VTMED 704 Quality Milk**

Fall or spring. 2 credits. Enrollment min/max. Third- and fourth-year veterinary students. Letter grades. R. Gonzalez, D. Wilson and others. This course covers the causes, diagnosis, treatment, and prevention of bovine 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 Promotion Services—New York State Mastitis Control Program.

**VTMED 705 Special Opportunities in Clinical Veterinary Medicine**

Fall, spring, and summer. Variable credits. Enrollment min/max. Third- and fourth-year veterinary students. S-U grades only. This course provides opportunities for students after the end of Foundation Course V to explore professional areas not available through the regular curriculum. Blocks of two to four weeks are usually spent at other teaching hospitals, research laboratories, or zoological facilities. Student proposals are submitted to the associate dean for academic programs for review and approval. On-site supervisors of the block act as ex-officio faculty members and are required to evaluate each student formally.

### CLINICAL SCIENCES

**VETCS 666 Introduction to Epidemiology (Graduate)**

Fall. 3 credits. Prerequisites: Statistics and Biometry 601 (College of Agriculture and Life Sciences) may be taken concurrently. S-U grades optional. H. N. Erb. Lectures and discussion deal with the fundamentals of epidemiology. Current topics in epidemiology from the fields of nutrition, infectious and chronic diseases, occupational medicine, and veterinary medicine will be reviewed to illustrate the principles and practice of epidemiology, especially of clinical trial design and infectious-disease epidemiology.

**VETCS 665 Study Designs (Graduate)**

Spring. 2 credits. Prerequisites: VETCS 664 and Biometry 601 (College of Agriculture and Life Sciences). S-U grades optional. H. O. Mohammed. Design and interpretation of cross-sectional, case-control, and cohort studies (including controlled clinical trial) are covered. Design issues will include sample size, bias, and relative advantages and disadvantages. The course objectives are: 1) know the difference between different types of epidemiologic study designs and relative advantages and disadvantages of each; 2) given a problem (usually a field situation), be able to design an appropriate epidemiologic study; 3) be able to effectively analyze and criticize published epidemiologic studies. The course will consist of lectures on the principles of epidemiologic study design and related issues (sample size calculations, validity and precision, and identification and minimizing of bias); basic analysis of epidemiologic data; and discussion of published epidemiologic studies. These studies include observational cohort studies (prospective and retrospective), cross-sectional studies, case-control studies, and hybrid studies (ambidirectional, and other hybrid designs).

**VETCS 664 Advanced Methods in Epidemiology (Graduate)**

Fall. 3 credits. Prerequisites: VETCS 665 and Statistics and Biometry 602 (College of Agriculture and Life Sciences). S-U grades optional. Y. T. Grohn. Concepts introduced in VETCS 664 and VETCS 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.

**VTCS 700 Pathophysiology of Gastrointestinal Surgery (Graduate)**

Fall, every third year. 1.5 credits. Not offered 1997; next offered fall 1998. S-U grades only.

**VTCS 701 Pathophysiology of Orthopedic Surgery (Graduate)**

Spring, every third year. 1.5 credits. Not offered 1998; next offered spring 1999. S-U grades only.

**VTCS 702 Pathophysiology of Cardiopulmonary Surgery (Graduate)**

Fall, every third year. Offered fall 1999. 1.5 credits. Prerequisite: DVM degree or equivalent. S-U grades optional. R. P. Hackett, S. L. Fubini, N. G. Ducharme, H. J. Harvey. Using lectures and group discussions, the objective of this course is to explain the pathophysiologic of various cardiovascular diseases (cardiac arrest, cardiac arrhythmia under anesthesia) and thoracic disease (various forms of upper airway resistance). The emphasis is placed on understanding these mechanisms and outlining the surgeon's response to these.

**VTCS 703 Surgical Principles and Surgery of the Integumentary System (Graduate)**

Spring, every third year. Offered spring 1999. 1.5 credits. S-U grades only. This course is designed for surgery residents and graduate students. It is largely discussion format and examines surgical principles and surgery of the integumentary system.

**VTCS 704 Pathophysiology of Urogenital Surgery (Graduate)**

Fall, every third year. 1.5 credits. S-U grades only.

**VTCS 705 Animal Pain and Its Control (Graduate)**

Spring 1999. 2 credits. By permission of the instructor. Letter or S-U option. C. E. Short. This course is open to interns, residents, graduate students, and postdoctoral associates to provide instruction in fundamental and applied concepts of animal pain. The emphasis will be on neurologic, cardiopulmonary, and endocrine responses to either noxious stimulation or pain due to injury and disease processes and the medications used for its control. The subject material will be covered by lectures, group discussions, and group evaluation of protocols to treat or prevent animal pain.

**VETCS 706 Pathophysiology of Neurologic Surgery (Graduate)**

Spring, every third year. 1.5 credits. S-U grades only.

### ANATOMY

**VETA 600 Special Projects in Anatomy**

Fall and spring. 1 credit per 2.5-hour period. By permission of the instructor. S-U grades only.

**VETA 604 Mechanics of Animal Movement**

Spring. 2 credits. Open to veterinary students, graduate students, and qualified undergraduates with permission of the instructor. J. E. A. Bertram. For course description, see VETMED 604.
VETCS 707 Clinical Biostatistics (Graduate)
Spring, alternate years. Next offered spring 1997. 2 credits. Letter grade only. H. N. Erb, Y. T. Grohn, H. O. Mohammed, J. M. Scarlett (coordinator). The theory behind and interpretation of parametric and nonparametric statistical techniques commonly employed in clinical medicine will be explained. Students will analyze small data sets using a commercial statistical software package.

VETCS 708 Epidemiology Seminar Series (Graduate)
Fall and spring. 1 credit. S-U grades only. Epidemiology faculty. Advanced theoretical and analytical epidemiologic concepts and techniques will be discussed.

VETCS 710 Advanced Veterinary Anesthesiology I
Fall and winter. 3 credits. Third- and fourth-year veterinary students, graduate students, interns, and residents. Prerequisites: VTMED 508 Veterinary Anesthesiology or permission from instructor. S-U grading. P. F. Moon (coordinator) and others. The content of the course is designed for preparation for the American College of Veterinary Anesthesiology Board Exam. However, the course is also suitable for residency training in other areas such as surgery and internal medicine. Speakers will be from both inside and outside the college. Topics will cover the basic sciences as they apply to anesthesiology such as physics and engineering, applied pharmacology, physiology and pathology. Clinically orientated lectures will also be given concerning specific anesthetic techniques and species-specific differences in response to anesthetic drugs.

VETCS 711 Advanced Veterinary Anesthesiology II
Fall and winter. 1 credit. Third- and fourth-year veterinary students, graduate students, interns, and residents. Prerequisites: VTMED 508, Veterinary Anesthesiology I or permission from instructor. S-U grading. P. F. Moon (coordinator) and others. For course description, see VETCS 710.

VETCS 766 Graduate Research (Graduate)
Fall, spring, and summer. Credit and hours to be arranged. By permission of the graduate faculty member concerned. S-U grades only. Epidemiology faculty.

VETCS 768 Master's-Level Thesis Research (Graduate)
Fall or spring. 1-6 credits. S-U grading. Epidemiology faculty. This course enables graduate students in the Section of Epidemiology to receive graduate research credits for master's-level thesis research.

VETCS 769 Doctoral-Level Thesis Research (Graduate)
Fall or spring. 1-6 credits. S-U grading. Epidemiology faculty. This course enables students in the Section of Epidemiology to receive graduate research credits for doctoral-level thesis research.

VETCS 790 Independent Studies in Epidemiology
Fall and spring. 1-3 credits. H. N. Erb, Y. T. Grohn, H. O. Mohammed, J. M. Scarlett.

The purpose of this course is to investigate an epidemiologic topic with one of the instructors. It provides experience in problem definition, research design, and the analysis of epidemiologic data.

DIAGNOSTIC LABORATORY

VETDL 700 Special Projects in Diagnostic Endocrinology
Fall and spring. 1-3 credits. By permission of the instructor. Letter grades only. J. Reimers.
An independent study course. Students have the opportunity to research a particular topic in diagnostic/clinical endocrinology of animals.

VETDL 701 Special Projects in Infectious Diseases
Fall and spring. 1-3 credits. By permission of the instructor. S-U grades only. Y. F. Chang.
The objective of this course is to offer a broad exposure to various aspects of infectious disease problems.

VETDL 702 Special Topics in Infectious Diseases
Fall and spring. 1-3 credits. By permission of the instructor. S-U grades only. Y. F. Chang.

VETDL 703 Doctoral-Level Thesis Research (Graduate)
Fall and spring. 0-9 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty. Research leading to a Ph.D. degree.

VETDL 704 Master's-Level Thesis Research (Graduate)
Fall and spring. 1-3 credits. By permission of the instructor. S-U grades only. Diagnostic Laboratory faculty. Research leading to an M.S. degree.

MICROBIOLOGY AND IMMUNOLOGY

VETMI 315 Basic Immunology (Undergraduate) (also Biological Sciences 305)
Fall. 3 credits. Strongly recommended: basic courses in microbiology, genetics, and biochemistry. S-U optional. J. A. Marsh.
A survey of immunology, with emphasis on the biological functions of the immune response.

VETMI 320 Principles of Toxicology
Spring. 3 credits. 1 year each of introductory biology and chemistry, with lab; 1 semester of organic chemistry lecture. Lec., T R 1:25-2:40. S. Penningroth, R. Dietert, and S. Bloom.
The goal of this new course is to provide undergraduate students from a variety of majors with a useful bridge between biology and chemistry and an introduction to the field of toxicology. The organizing principle of the course is toxicological risk to human health and the environment. The scientific basis for evaluating risk will be presented, including principles underlying the effects of toxicants on biological systems and the transport of chemicals in the environment. The concept of risk will be elaborated to include individual effects at the level of specific organ systems, such as genes and the immune system, population effects, and ecosystem effects. Two case studies, one examining a chemical that is hazardous to human health and the other examining a chemical that impacts a non-human species, will integrate information presented in the course as well as provide an opportunity to examine cross-cultural issues of risk perception.

VETMI 404 Pathogenic Bacteriology and Mycology (also BIOM 404)
Spring, odd-numbered years. 2 or 3 credits (3 credits with lecture and seminar). Prerequisites: BIOM 290 and 291. Strongly recommended: VETMI 315. Seminar is required of graduate students and open to undergraduates with permission of instructor. Seminar limited to 15 students. E. Tullson.
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 bacteria and fungi, and principles of antimicrobial therapy and drug resistance. A companion seminar addresses the current and classic literature related to microbial pathophysiology on the cellular and molecular level.

VETMI 408 Viruses and Disease (Undergraduate) (also Biological Sciences 408)
Spring, alternate years. 3 credits. Intended primarily for graduate and undergraduate microbiology majors. Prerequisites: Microbiology 290 and 291 (College of Agriculture and Life Sciences). Recommended: VETMI 315, GENetics 281. Letter grades only. J. W. Casey.
The course will cover basic concepts in virology with emphasis on virus-host interactions, strategies for gene regulation, and mechanisms of pathogenicity. Selected viral infections that result in immune dysfunction and neoplasia will be highlighted in the context of approaches to prevent or reduce the severity of diseases.

VETMI 431 Medical Parasitology (Undergraduate)
Fall, alternate years. Not offered fall 1997. 2 credits. Prerequisites: zoology or biology. Letter grades only. D. 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 parasites.
VETMI 700 The Biology of Animal Viruses (Graduate and Upper-level Undergraduate)
Fall, odd-numbered years. 2 credits. Next offered fall, 1997. Letter grade only. C. R. Parrish.

This course is a general introduction to the biology of animal viruses. A brief history of the concept and study of viruses, along with an overview and classification of the major viral groups, will be given. Topics include the structures of viruses and their components, viral nucleic acids and genome replication strategies, selected examples of gene regulation mechanisms, structural, and nonstructural viral proteins, and the interactions between viruses and cells. Traditional and recent examples of methods for the genetic analysis of viruses will be given. Further topics include evolution, variation, and selection of virus strains over time and during infections of host animals; traditional and novel approaches to vaccine development; and antiviral chemotherapy.

VETMI 701 Pathogenesis of Viral Diseases
Spring 1997 and alternative years. 2 credits. Letter grades. Given during 8-week spring or fall conjoint period, January-March. Open to graduate students and advanced undergraduates with permission of instructor. Strongly recommended prerequisite: Immunology. J. Baines. Course content and objectives: the course will focus on the balance between host defense against viral infections and the mechanisms by which viruses perpetuate themselves in human and animal populations. In the process, the mechanisms of cell and animal infection, spread between cells, disease mechanisms, and the roles of the immune response in enhancing and suppressing disease will be explored. This will include a systems-based approach exploring the pathogenesis of disease in the CNS, gastrointestinal, hepatic, tegumentary, respiratory and urogenital systems. The basic principles of virus taxonomy, structure and replication will be included to introduce various viral groups and their properties. Methods of intervention (vaccination, antiviral drugs) will also be covered. Lectures are derived from relevant current literature, the text, Nathanson's Viral Pathogenesis: 1997, and Field's Virology, third edition, 1996. Relevant materials will be placed on reserve in the veterinary library.

VETMI 702 Molecular Biology and Immunology of Host-Parasite Interactions (Graduate) (also VTMED 620) Spring, even-numbered years. 2 credits. Letter grade or S-U option. E. J. Pearce. See description for VTMED 620.

VETMI 705 Advanced Immunology (Graduate) (also Biological Sciences 705) Spring, even-numbered years. 3 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. Letter grades only. R. G. Bell (coordinator) and staff. Coverage at an advanced level of molecular and cellular immunology.

VETMI 706 Immunology Seminar Series (Graduate) Fall and spring. No credit. Required of all graduate students in the Field of Immunology and by invited speakers from other institutions.

Presentations of research investigations by Cornell faculty members, postdoctoral fellows, and graduate students in the Field of Immunology and by invited speakers from other institutions.

VETMI 707 Advanced Work in Bacteriology, Virology, and Immunology (Graduate) Fall and spring. Credit to be arranged. By permission of the instructor. Letter grade or S-U option. Microbiology staff.

This course is designed primarily for graduate students with a good background in pathogenic microbiology and immunology. It may be elected by veterinary students who are properly prepared.

VETMI 708 Selected Topics in Animal Virology (Graduate) Spring. 2 credits. Microbiology staff. Lectures focus on the molecular biology of a few selected animal viruses. Important publications will provide the basis for a discussion of current models for host-viral interactions.

VETMI 709 Laboratory Methods of Diagnosis (Graduate) Fall and spring. 1–3 credits by arrangement. By permission of instructor. Letter grade or S-U option. Microbiology staff. Instructions and practice in the application of microbiological and serological methods for the diagnosis of disease.

VETMI 710 Microbiology Seminar (Graduate) Fall and spring. 1 credit. Required of all graduate students in the Department of Microbiology and Immunology. S-U grades only. E. J. Pearce, C. R. Parrish.

VETM 719 Immunology of Infectious Diseases and Tumors (also Biological Sciences 706) (Graduate) Spring, alternate years. Next offered spring, 1999. 2 credits. Prerequisite: VETMI 315 Basic Immunology or permission of instructor. S-U optional. R. G. Bell (coordinator) and staff. Coverage at an advanced level of the immunology of diseases caused by selected bacteria, viral, prion, and helminthic parasites, and tumor immunology.

VETMI 737 Advanced Work in Animal Parasitology (Graduate) Fall and spring. 1–3 credits by arrangement. For advanced undergraduate and graduate students. Letter grades only. D. D. Bowman and other faculty. This course is intended for graduate students minoring in parasitology and for highly motivated veterinary students with interests in parasitology research.

VETMI 770 Advanced Work in Avian Diseases (Graduate) Fall and spring. Credit to be arranged. By special arrangement with the instructor. Letter grades only. S. A. Naqi.

VETMI 772 Advanced Work in Aquatic Animal Diseases (Graduate) Fall and spring. Credit to be arranged. By special arrangement with the instructor. S-U grades only. P. R. Bowser.

VETMI 783 Seminars in Parasitology (Graduate) Fall and spring. 1 credit. Open to veterinary students, graduate students minoring in the field of parasitology; others by permission of the instructor. S-U grades only. D. D. Bowman.

This is a seminar series designed to acquaint students with current research in the field of parasitology. The range of topics is determined, in part, by the interests of those participating and may include such topics as the ecology of parasitism, parasite systematics, immunoparasitology, and parasitic diseases of plants and animals, including humans.

PATHOLOGY

VETPA 636 Wildlife Pathology
Fall and spring. 2 credits. Open enrollment. Letter grade or S-U option. J. King.

This course introduces students to common and important lesions of wild species of animals. The etiology and pathogenesis of diseases of importance to wildlife are discussed. Slide presentations of lesions are made; and they are discussed by an experienced pathologist.

The nature and causes of diseases of wild animals, birds, and some other species are presented. Emphasis is on epizootiology, etiology, pathogenesis and diagnostic lesions. Experience is provided in specimen collection and necropsy techniques. Attendance at Show and Tell at 4–5 P.M. Fridays during the course is mandatory in the necropsy room for the presentation of fresh, wet tissue specimens and discussion by clinicians and pathologists as well as actual handling of the tissues (gloves provided) after the class.

VETPA 637 Postmortem Pathology
Fall and spring. 2 credits. Intended for veterinary students, graduate students minoring in the field of pathology; others by permission of instructor. Letter grade or S-U option. J. M. King.

A presentation of gross and microscopic lesions of diagnostic significance, employing color projection slides as illustrations. Emphasis is on pathological and differential diagnosis of a wide spectrum of viral, bacterial, parasitic, and other diseases.

VETPA 639 Autotutorial in Laboratory Animal Medicine and Science
Spring. 1–3 credits. Letter grade. F. W. Quinby.

This course is offered to individuals interested in pursuing various aspects of laboratory animal medicine and science in depth. A variety of resources are available to assist students in their research on a particular topic: the library of the Division of Laboratory Animal Medicine, the autotutorial library; the university libraries; and special information collected from other institutions.

Grades are determined on the basis of a paper, oral presentation, or the criterion of an audiovisual teaching aid, any of which may be selected by the student.

VETPA 640 Principles of Toxicological Pathology
Fall, alternate years. 3 credits. Intended for veterinary and graduate students and residents. Letter grade. J. M. King.

The primary objective of this course is to make the student aware of the problems and their solutions encountered in pathology as it...
applies to the field of toxicology, with special emphasis on techniques and lesions found or produced.

**VETPA 641 Veterinary Clinical Immunology**

Fall. 1 credit. Limited to veterinary students; others by permission of the instructor. S-U grades. R. M. Lewis.

This course emphasizes the clinical aspects of fifteen specific diseases that are mediated by immunologic processes. Case material from the Teaching Hospital is used to illustrate presenting clinical signs, laboratory diagnostic approaches, and eventual outcome of each disease under discussion. Student participation in the informal case discussions is encouraged as a means of introducing students to the practice of veterinary medicine through case discussion and analysis. Training is also provided in the use of the college's computerized biomedical information system and the hospital records system to develop a critical written case analysis, which serves as the basis for grading.

**VETPA 713 Cell Cycle and Growth Regulation (Graduate) (Selective)**

Spring. 1 credit. S-U grades only. A. Yen and R. Levine.

This course reviews the regulation of the cell cycle in eukaryotes, the basic cellular physiology of the cell cycle transit, and the regulatory role of oncogenes and tumor suppressor genes in cell division. The course covers the historical development and current topics in the cell cycle. It includes cell growth regulation and de-regulation in cancer.

**VETPA 750 Cancer Cell Biology (also Biological Sciences 750) (Graduate)**

Spring, alternate years. 3 credits. Next offered spring 1998. Prerequisite: Biological Sciences 330 or 331 or equivalent. Recommended: graduate courses in biological sciences. Letter grade. J. L. Guan (coordinator), R. A. Levine, B. U. Pauli, A. Yen.

This advanced graduate course will cover molecular, cellular, and genetic aspects of cancer. The course is divided into three sections. The first section will address tumor etiology, progression, and metastasis. Topics in this section will include causes of cancer, morphologic and genetic models of cancer progression, tumor angiogenesis, tumor invasion, and metastasis. The second section will discuss cell-matrix and cell-cell interactions in cancer. Topics include the structure and function of the major matrix receptor integrin family of cell adhesion molecules, integrin interactions with the cytoskeleton, intracellular signaling pathways in cell-ECM interactions, integrin-mediated signaling in cellular growth regulation, changes of integrins in human tumors and metastasis, structure and function of cadherin family of cell-cell adhesion molecules, signaling mechanisms in cell-cell interactions in normal development and cancer. The third section will be on cell cycle. It will develop properties of the cell cycle and how its phases are measured, changes associated with cell transformation, and how oncogenes and tumor suppressor genes regulate cell proliferation, differentiation, and apoptosis.

**VETPA 788 Seminar in Surgical Pathology**

Fall and spring. 1 credit. Intended for residents. Third- and fourth-year veterinary students may attend. Letter grades only. B. A. Summers (coordinator) and others.

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 descriptors of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

**VETPA 789 Seminar in Necropsy Pathology**

Fall and spring. 1 credit. Letter grades only. J. M. King.

The major objective of this course is to introduce students (veterinary and graduate students, residents) to the gross and microscopic features of necropsy pathology. Selected material from the Necropsy Service and elsewhere is prepared in advance for independent review by the students. This material is presented in a slide-seminar format by the students under the review of the faculty. Emphasis is on pathogenesis, etiology, and pathologic description of the lesions. In addition, appropriate guest lecturers cover specific areas of interest and special topics not encountered in the departmental service programs.

**VETPR 611 Systems Pharmacology**

Spring, even-numbered years. 2 credits. By permission of the instructors. Letter grades or S-U option. G. A. Weiland and pharmacology faculty.

A graduate-level course surveying system- and organ-related aspects of pharmacology. Topics covered include drug disposition; pharmacokinetics; autonomic pharmacology; central nervous system pharmacology; pharmacology of contraception, allergy and platelet function; cardiovascular, gastrointestinal and endocrine pharmacology; and chemotherapy, including antimicrobial agents and cancer chemotherapy.

**VETPR 615 Molecular Biophysics of Cell Dynamics (also A&EP 615)**

To be arranged. 3 credits. Prerequisite: graduate or senior level in science or engineering. Letter grade. W. W. Webb. Physical mechanisms in cellular function: statistical thermodynamics of ion channel molecules, single channel recording, receptor signaling, molecular and single channel processes. Intermolecular forces, spontaneous self-assembly of mesoscopic structures, molecular mechanisms of secretion, supramolecular mechanisms in memory and development.

**VETPR 672 Protein Kinetics (also CHEM 672)**

Fall. 4 credits. Prerequisite: CHEM 390, BIOMB 331 (or equivalents) or permission of the instructor. Letter grade or S-U option. B. A. Baird.

Focus is on protein interactions with ligands and consequent changes in structure and activity. Topics include: protein structure and dynamics; thermodynamics and kinetics of ligand binding; steady state and transient enzyme kinetics; enzyme catalysis and regulation; role of cell membrane receptors in regulating cellular activities.

**VETPR 700 Calcium as a Second Messenger in Cell Activation**

Spring, even-numbered years. 2 credits. By permission of the instructor. Lecture-discussion. S-U grading. C. M. S. Fewtrell. Regulation of intracellular calcium and techniques for studying calcium movements and distribution in cells. Calcium channels and exchangers, calcium-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 will be introduced with a lecture followed by discussion of recent papers from the literature.

**VETPR 701 Organ System Toxicology (also TOX 611)**

Fall. 4 credits. Prerequisite: CHEM 390, BIOMB 331 (or equivalents) or permission of the instructor. Letter grade or S-U option. G. A. Weiland and pharmacology faculty.

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 will be considered.

**VETPR 703 Receptor-Ligand Interactions (also BIOM 790-02)**

Spring, even-numbered years. 2 credits. By permission of the instructors. Letter grade or S-U option. R. E. Oswald, G. A. Weiland (coordinator).

The course covers both the practical and theoretical tools for the study of ligand-
VETPR 704 CNS Neuropharmacology: Mechanisms of Synaptic Transmission
Fall, even-numbered years. 2 credits. Maximum enrollment: 20 graduate students and undergraduate seniors by permission of the instructor. Letter grade or S-U option. L. M. Nowak.
This is a seminar survey course in vertebrate central nervous system pharmacology and pharmacology, and focuses on mechanisms of neurotransmitter and receptor action at the membrane and cellular levels. 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.

VETPR 705 Molecular Mechanisms of Receptor-G Protein Coupled Signaling
Spring, odd-numbered years. 2 credits. By permission of the instructor. Letter grade or S-U option. R. A. Cerione.
This course focuses on the mechanisms of action of GTP binding proteins. Several receptor-coupled signaling systems are examined, including adenylate cyclase, vertebrate vision, phosphatidylinositol lipid turnover, receptor systems regulating ion channels, and receptors involved in cell growth regulation.

VETPR 706 Growth Factor-Coupled Signaling (also BIOBM 734)
Spring, odd-numbered years. 0.5 credits. By permission of the instructor. Letter grade or S-U option. R. A. Cerione.
General theme will be mitogenic signaling pathways. Receptor tyrosine kinases, src, ras, and ras-regulatory proteins will be covered.

VETPR 707 Protein NMR Spectroscopy (also BIOBM 730)
The fundamentals of NMR will be presented and the student will acquire the tools necessary to establish an in-depth understanding of multidimensional, multinuclear NMR techniques. Application of the technique to proteins for assignment of resonances, determination of structure, and characterization of dynamics will be presented. Special approaches for applying solution NMR techniques to large proteins will be discussed.

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. Pharmacology faculty. Independent study or research. These courses cover a variety of topics related to the research interests of the faculty.

PHYSIOLOGY

VETPH 346 Introductory Animal Physiology (also BIOAP 311) (Undergraduate)
Fall. 3 credits. Prerequisites: one year of college-level biology, chemistry, and mathematics. S-U by permission.
E. R. Loew, D. Robertshaw. MWF 11:15.
A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure-function relationships are stressed along with underlying physiological mechanisms.

VETPH 528 Graduate Research in Animal Physiology (Graduate) (also BIO S 719)
Fall and spring. Variable credit. Prerequisite: written permission of section chairperson and staff member 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.

VETPH 720 Special Problems In Physiology (Graduate)
Fall and spring. By permission. Laboratory work, conferences, collateral readings, and reports. Adapted to the needs of students.

VETPH 811 and 812 Advanced Physiology Methods I & II (also BIO S 811 and 812 (Graduate)
Fall and spring. 2 credits each. Enrollment limited. Prerequisite: graduate student status or permission of course coordinator. S-U grades only.
P. Nathanielis.
This is a course primarily for graduate students in physiology and related disciplines. Experiments are conducted 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.

FACULTY ROSTER

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
Dorothy Havemeyer McConville Professor of Microbiology and Immunology
Appel, Max J., Ph.D., Cornell U. Prof., Microbiology and Immunology
Appleton, Judith A., Ph.D., U. of Georgia. Assoc. Prof., Microbiology and Immunology
Avery, Roger J., Ph.D., U. of Newcastle-Upon-Tyne (England). Prof., Microbiology and Immunology
Baines, Joel, Ph.D., Asst. Prof., Microbiology and Immunology
Barr, Stephen C., Ph.D., Louisiana State U. Assoc. Prof., Clinical Sciences
Bell, Robin G., Ph.D., John Curtin School (Australia). Prof., Microbiology and Immunology
Bertram, John E., Ph.D., U of Chicago. Asst. Prof., Anatomy
Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Physiology
Bloom, Stephen E., Ph.D., Penn State U Prof., Microbiology and Immunology
Foreign language: Proficiency in one language or qualification in two. See below.

Distribution Requirements: See below.

Elective requirement: See below.

Breadth requirement: See below.

Residence: Eight full-time semesters, unless a student can successfully complete all other requirements in fewer than eight semesters and meet the criteria to accelerate graduation. See below under "Acceleration."

Minimum number of courses: Thirty-four courses. A two-credit course counts as half a course; a six-credit language course counts as one and one-half courses; a one-credit course does not count toward this requirement. See below under "Courses and Credits."

Credits: A total of 120 academic credits, of which 100 must be taken in the College of Arts and Sciences. See below under "Non-credit courses."

Physical education: Completion of the College's requirements for graduation. Please note that physical education credit counts toward graduation or not in the major field.

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. Note that this route to qualification does not guarantee entrance into an intermediate (200-level) course. Students who want to continue studying the language must be placed in the appropriate course by an examination. Being placed below the intermediate (200-level) does not, however, cancel the requirement.

2) Passing the requisite Cornell course: 102, 123, or 134 in most languages taught by the Department of Modern Languages; Chinese 110, 112, or 114; Japanese 160; Near Eastern Studies 102 or 122 in Hebrew, 112 in elementary classical Arabic, or 118 in Turkish; Classics 103 or 104 in Greek, 106 or 107 in Latin, 112 in modern Greek; 132 in Sanskrit; AS&BC 154 in Swahili. Note: Except in the case of Sanskrit, completion of language sequences 151–152 does not constitute qualification.

3) A score of 600 or better in French, 580 in German, and 590 in Italian or Spanish on the SAT II taken in high school or a score of 56 or higher on the Cornell LP (Language Placement test) taken during orientation week. Students may earn a 56 placement test score 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. However, with a score of 56, it may be worthwhile to take 123 to be better prepared for the 200-level courses.
4) Placement into a 200-level course by departmental or (when no placement test is available) individual examination at Cornell.

**Placement in Language Courses and Advanced Placement Credit**

Placement into language courses and advanced placement credit are separate results of examinations.

**Placement**

Entering students who have had two or more years of high school study in a language or who have been awarded credit for language work at another college or university 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 at Cornell during orientation (LP test). Students may, but need not, reteke a language test if a year or more has passed since last taking it. Being placed into a 200-level course does not earn credit toward the degree. Credit is earned only for high school work equivalent in level to language courses numbered 200 and above at Cornell.

**Placement Tests and Advanced Placement Credit**

The type of test depends upon the language and the student’s level of achievement:

1) French, German, Italian, and Spanish: students register for the placement tests with the Department of Modern Languages, 203 Morrill Hall. Students who have a score of 65 and above on the appropriate LP test, 690 and above on the SAT test in French, Italian, or Spanish, and 680 and above on the SAT II in German, must take the Cornell Advanced Standing Examination (CASE) in order to be placed in a course. (The minimum score on the older SAT Achievement Test or a Cornell placement test taken prior to Fall, 1996 is 650 in all languages.) Cornell credit may be granted as a result of this test, depending on the student’s score.

2) Arabic: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

3) Greek, Ancient and Modern: departmental examination, Department of Classics, 120 Goldwin Smith Hall.

4) Hebrew: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

5) Latin: departmental examination, Department of Classics, 120 Goldwin Smith Hall.

6) Russian: Cornell Advanced Standing Examination (CASE), Department of Modern Languages, 203 Morrill Hall.

7) Turkish: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

8) Other languages: special examinations, see the instructor who teaches the language. Cornell is able to provide special examinations only when an instructor with the appropriate expertise is a member of the relevant department.

### French Placement Tests

<table>
<thead>
<tr>
<th>Language Courses</th>
<th>Literature Courses</th>
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<tbody>
<tr>
<td><strong>LPF</strong></td>
<td><strong>SAT II</strong></td>
</tr>
<tr>
<td>below 37</td>
<td>below 370</td>
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<tr>
<td>37-44</td>
<td>370-480</td>
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<tr>
<td>45-55</td>
<td>490-590</td>
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<tr>
<td>56-64</td>
<td>600-680</td>
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<tr>
<td>56-59</td>
<td>600-630</td>
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<tr>
<td>60 and above</td>
<td>640 and above</td>
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<tr>
<td>65 and above</td>
<td>690 and above</td>
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<tr>
<td>AP 4 or 5 in</td>
<td>Take CASE for placement</td>
</tr>
<tr>
<td>language, 3 credits.</td>
<td>Take CASE for placement</td>
</tr>
<tr>
<td>AP 4 or 5 in</td>
<td>Take CASE for placement</td>
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<tr>
<td>literature,</td>
<td>Take CASE for placement</td>
</tr>
<tr>
<td>3 credits</td>
<td>Take CASE for placement</td>
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<tr>
<td>and proficiency.</td>
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### German Placement Tests

<table>
<thead>
<tr>
<th>Language Courses</th>
<th>Literature Courses</th>
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</thead>
<tbody>
<tr>
<td><strong>LPG</strong></td>
<td><strong>SAT II</strong></td>
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<tr>
<td>below 37</td>
<td>below 370</td>
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<tr>
<td>37-44</td>
<td>370-450</td>
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<tr>
<td>45-55</td>
<td>460-570</td>
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<tr>
<td>56-64</td>
<td>580-670</td>
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<tr>
<td>65 and above</td>
<td>680 and above</td>
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<tr>
<td>AP 4 or 5, 3 credits and proficiency.</td>
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<td></td>
<td>Take CASE for placement</td>
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### Italian Placement Tests

<table>
<thead>
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<tbody>
<tr>
<td><strong>LPI</strong></td>
<td><strong>SAT II</strong></td>
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<tr>
<td>below 37</td>
<td>below 370</td>
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<tr>
<td>37-44</td>
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<td>590-680</td>
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<tr>
<td>65 and above</td>
<td>690 and above</td>
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<td>AP 4 or 5, 3 credits and proficiency.</td>
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<td></td>
<td>Take CASE for placement</td>
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<thead>
<tr>
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<th>Literature Courses</th>
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<tbody>
<tr>
<td><strong>LPS</strong></td>
<td><strong>SAT II</strong></td>
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<td>below 37</td>
<td>below 370</td>
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<td>37-44</td>
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<td>65 and above</td>
<td>690 and above</td>
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<td>AP 4 or 5, 3 credits and proficiency.</td>
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<td></td>
<td>Take CASE for placement</td>
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### Spanish Placement Tests

<table>
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<tr>
<td><strong>LPS</strong></td>
<td><strong>SAT II</strong></td>
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<tr>
<td>below 37</td>
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<tr>
<td>65 and above</td>
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<tr>
<td>AP 4 or 5, 3 credits and proficiency.</td>
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<td></td>
<td>Take CASE for placement</td>
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### Placement Tests Table

<table>
<thead>
<tr>
<th>Language</th>
<th>Literature</th>
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<tbody>
<tr>
<td>French</td>
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<tr>
<td>German</td>
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<tr>
<td>Italian</td>
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<tr>
<td>Russian</td>
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<tr>
<td>Spanish</td>
<td></td>
</tr>
</tbody>
</table>

- **French Language**
  - LPF: Placement Test
  - SAT II: High School Test
  - Language Courses: 121
  - Literature Courses: 201

- **German Language**
  - LPG: Placement Test
  - SAT II: High School Test
  - Language Courses: 121
  - Literature Courses: 201

- **Italian Language**
  - LPI: Placement Test
  - SAT II: High School Test
  - Language Courses: 121
  - Literature Courses: 201

- **Russian Language**
  - LPS: Placement Test
  - SAT II: High School Test
  - Language Courses: 121
  - Literature Courses: 201

- **Spanish Language**
  - LPS: Placement Test
  - SAT II: High School Test
  - Language Courses: 121
  - Literature Courses: 201
Distribution Requirements

In satisfying the distribution requirements, students become acquainted with a broad range of subject matter and points of view in the college and liberal arts, and sciences, and they explore areas that may be entirely new to them. Fulfilling the distribution requirements is part of the task of freshmen and sophomores. Although students may complete the requirements over the eight semesters, they can take advanced courses in many subjects they find intriguing only if they have previously completed the introductory prerequisites.

Students must take a total of nine courses (of three or more credits each) for the distribution requirements: four courses from Groups 1 and 2 below, at least two of which are from Group 1 and at least one of which is from Group 2 (for example, one chemistry, one physics, one geology, and one mathematics); five courses from Groups 3 and 4 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).

1. Physical and Biological Sciences

In fulfilling the science distribution requirement, students must take at least one course from the list of "primary" courses and may select additional courses from the supplementary list.

Primary list:
- Astronomy: all courses except 233
- Chemistry: all courses
- Biological Sciences: all courses
- Physics: all courses

Biological Sciences: all courses except 152, 200 (unless permission of the associate director is obtained), 208, 209, or 367. The following courses are especially suitable for the distribution requirement because they have no prerequisites: 101-104, 105-106, 107-108, 109-110, 154, 170, 194, 192, 202, 207, 212, 240, 241, 264 plus 266, 275. Note that introductory biology can count for distribution credit only when taken as a two-semester sequence: 102-110, 105-106, or 101 and 103 plus 102 and 104, or 107-108, or a combination of the first term of one sequence and the second term of another.

Supplementary list:
- Animal Science: 100, 150, 212
- Anthropology: 101, 208, 275, 371, 390, 474, 490
- Applied and Engineering Physics: 110
- Biology and Society: 301
- Entomology: 212
- Food: 200
- Materials Science and Engineering: 277
- Natural Resources: 201, 210, 301
- Nutritional Science: 115
- Plant Breeding: 225
- Psychology: 123
- Plant Pathology: 301
- Soils, Crops, and Atmospheric Sciences: 131, 231

2. Quantitative and formal reasoning

Biometry and Statistics: 215
City and Regional Planning: 320
Computer Science: 100, 211, 212
Economics: 321
Industrial & Labor Relations: 210, 211
Linguistics: 216
Mathematics: all courses except 101 and 109
Operations Research & Industrial Engineering: 115
Philosophy: 231, 331, 431, 436
Physics: 205, 209, 210
Psychology: 350
Sociology: 301

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.

Under exceptional circumstances and upon petition, certain Cornell courses not listed above under Group 2 (courses such as those appearing on the following auxiliary list) may be used to satisfy the requirements in quantitative and formal reasoning. The petition should provide a persuasive rationale both in terms of the student's course of study and in terms of meeting the goals of the requirement.

Auxiliary list:
- Agricultural Economics 510
- Agricultural Engineering 151
- City and Regional Planning 321
- Industrial and Labor Relations 312
- Linguistics 421, 450
- Psychology 472-473 (a sequence of two two-credit courses which may count only in its entirety as one course)

3. Social sciences and history

- American Studies: 101, 102, 201, 202, 320
- Anthropology: all courses except 101, 208, 275, 371, 390, 451, 452, 453, 474, 490
- Archaeology: 100, 201, 202, 203, 204, 205, 275, 317, 353, 355, 362, 370, 405, 409, 458, 493, 494
- Asian Studies: courses in Asian anthropology, economics, government, history, linguistics, or sociology
- Biology and Society: 301, 342, 407, 427
- City and Regional Planning: 100, 101
- Cognitive Studies: 101, 201
- Economics: all courses except 317, 318, 319
- Engineering: 250, 292
- Government: all courses
- History: all courses
- Linguistics: all courses except 131, 132, 251, 252
- Near Eastern Studies: 197, 198, 244 and all other courses in Near Eastern archaeology and history
- Philosophy: all courses except 191 and courses in logic
- Russian Literature: all courses
- Science and Technology Studies: 205, 206, 286, 341, 384, 389, 390, 481, 661, 681
- Spanish Literature: all courses
Theatre, Film and Dance: all courses except technical production studios

Restrictions on Applying Courses to the Distribution Requirements
1) Advanced Placement Credit and Credit from Other Institutions

Students may apply up to two courses of approved advanced placement or transfer credit towards distribution requirements in Groups 1 and 2 (physical/biological sciences and quantitative/formal reasoning), as long as they take at least one course from the primary list in science at Cornell. Transfer credit applied to distribution in Group 2 (quantitative/formal reasoning) must be in mathematics or computer science; it may not be in other quantitative subjects, for example, statistics or logic.

Students may apply no advanced placement or transfer credit from other institutions for satisfaction of the distribution requirements in Groups 3 and 4 (social sciences/history and humanities/arts).

Students who enter the college as transfers from another institution are under the above rules for Advanced Placement credit, but are eligible to have credit for coursework taken at their previous institution count towards all distribution requirements. They will receive a detailed credit evaluation when they are accepted for admission.

2) Freshman writing seminars may not count towards any distribution requirement.

3) No single course may satisfy more than one distribution requirement. However, students may count courses in their major towards distribution. Courses offered or cross-listed by their major department may not be counted towards any distribution category beyond the usual category of the major department itself.

For example, a history major may not count a course cross-listed between history and a literature department towards distribution in the humanities.

Breadth Requirements
Students must include in their undergraduate curricula at least one Arts and Sciences course that focuses on an area or a people other than those of the United States, Canada, or Europe, and one course that focuses on an historical period before the twentieth century. (Arts and Sciences courses about Native American cultures may count toward the geographic breadth requirement if they focus on the cultures themselves and not interaction with European cultures.) Courses that satisfy the geographic breadth requirement are marked with a @ when described in this catalog. Courses that satisfy the historical breadth requirement are marked with a #. Many courses satisfy both requirements, and students may in fact use the same course to satisfy both. Students may also apply Cornell courses conferring proficiency in a non-Western language toward the geographical breadth requirement and use courses satisfying distribution, major, or elective (but not writing) requirements in satisfaction of either of the breadth requirements. They may not apply advanced placement or credit awarded by examination or, for students matriculating as freshmen, transfer credit to either of the breadth requirements.

The Major
In their last two years, students devote roughly one-half their time to acquiring depth and competence in a major subject. The choice of major is not intended to define a student's intellect or character or to lead to a lifetime's occupation, although it may do some of each. By majoring, students focus and develop their imaginative and intellectual capacities on a subject they find especially interesting.

Most departments and programs specify certain prerequisites for admission to the major; they are found in the department and program descriptions on the following pages. Students may apply for acceptance into the major as soon as they have completed their prerequisites. To apply, they take a copy of their transcript to an appointment with the director of undergraduate studies in their prospective major. Sophomores must be accepted into a major before registering for the junior year. 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 end of the sophomore year should meet with an advising dean.

Available majors
Majors are offered by each of the departments. There are also majors in American studies, archaeology, biology and society, religious studies, Russian and East European studies, and women's studies.

Some students want to pursue an interest 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. See "Independent Major Program," below, under "Special Academic Options."

Double Majors
One major only is required for graduation. Some students choose to complete two majors. No special permission or procedure is required; students simply become accepted into both majors and find an adviser in each department. Both majors will be posted on the official transcript.

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 curriculum. Students must complete at least four electives and at least 15 credits offered outside the major field and not used to fill another requirement. AP credits not otherwise used may be used to fulfill elective requirements. Students may group electives to form a concentration separate from their major or even apply them to a second major. Some simply choose to explore a variety of subjects, while others develop a concentration in one particular department or subject outside Arts and Sciences to gain practical training or specialized knowledge.

Residence
The College of Arts and Sciences is primarily a residential college 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 A.B. 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.

Transfer students from other institutions must spend a minimum of four semesters on the Cornell campus in Ithaca enrolled in the College of Arts and Sciences. Transfers from other colleges at Cornell must spend four semesters on campus as full-time students in the Internal Transfer Division or in the college.

Approved study abroad, SEA Semester, and Cornell-in-Washington are considered semesters of residence, but not as semesters on the Cornell campus. Nonetheless, students may spend no more than two semesters on such programs and must be on campus during their last semester.

Some students enter with advanced placement credit from other institutions, take leaves and complete courses at other institutions, or take summer courses at other institutions. The college will accept credit for such courses, if they are comparable to courses offered by departments at Cornell and are approved by those departments (approval forms are available in the Academic Advising Center, 55 Goldwin Smith Hall). Students may not, however, count such credit as part of the 100 credits required in the College of Arts and Sciences or use such credit to replace a term of residence. Students may not leave the college after fewer than eight semesters of residence and complete their undergraduate degrees with credits earned at other institutions or as part-time or summer students at Cornell.

Acceleration
Some students decide that they do not need eight semesters of residence to obtain a solid undergraduate education. These students should compress the first four semesters and spend four full semesters in the major.

Benefiting from opportunities for advanced, seminar, and independent (sometimes honors) work in what best characterizes undergraduate education in the college. Students considering acceleration should discuss their plans with their major advisor.

Students occasionally enter with advanced placement credit from other institutions, take leaves and complete courses at other institutions, or take summer courses at other institutions. The college will accept credit for such courses, if they are comparable to courses offered by departments at Cornell and are approved by those departments (approval forms are available in the Academic Advising Center, 55 Goldwin Smith Hall). Students may not, however, count such credit as part of the 100 credits required in the College of Arts and Sciences or use such credit to replace a term of residence. Students may not leave the college for fewer than eight semesters of residence and complete their undergraduate degrees with credits earned at other institutions or as part-time or summer students at Cornell.
Academic Records. Such permission is normally granted only to:

1. Accelerants must meet either condition a or b:
   a. Complete 60 credits before the beginning of the last four semesters and complete the prerequisites for admission to the major in time to spend four semesters in the major.
   b. Pass 48 credits in College of Arts and Sciences courses numbered “300” and above. Upper-level courses taken in other colleges at Cornell University may count as College of Arts and Sciences credit only if approved for the major.

2. All accelerants are required to complete 100 credits at “C” or above. Courses completed with a grade of “S” will count toward the 100 credits.

3. Students may not use credits earned while on leave of absence to reduce their term of residence.

4. 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, 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, from other institutions and from other colleges at Cornell, 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 presented, the dean of seniors can approve that plan and ask the registrar of the college to enroll the student as a special student for the additional semester.

Transfer students must successfully complete the outstanding courses as part-time study, from Cornell funds. Students who need only a part-time schedule of courses in a ninth or tenth semester may petition the Committee on Academic Records for part-time status and proration of tuition in the college. The college and university support students (with aid and services) as best they can to make full-time study possible. Rarely and occasionally, however, extraordinary but non-financial personal, academic, or medical circumstances make becoming a part-time student necessary and appropriate.

Students requesting part-time status should discuss their situation with Dean Walbridge if their reason is a documented disability that, under the Americans with Disabilities Act, requires appropriate accommodations. Otherwise, students should meet with the dean of their class.

Students may complete their degrees as part-time students 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, and could have accelerated.
2) They have received permission to accelerate, but have been forced to drop or delay a course for reasons beyond their control.
3) They are writing an honors thesis in the eighth semester and can complete all degree requirements by taking two or fewer courses, one of which is the thesis itself. They must register for the thesis and at least one additional course.

In all cases, approval of the dean of seniors must be sought in the semester prior to the part-time semester.

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 the last two semesters. A four-or five-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 Departments of Music and Theatre, Film and Dance). Three- or four-credit courses do not aggregate to count as one course. A six-credit language course counts as 1 1/2 courses, while the summer Falcon Programs in Asian languages count as ten credits and 2 1/2 courses each. Archaeology and geology fieldwork for more than six credits count as two courses each. Biology 281 counts as 1 1/2 courses. Other five- or six-credit courses count as one course. AP exam scores that result in an award of 3 or 4 credits count as one course; those that result in an award of 5 credits count as two courses. Students must also complete 120 credits, 100 of which must be from courses taken in the College of Arts and Sciences. 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 within the college and also toward the required 34 courses. Credits earned in other colleges at Cornell, or in any subject at U.S. institutions other than Cornell, do not count as part of the 100 nor, for students matriculating in Fall 1994 or after, do advanced placement credits count as part of the 100. The only exception is for courses (usually no more than three) that certain departments accept from other colleges at Cornell as fulfilling major requirements.

A course may not be used to fulfill more than one college requirement, with the following exceptions:

1) A course may be used to fulfill a distribution requirement and also a major requirement.
2) A one-semester course in foreign literature (not language) that is acceptable for achieving proficiency in that language may also be used as a partial fulfillment of the distribution requirement in the humanities and the arts.
3) Courses may count toward breadth requirements and toward any other requirement except Freshman Writing Seminars.

4) Courses in a second major may count as electives.

Repeating courses

Students occasionally repeat courses. If the instructor certifies that the course content has been changed, credit will be granted a second time. If the content has not changed, both grades will appear on the transcript and will be included in any average that is calculated, but credit will be counted toward the degree only once. Students who plan to repeat a course should submit a petition to the college registrar. If the original course grade was F, no petition is necessary.

Auditing

The college encourages its students to take advantage of its rich curriculum by sitting in on courses that interest them but do not fit into their schedules for credit. As long as the instructor agrees, students are welcome to visit courses, but they must be in residence in the college for at least 60 credits and 16 courses at Cornell.

Transferring credit

The college evaluates credit earned either at another school or college at Cornell University or at another accredited institution of collegiate rank and determines the number of credits and courses that may apply toward the various requirements for the Bachelor of Arts degree at Cornell. Transfer students must successfully complete at least 60 credits and 16 courses at Cornell; they must be in residence in the college for four regular semesters (summer session does not count toward the residence requirement). Evaluations of their transfer credits are normally provided when they are notified of their admission. Advanced placement credit awarded by other colleges, either at Cornell or elsewhere, is subject to a re-evaluation by the college.

Advanced placement credit

See p. 5.
Summer session credit
A student may earn credit toward the degree by completing courses in Cornell's summer session or by petitioning to take courses at other colleges. Students should consult their advisors regarding summer study plans. Credit for summer courses not taken at Cornell must be approved by the appropriate Cornell department. Approval forms and information are available in the Academic Advising Center, 55 Goldwin Smith Hall. Credit earned in summer courses other than those at Cornell will not count toward the 100 credits required in the college (including summer or orientation programs abroad) and may be applied only to part of the Group 1 and 2 distribution requirements. Transcripts from other institutions must be sent to the associate registrar, 55 Goldwin Smith Hall.

Entering students who want to receive credit toward the degree for courses completed in a summer session away from Cornell should obtain approval forms as soon as possible and have transcripts sent to the associate registrar, 55 Goldwin Smith Hall, during the summer before matriculation. 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.

Non-credit courses
The college does not grant credit toward the degree for every course offered by the university. Courses in remedial or developmental reading, high school mathematics, supplemental science and mathematics offered by the Learning Skills Center, keyboarding, shorthand, military training, and service as a teaching assistant are among those for which credit is not given and that do not constitute part of the 12 credits required for good academic standing.

Examples of non-credit courses:
All courses numbered below 100 (with the exception of Computer Science 099)
All courses in Military Science, Naval Science, and Aerospace Studies
Biology G 498
Communications 498
Education 498
Hotel Administration 170
Human Development and Family Studies 403
Human Ecology 100, 101
Human Service Studies 403
Mathematics 109
Nutritional Science 403
Psychology 498

Physical Education
See "University Requirements for Graduation," p. 13. The college does not count physical education credit toward the 120 credits required for graduation, nor toward the twelve credits required for good standing each semester.

SPECIAL ACADEMIC OPTIONS

Degree Programs
The following five programs allow students to work toward more than one degree or to alter the regular college or major requirements.

Independent Major Program
The Independent Major Program allows students to design their own interdisciplinary majors to pursue a subject that cannot be found within an established major. Proposals for an independent major must be equivalent in coherence, breadth, and depth to a departmental major, well suited to the student's academic preparation, and consistent with a liberal education. Proposals must also be supported by a faculty adviser and are assessed by a board of faculty members. Independent majors substitute for established majors, but students must still satisfy all the other requirements for the baccalaureate degree. Students should contact the director of the Independent Major Program, Academic Advising Center, 55 Goldwin Smith Hall, for further information. Deadlines for submitting independent major proposals are listed on the calendar supplement for the College of Arts and Sciences.

College Scholar Program
The College Scholar Program frees up to forty students in each class from the usual college requirements for a degree and allows them to design their own curricula. It 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 studies. College Scholars do not all design the same kind of program: some, for instance, pursue diverse interests, while others integrate a variety of courses with a common theme.

College Scholars must complete 120 credits of course work (100 in the college), 34 courses, and, unless permission from the program to accelerate, eight full terms of undergraduate study. They must complete the physical education requirement. All College Scholars must complete a senior project. They are not required to complete or fulfill the general education requirements, although members of the College Scholar Advisory Board believe that the spirit of the college requirements is a good one.

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. Mid-year freshmen apply at the end of their first spring semester in the college. Students should contact the Academic Advising Center, 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 five years of financial aid. For further information contact Dean Saraydar, Arts and Sciences Admissions, 172 Goldwin Smith Hall.

Double Registration with Professional Schools
Registration in the senior year of the College of Arts and Sciences and the first year of Cornell Law School, Cornell Medical College, or the Johnson Graduate School of Management, is possible. A 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.

Students with eight or fewer credits to complete may apply to enter the Master's of Engineering program during the eighth semester, dual-degree students may enter this program no earlier than the ninth semester.

Students interested in the joint program with the Law School or the Graduate School of Management, or the Master's of Engineering program should see the dean of seniors. Academic Advising Center, 55 Goldwin Smith Hall.

Students registering simultaneously in the college and in the Cornell Medical College receive the Bachelor of Arts degree after the first year of medical studies and the Doctor of Medicine degree after the remaining years of medical college are completed.

Interested students should contact the health careers coordinator, 203 Barnes Hall.

Double-registered students must, of course, complete all requirements for the A.B. degree, including 100 credits in College of Arts and Sciences courses.

Teacher Education in Science and Mathematics
Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. Teacher Education in Science and Mathematics (TESM) is a university program jointly conducted by the departments of education and mathematics. Although TESM offers options for undergraduate and graduate study, most 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 degree (MAT). Students from any college at Cornell are eligible to apply to the program as undergraduates, usually during their sophomore year.

For more information, contact the TESM student support specialist at 255-0255 or the program coordinator, D. Trumbull, 255–3108.
Special-Interest Options
The following options do not alter the college’s requirements but enable students to pursue special interests within the usual programs.

Informal Minors
Some students organize electives within a discipline or department. Such informal minors can be developed with the help of the departmental directors of undergraduate studies, but are not noted on the transcript.

Concentrations
Interdisciplinary concentrations, described in the pages following the descriptions of the departments and their curricula, provide structures for organizing electives. Completed concentrations are 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 program study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study (proposals are available in the Academic Advising Center, 55 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 and 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 can 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—both on campus and elsewhere, and both during the academic year and during the summer—and helps students prepare for research and present 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 see Dean Williams, Academic Advising Center, 55 Goldwin Smith Hall.

Language Study
More than forty languages are taught in the College of Arts and Sciences; some of them are taught only at Cornell. A full range of language, literature, and cultural courses are available in most of the major ancient and modern languages through the joint efforts of the Departments of Linguistics and Modern Languages and the departments that specialize in literary and cultural study: the Africana Studies and Research Center and the departments of Asian Studies, Classics, German Studies, Near Eastern Studies, Romance Studies, and Russian Literature. Semi-intensive courses afford students the option of accelerating the development of language skills.

FALCON (Full-Year Asian Language Concentration).
FALCON allows students who are interested in the Far East to study Chinese, Indonesian, 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 here to pursue rapid and thorough beginning studies on campus with the objective of studying abroad later—in China, Japan, or Southeast Asia.

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, Russian, 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 Academic Administrator Evett, 136 Goldwin Smith Hall.

Prelaw Study
Law schools neither require nor prefer any particular program of study; they do seek students with sound training in the liberal arts and sciences. It is important that students plan a program in which they are interested and do well. Beyond that, students are advised to take courses that will develop their powers of precise, analytical thinking and proficiency in writing and speaking.

The college offers a concentration in law and society. Students should work toward completion of this concentration because they find it interesting, and they believe it will convince law schools of their interest. The adviser for students in the College of Arts and Sciences who are applying to law school is Dean Cox, Arts and Sciences Admissions, 172 Goldwin Smith Hall.

Premedical Study
The breadth and depth afforded by a liberal arts education is invaluable for people who plan medical careers, whether they intend to practice or go into research. Such training has a profound effect on the doctor’s usefulness to patients, and it affords the flexibility of mind that is needed for major research undertakings. Medical and dental schools do not prescribe or even prefer a particular major; they do, however, require a unique set of requirements that is not the same for all students.

Medical and dental schools do not prescribe or even prefer a particular major; they do, however, require a unique set of requirements that is not the same for all students.

The adviser for students in the College of Arts and Sciences who are planning careers in medicine is Dean Turner, Academic Advising Center, 55 Goldwin Smith Hall.

Off-Campus Programs
Many students find it important to their majors or to their overall academic programs to study off campus or abroad for one or two semesters. When it makes academic sense, the college encourages its students to pursue such studies and grants credit toward the degree for work satisfactorily completed.

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. 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 upon a broad liberal arts background in the early semesters: area studies, language training, and preparation in the proposed field of study are all essential.

The college encourages wherever possible study at foreign institutions alongside their degree candidates rather than study in self-contained programs that offer courses specially designed for foreigners. The primary goals of this educational 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.

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 advocates study abroad that enables students to become competent enough in another language to experience daily life, develop social relationships, and accomplish formal coursework 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 coursework before studying abroad. At least one area studies course or one course in the history, culture, economics, politics, or social relations of the country of destination must be part of every student’s preparation for study abroad.

Students planning to study abroad need solid academic credentials to do so productively and successfully. The college requires a minimum overall GPA of 3.0 for all Cornell course work and good academic standing in the semester immediately before going abroad.

Study 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:

- substantial progress with college distribution requirements;
- admission to a major and a faculty adviser in the major;
- clear academic agenda for study abroad.
• appropriate study of the country or region of destination, especially language study.

Study abroad can earn up to 15 liberal arts and sciences credits per semester of full-time course work as long as the curriculum abroad is consistent with that of the college. 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 scope. 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.

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 GPA.

Students who transfer to Cornell must complete a minimum of four semesters of residence on campus in Ithaca and may not study abroad during one of those four semesters.

Applications to study abroad must have the support of a faculty adviser in the major and the approval of Dean Terrell in the Academic Advising Center, 55 Goldwin Smith. 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 and an outline of prospective courses to be taken.

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 New York State, Central America, Greece, and Italy. Students should contact the Archaeology Program for information about the sites currently available.

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 Division of Biological Sciences for further information.

Cornell-in-Washington

The Cornell-in-Washington program offers students from all colleges within 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 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 Cornell-in-Washington program. For further information, see p. 19 or inquire at 471 Hollister Hall, 255-4000. Seniors who wish to study in Washington during their final semester must petition the college for permission to do so; they should first consult with the dean of seniors, Academic Advising Center, 55 Goldwin Smith Hall, 255-5004.

Fieldwork

Sometimes it is appropriate for students to include fieldwork as part of their major. A three-member faculty committee helps the student plan the project, arranges for ongoing supervision, and evaluates the project at the end of the term. Fieldwork almost always 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 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 the Academic Advising Center, 55 Goldwin Smith Hall or the Office of Admissions, 172 Goldwin Smith Hall.

ADVISING

The following advisers and offices provide academic advising or information on college procedures and regulations.

Faculty Advisers

All new students are assigned a faculty adviser. The adviser helps students plan programs of study and advises them about ways to achieve their academic goals. Advisers may also help students with study or personal problems or direct them to other offices on campus where help is available. Academic difficulties may frequently be solved or avoided if students and advisers recognize problems early.

Advisers and new advisees meet first during orientation week to discuss course selection. Students who are changing majors must have a consultation with the major department, with whom they make plans for their most important academic decisions at Cornell. The adviser eventually certifies the completion of the major. The major adviser should be consulted by the student about all academic plans, including honors, study abroad, acceleration, and graduate study. The adviser’s support is especially important if a student prepares for an exception to the requirements for the degree.

Academic Services

The Academic Advising Center, 55 Goldwin Smith Hall, 255-5004 and the Office of Admissions, 172 Goldwin Smith Hall, 255-4833, offer resources for faculty and student advisers and for students themselves and their parents. Advising deans are available to help students define their academic and career goals and to help with special academic options and exceptions to college rules.

Lynne S. Abel, dean of undergraduate education, independent majors and college scholars—255-5004

Thak Chaloemtarana, dean of seniors—255-4833

Gerry Cox, dean of juniors, pre-law adviser and coordinator of outside scholarships—255-4833

Michele Crane, associate registrar—255-5051

Patricia M. Dougherty, college registrar—255-5051

Daniel H. Evett, academic administrator, Language House—255-6543

Ken Gabard, dean of freshmen (fall matriculants)—255-5004

Lawrence Lamphere, dean of internal transfer students—255-4833

Stephen Saraydar, dean of freshmen (spring matriculants) and dual-degree students—255-4833

Maria S. Terrell, dean of sophomores and adviser for Cornell Abroad Students—255-5004

Janice Turner, dean of minority programs and premedical adviser—255-5004

Peggy Walbridge, dean of transfer students and students with disabilities—255-4833

Marilyn Williams, dean of undergraduate research and scholastic development and Career Center liaison—255-5004

REGISTRATION AND COURSE SCHEDULING

Enrollment in Courses in the College of Arts and Sciences

Students enroll in courses through the Academic Advising Center, 55 Goldwin Smith Hall. Any student not officially enrolled in a schedule of courses by the end of the third week of classes may be withdrawn from the college (see below under "Withdrawals").

New Students

During orientation week, the dean of freshmen and the dean of transfer students conduct briefings on course scheduling for new students.

Continuing Students

Continuing students are expected pre-register, that is, to select and schedule up to five courses in advance, during the semester prior...
to the one in which they will be taken. Students who fail to sign into courses during the designated period must wait until the beginning of the semester; they may well have difficulty securing places in those they most want. Before signing into courses, students should make appointments with their faculty advisers to plan their programs and discuss long-range goals. All students are welcome to discuss programs and plans with an advising dean in the Academic Advising Center, 55 Goldwin Smith Hall, or the Office of Admissions, 172 Goldwin Smith Hall. At the beginning of each term, students should check their schedules and records on "Just the Facts."

Limits on 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 should average 15 credits per semester. (AP credit and/or summer credits may reduce these numbers.) At a minimum, students must carry twelve credits per semester; if for compelling personal or academic reasons students need to carry fewer than twelve credits, they should consult their advisor and an advising dean. Permission is by petition only; it is relatively freely given for first-semester students. Completion of fewer than twelve credits without permission results in unsatisfactory academic standing. First-semester freshmen must petition to register for more than eighteen credits; other students may register for more than eighteen credits a term only if their previous term's average was a 3.0 or higher. No more than twenty-two credits may be taken in a regular semester without permission of the Committee on Academic Records. Students who fail to receive approval for excess credits from the committee run the risk of having only 18 credits for the semester count toward the degree.

Attendance
Attendance in classes is a matter between students and their instructors. If a student cannot attend classes because of illness or family crisis, the Academic Advising Center will notify instructors when requested to do so, but students must arrange to make up examinations or other work with their instructors. 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 in advance. Alternative arrangements are at the discretion of the instructor.

Adding and Dropping Courses
After course enrollment (pre-registration), 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. Add/drop forms are available in the Academic Advising Center, 55 Goldwin Smith Hall. After the third week of classes, students must petition to add or drop courses up to the seventh week. Between the seventh and twelfth weeks students may petition to withdraw from courses, if (1) the instructor approves; (2) the adviser approves; (3) no issue of academic integrity is at stake and (4) an advising dean approves. Students must meet with an advising dean to obtain petition forms. Courses dropped after the seventh week will be noted on the transcript by a "W" where the grade would normally appear. No petitions to withdraw from courses may 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. After the midpoint of a short course, students who wish to drop the course must petition to do so.

Leaves of Absence
Taking time off from college to think about goals and progress, to gain additional experiences or funds, or just to take a break from studying is sometimes useful. Those in good standing who take a leave before the beginning of any semester or by the end of the seventh week of the term are welcome to register in the college the following semester. Five years is the maximum 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 at least one month before the beginning of the term in which the student wishes to return. 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."

2) Medical leaves, usually for at least six months, are granted by the college on recommendation of a physician from Gannett Health Center. In some cases, students must satisfy the Gannett Health Center that the condition requiring the leave has been corrected before they may return. The student's academic standing will also be subject to review at the time of the leave and on return.

3) Conditional leaves may be granted by an advising dean if the student is not in good standing or, in unusual circumstances, after the seventh week of the term. Normally 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.

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."

A WARNING is posted on a student's unofficial college transcript but is not reported to the student's graduation date will be recalculated according to the number of terms completed. Students who take courses elsewhere while on leave may petition to have credits transferred and applied toward the 120 credits needed for graduation, but not toward the 100 credits required for a degree. Approval depends on acceptable grades and the judgment of the relevant departments about the quality of the courses. 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. See the section "Residence."

Withdrawals
A withdrawal is a voluntary, permanent severance from the university and from status as a degree candidate. If a student wants to withdraw after registering for the term, the withdrawal must be requested before the end of the seventh week of classes to avoid grades of "W" on the transcript. A notation of "W" will appear on the transcript for any course dropped after the seventh week. Students seeking readmission after withdrawing from the college must petition the Committee on Academic Records. If a student fails to register for a term and does not register for a leave, the student will be withdrawn from the college for failure to register.

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. 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 Intercollege 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 B average and without any grades of Incomplete, any S-U grades (unless only S-U grades are offered for that particular course), or any grades below C. Satisfying this minimum requirement does not, however, guarantee admission. Admission to the college is based on consideration of the student's entire record at Cornell and the high school record, not just the work of one semester. Interested students should see Dean Gabard, Arts and Sciences Admissions, 172 Goldwin Smith Hall.
university registrar and does not appear on official transcripts.

Required leave of absence
A student in serious academic difficulty may be required by the Committee on Academic Records to take a leave of absence, normally for a full year. Usually, but not always or necessarily, the Committee on Academic Records warns students before suspending them. Before being allowed to return and reregister in the college, students must describe what they did on leave and how they resolved their problems and submit a plan for completing the degree. In some cases the students will be required to furnish evidence that they are ready to return before being allowed to reregister in the college. Students who request to return in less than a year must present to the committee exceptionally strong evidence of their readiness to return. "Required leave" and the date are posted on the student's transcript.

Required withdrawal
The 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 the requirements of the major. This action expels the student permanently from the college. "Required withdrawal" and the date are posted on the student's transcript. Students being reviewed for academic action are urged to present evidence that will help explain their poor academic performance. Students may appeal a decision or action of the committee if they have new relevant information to present.

Forgery 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 confidential file for forgeries. If a student forges more than once or if the forgery would advance the student's academic standing unfairly or fraudulently or if, for any other reason, the situation requires some response in addition to the uniform penalty, the Academic Integrity Hearing Board might make a different recommendation, such as a notation on the student's transcript, suspension, or dismissal.

GRADUATION

Application to Graduate
In the first semester of their senior year, students must complete an application to graduate so that the college can check each student's plan for full 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. 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 in the following May.

The Degree
The College of Arts and Sciences grants only one degree, the A.B. (or B.A.). A.B. is the abbreviation of the Latin name for the degree: "Artium Baccalarius," or translated into English, B.A.: "Bachelor of Arts."

Honors

Dean's List
Inclusion on the Dean's List for academic excellence is an honor bestowed by the dean of the college. The criteria are subject to change from semester to semester and are available in the Academic Advising Center, 55 Goldwin Smith Hall.

Bachelor of Arts with Honors
Almost all departments offer honors programs for students who have demonstrated exceptional ability in the major and who have completed original independent research. The honors programs are described by individual departments in the following sections. The degree of Bachelor of Arts with honors will be conferred upon students who, in addition to having completed the requirements for the degree of Bachelor of Arts, have satisfactorily completed the honors program in their major and have been recommended for honors by their 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) maintained good academic standing, including completing a full schedule of at least 12 credits, in each of their last four semesters; and
6) have no Incompletes remaining on their records.

### CALENDAR SUPPLEMENT

All of the dates in the university calendar at the front of this volume apply to all Cornell students. Listed below are some additional dates that are of importance for students in the College of Arts and Sciences.

<table>
<thead>
<tr>
<th>Fall 1997</th>
<th>Spring 1998</th>
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<tbody>
<tr>
<td>Last day for adding courses without petition.</td>
<td>Sept. 19</td>
</tr>
<tr>
<td>Last day for changing grade option to S/U or letter.</td>
<td>Sept. 19</td>
</tr>
<tr>
<td>First deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.</td>
<td>Sept. 29</td>
</tr>
<tr>
<td>Last day for dropping courses without petition.</td>
<td>Oct. 17</td>
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<tr>
<td>Last day to petition to withdraw from a course.</td>
<td>Nov. 21</td>
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<tr>
<td>Second deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.</td>
<td>Dec. 1</td>
</tr>
<tr>
<td>Deadline for requesting internal transfer to the College of Arts and Sciences for the following term.</td>
<td>Dec. 5</td>
</tr>
<tr>
<td>Deadline for applying to the College Scholar Program.</td>
<td>April 29</td>
</tr>
<tr>
<td>Deadline for applying to study abroad. See Cornell Abroad, 474 Uris Hall.</td>
<td></td>
</tr>
<tr>
<td>Course enrollment (pre-registration) for the following term.</td>
<td>TBA</td>
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</tbody>
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### ADMINISTRATION

Phillip Lewis, dean—255-4146
Ronald Hoy, associate dean—255-4147
Biddy Martin, associate dean—255-4147
Lynne S. Abel, associate dean of undergraduate education—255-3866
Thak Chaloemtiarana, associate dean and director of admissions—255-7061
Jane V. Pedersen, director of administration and finance—255-7507

### Courses and Departments

### SPECIAL PROGRAMS AND AREAS OF CONCENTRATION

The college offers a number of interdisciplinary programs described in the section following the departmental program descriptions.

### AFRICANA STUDIES MAJOR

See “Special Programs and Interdisciplinary Studies.”

### AKKADIAN

See Department of Near Eastern Studies.

### AMERICAN STUDIES

See “Special Programs and Interdisciplinary Studies.”

### 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, utilizes 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, and it also serves as a major that, when well designed by the student and their adviser, prepares students for a wide range of professional careers, e.g., law, medicine, foreign service, social services, and business, among others.

Courses for non-majors: Anthropology welcomes non-majors 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 non-majors and students from other colleges in selecting anthropology courses, see the Anthropology Department web page (http://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." Entry into the major is possible before completing these courses, with permission from the director of undergraduate studies in anthropology. When students first enter the major, they work with their adviser to develop a preliminary program of study built around their own interests and goals.

In the first semester of the junior year, the student and adviser formalize a concentration reflecting the special interests of the student and select a set of courses from those listed below as a program of study. Once the concentration is developed, they submit the plan to the Anthropology Curriculum Committee for comment and advice. Examples of possible concentrations are Latin American ethnohistory and contemporary identity politics, nature and culture in human history, prehistory of the Americas, anthropology and literature, anthropology and social change, ethnomusicology, anthropology and the arts, etc. The plan must include a minimum of eight courses in anthropology (including Anthropology Senior Seminar) totaling 32 credit hours. When warranted, the adviser is free to approve up to two cognate courses from other departments totaling up to eight credit hours to fill this eight-course 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.

In their senior year, anthropology majors are required to take a Senior Seminar. These seminars meet weekly, are discussion-based, and are limited to anthropology majors. A professor serves as the coordinator for the group. Collaboratively the students and the professor plan the semester to reflect the concentrations and/or research interests of the participating students. Thus, the Senior Seminar serves as a space where students develop their own synthesis of their undergraduate work in 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 and has designated Professor Vrjanji Munasinghe 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 in Kathmandu, Nepal. It is designed for Cornell University students interested in anthropology and related fields. The program offers opportunities to study in a traditional and rural environment, gaining firsthand experience in anthropology.

Anticipated participation in the Cornell-Nepal Study Program is based on academic and language proficiency. Students are expected to complete a core curriculum in anthropology, which includes language courses and fieldwork.

The program offers a range of courses, from introductory to advanced levels, allowing students to explore various aspects of anthropology. Students can choose to focus on specific areas such as cultural anthropology, archaeology, or linguistic anthropology, depending on their interests and academic background.

The Cornell-Nepal Study Program also provides opportunities for students to engage in community service projects and to contribute to the local community. These activities are designed to foster a deep understanding of the local culture and to promote cross-cultural exchange.

The program is open to students from all disciplines, and it aims to create a diverse and inclusive community of learners. Students are encouraged to develop their own research projects and to participate in fieldwork, which is an integral part of the program.

In conclusion, the Cornell-Nepal Study Program offers a unique and rewarding experience for students interested in anthropology and related fields. It provides a platform for students to explore new cultures, engage in meaningful activities, and develop their skills in a supportive and collaborative environment.

For more information, including application procedures and requirements, please visit the Anthropology Department website or contact the program coordinator.
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, contact 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. Anthropology majors interested in the Honors Program should consult the chair of the Honors Committee at the end of their junior year. To qualify for entrance into the Honors Program, a student must have at least a 3.5 GPA overall and 3.3 GPA in the major, and the consent of a faculty member in anthropology who will guide the honors thesis. After applying to the program and being admitted as a candidate by the Honors Committee, the student will conduct research and write a thesis. This thesis will be 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.

While working on the thesis during the senior year, students should make use of the Senior Seminar as a place to develop the ideas for their thesis. In addition, students may enroll in Anthropology 483 (fall or spring) "Honors Thesis Research." To complete the thesis, students must enroll in 491 (fall or spring) "Honors Thesis Write-up." Only Anthropology 483 may be counted toward completion of the anthropology major. The credit hours for these courses are variable, according to the faculty adviser, and are based on performance in the 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 department's 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 303) 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 407, "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 colloquium on the second 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, pick up a copy of the major brochure (which includes descriptions of the courses not offered during 1997-98), or visit the Anthropology Department web page (http://falcon.abs.cornell.edu/~anthro/).

**I. Introductory Courses**

**A. Nature and Culture:**

ANTHR 101 *Introduction to Anthropology: Social and Cultural Perspectives on the Evolution of Humankind* #

- Spring: 3 credits. 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.
- Fee for lab usage and maintenance, $5.

ANTHR 102 *The Scope of Anthropology* #

- Spring: 1 credit. Prerequisite: concurrent enrollment in or prior completion of Anthropology 101 or Anthropology 102.
- 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 make a presentation on the nature of their work within the field and discuss their interests with students.
- The course is meant to introduce the range of approaches found within anthropology and help students in planning future course work.

ANTHR 203 *Early Peoples: The Archaeological and Fossil Record (also Anthropology 203)* #

- Spring: 3 credits. Not offered 1997-98.

ANTHR 211 *Nature and Culture* #

- Spring: 4 credits. Staff.
- Cultural anthropology, because it encompasses the comprehensive study of humankind in society, provides a unique vantage on the nature of humanity. One of the focal questions of the discipline is the relationship between the physical/biological and symbolic/moral worlds in which we live. This inquiry places anthropology squarely at the center of social theory, as all social theorists and political ideologues are founded on premises regarding human nature. Through study of a variety of issues and debates (e.g., "sociobiology;" the origin and meaning of the incest taboo), this course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

ANTHR 275 *Human Biology and Evolution (also Biological Sciences 275)* #

- Fall: 3 credits. Not offered 1997-98.

**B. Culture and History:**

ARKEO 100 *Introduction to Archaeology* #

- Spring: 3 credits. Staff.
- A broad introduction to archaeology—the study of material remains to answer questions about the human past. Case studies illustrate current methods and interpretive frameworks.
- Guest lectures by members of the Cornell Archaeology Program are an integral part of the course.

ANTHR 102 *Introduction to Anthropology: The Comparison of Cultures* #

- Spring: 3 credits. J. Krier.
- An introduction to cultural anthropology through ethnographies, or the descriptive accounts of anthropologists. Through readings and lectures, students acquaint themselves with a number of cultures from several parts of the world. The cultures range in form from those of small-scale tribal societies to those of state societies. Throughout the course, we attempt to make sense of exotic cultures in their own terms. Attention is focused on variation in cultural patterns as they are expressed in social, economic, and ritual practices. In this encounter, the principles of anthropology as a comparative enterprise that poses distinct cultural systems in relief will be developed. Fiction, films, and exercises supplement the formal anthropological materials.

ANTHR 103 *The Scope of Anthropology* #

- Spring: 1 credit. Prerequisite: concurrent enrollment in or prior completion of Anthropology 101 or Anthropology 102.
- S-U grades only. Staff.
- For course description, see section I.A.

ANTHR 200 *Cultural Diversity and Contemporary Issues* #

- Fall: 3 credits. J. Krier.
- This course will introduce students to the meaning and significance of forms of cultural diversity for understanding contemporary issues. Drawing from films, videos, and selected readings, students will be confronted with different representational forms that portray cultures in various parts of the world and they will be asked to examine critically their own prejudices as they influence the perception and evaluation of cultural differences. We shall approach cultures holistically, assuming the inseparability of economics, kinship, religion, and politics, as well as interconnections and dependencies between world areas (e.g., Africa, Latin America, the West). Among the issues considered: "political correctness" and truth; nativism and ecological diversity; race, ethnicity, and sexuality; sin, religion, and war; global process and cultural integrity.

ANTHR 202 *Interpretive Archaeology (also Archaeology 202)* #

- Fall: 3 credits. Limited to 50. T. Volman.
- An introduction to the analysis and interpretation of archaeological data, especially stone and ceramic artifacts, and related contextual data, such as the remains of plants and
This course is a synthesis of each student's graduate work in anthropology. Students will develop a series of topics representing the concentrations, visits to campus facilities, and analyses of logical data to answer questions about ancient animals. Emphasis is on the use of archaeological evidence for human behaviors, lifeways, and culture change. Topics include the formation of the archaeological record, the characterization and classification of artifacts, and the analysis of artifact distributions through space and over time. Sectional meetings include demonstrations, visits to campus facilities, and analyses of artifacts from Cornell archaeological collections.

ANTHR 204 Ancient Civilizations (also Anthropology 204) @
Fall. 3 credits. Not offered 1997–98.

II. Honors and Independent Study

ANTHR 483 Honors Thesis Research
Fall or spring. Credit and hours to be arranged. Prerequisite: consent of the Honors Committee. Staff. Independent work under the close guidance of a faculty member selected by the student.

ANTHR 491 Honors Thesis Write-up
Fall or spring. Credit and hours to be arranged. Staff.

ANTHR 497 Topics in Anthropology
Fall or spring. Credit and hours to be arranged. 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.

III. Anthropology Major Senior Seminars

In the senior year, anthropology majors are required to take a Senior Seminar. These seminars meet weekly, are discussion-based, and are limited to anthropology majors. A professor serves as the coordinator for the group. Collaboration among the students and the professor plan the semester to reflect the concentrations and/or research interests of the participating students. Thus the Senior Seminar serves as a space where students develop their own synthesis of their undergraduate work in anthropology.

ANTHR 489 Anthropology Senior Seminar
Fall or spring. 4 credits. Limited to 15 students. Prerequisite: Anthropology majors only. Fall: V. Munasinghe; spring, M. Small. This course is a synthesis of each student's undergraduate concentration in the major. In collaboration, the instructor and the students will develop a series of topics representing the interests of the students. Students will be required to read extensively and present topics.

IV. 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
Spring. 4 credits. Not offered 1997–98.

ANTHR 344 Male and Female in Chinese Culture and Society (also Women’s Studies 344) @
Fall. 4 credits. Not offered 1997–98.

ANTHR 370 Environmental Archaeology (also Anthropology 670 and Anthropology 370/670)
Fall. 4 credits. Not offered 1997–98.

ANTHR 371 Human Paleontology (also Biological Sciences 371) @
Fall. 4 credits. Prerequisite: one year of introductory biology or Anthropology 101 or permission of instructor. Offered alternate years. K. 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 390 Primate Behavior and Ecology
Spring. 4 credits. Not offered 1997–98.

ANTHR 409 Approaches to Archaeology (also Anthropology 609 and Anthropology 409/609)
Spring. 4 credits. Prerequisite: Permission of instructor(s). J. Henderson, T. Volman. An exploration of the concepts that have shaped modern archaeology. The course briefly examines the history of theoretical orientations in archaeology, then considers the variety of perspectives and interpretive frameworks that guide present-day investigations. Case studies illustrate the implications of the nature of the archaeological record for reconstructing subsistence and economic systems, trade, social and political organization, demography, and ideology. An undergraduate seminar especially recommended for undergraduate majors and graduate archaeologists but open to anyone with a serious interest in archaeology.

ANTHR 475 Evolutionary Theory and Human Behavior (also Anthropology 675)
Spring. 4 credits. M. Small. One of the major recent controversies in anthropology focuses on the role of evolution in the behavior of modern humans. Some scholars feel that ever since our species became sentient, and developed ways to override or bypass nature, the rules of Natural Selection were suspended. Others are convinced that buried deep within our consciousness are strategies, thoughts, and desires that were molded long ago but still motivate our lives. This seminar will examine the role of evolution in modern human behavior. First, we will read the evolutionary theory upon which current hypotheses are based. Second, the class will read, discuss, and criticize the most recent literature on the evolution of human behavior. We will ask several questions: Is current human behavior molded by the rules of Natural Selection? Do the modern theorists present a convincing argument? How would their predictions best be tested? What contribution does this work make (or not make) to the larger field of anthropology?

ANTHR 490 Primates and Evolution

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 317 Stone Age Archaeology (also Archaeology 317)
Fall. 4 credits. T. Volman. A survey of current approaches to the archaeological record of Stone Age peoples, from the earliest sites to those of recent times. Case studies are used to illustrate the nature of archaeological occurrences, excavation procedures, and analytical methods. Multidisciplinary efforts to expand our knowledge of prehistoric lifeways and behaviors are a major concern of the course.

ANTHR 355 Ancient Mexico and Central America (also Archaeology 355)
Spring. 4 credits. Not offered 1997–98.

ANTHR 370 Environmental Archaeology (also Anthropology 670 and Anthropology 370/670)
Fall. 4 credits. Not offered 1997–98.

ANTHR 371 Human Paleontology (also Biological Sciences 371)
Fall. 4 credits. Prerequisite: One year of introductory biology or Anthropology 101 or permission of instructor. Offered alternate years. K. Kennedy. For course description, see section IV.

ANTHR 405 Archaeological Research Design (also Anthropology 605 and Anthropology 405/605)
Spring. 4 credits. Not offered 1997–98.

ANTHR 409 Approaches to Archaeology (also Anthropology 609 and Anthropology 409/609)
Spring. 4 credits. Prerequisite: Permission of instructor(s). J. Henderson, T. Volman. For course description, see section IV.

ANTHR 456 Mesoamerican Religion, Science, and History @
Fall. 4 credits. Not offered 1997–98.

ANTHR 458 Archaeological Analysis (also Anthropology 658 and Anthropology 458/658)
Spring. 4 credits. Limited to 15 students. Prerequisite: One course in archaeology or permission of instructor. 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; software for analyzing 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 493 Seminar in Archaeology (also Anthropology 493) @
Fall. 4 credits. Not offered 1997–98.
VI. Anthropological Thought and Method

As a form of inquiry, anthropology has a long and complex history and utilizes a wide variety of theories and methods. In this section, topics in the history of anthropological thought and a wide variety of anthropological approaches are presented, along with courses focused on the design of anthropological research projects.

ANTHR 291 Filming Other Cultures (also Anthropology 691 and Theatre Arts 291/691) @

Spring. 3 credits. Limited to 20 students. Preference given to students who have taken either Anthropology 102 or Theatre Arts 274. Fee for film screening and maintenance, $35. R. Ascher.

Shortly after the first films were screened, their makers saw in motion pictures a promise for greater understanding among peoples. Was the promise fulfilled? In this discussion course, responses to this question are examined through the study of short, representative films and related readings. The discussions are framed and informed by ideas from anthropology and film studies. For example, we consider aesthetic, ethics, and responsibility in filming and editing, connections between sound—or lack of it—and image; the implications of film as a product of Euroamerican culture, cultural assumptions in camera movements, film color, and film pace; indigenous people's presentations of themselves and Euroamerican representations of others; and the moving line that separates fiction from non-fiction films. For one meeting each week, two students, in cooperation with the instructor, are responsible for leading the discussion.

ANTHR 306 Ethnographic Description

Fall. 4 credits. Not offered 1997–98.

ANTHR 362 Democratizing Society: Participation, Action, and Research (also Anthropology 662)

Fall. 4 credits. D. J. Greenwood.

This course poses an alternative to distances, "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, and "Southern" participatory action research, action science, and participatory evaluation. There are no prerequisites and undergraduates are welcome.

ANTHR 400 The Craft of Anthropology: Ethnographic Field Methods

Fall. 4 credits. Not offered 1997–98.

ANTHR 405 Archaeology Research Design (also Anthropology 605 and Archaeology 405/605)

Spring. 4 credits. Not offered 1997–98.

ANTHR 412 Contemporary Anthropological Theory @

Spring. 4 credits. B. Lambert.

A survey of the assumptions anthropologists make concerning the nature of society and culture and the explanations they have proposed for social behavior, values, belief systems, and ritual. Problems of social continuity and change will be addressed by way of theories of process, conflict, and transaction. Problems of cross-cultural understanding will be explored through interpretive and structural studies of symbolism, ritual, mythology, concepts of the person, and cultural logic. Examples will be drawn from Western and non-Western societies, past and present.

ANTHR 420 Development of Anthropological Thought

Fall. 4 credits. Limited to 15. A. T. Kirsch.

An examination of the history and development of anthropological theory and practice. The course will focus on the differences and continuities among the various national and historical approaches that have come to be regarded as the schools of anthropology.

ANTHR 424 Anthropology Amongst the Disciplines @

Fall. 4 credits. J. T. Siegel.

Anthropology is distinguished amongst the disciplines in depending on a notion of the not-yet conceptualized, the encounter with which is thought to provide an inassimilable element into thinking about culture and society. The course provides a history and assessment of this idea and illustrations of its embodiment, particularly in studies of ritual.

ANTHR 451 Anthropological Boundaries @

Fall. 4 credits. Not offered 1997–98.

ANTHR 452 Portraits, Profiles, and Life Histories @

Spring. 4 credits. Not offered 1997–98.

ANTHR 453 Visual Anthropology

Spring. 4 credits. Enrollment is limited by appropriate space for showing work. S-U grades only. Fee for film screening and maintenance, $20. R. Ascher.

The expression of ideas about the human condition through original drawings, graphics, paintings, photographs, cinema, sculpture, and video that take person as subject. Writing can be combined with visual expression, as, for example, in concrete poetry or photographic essays. Projects must conform to two general guidelines: (1) the student must have prior knowledge of the medium chosen or concurrent course work in it, and (2) the project must be one that can be developed throughout the course and benefit from its particular setting. In the first half, the creative work of others is studied. For example, we read Spiegelman's MAUS and view films made by both anthropologists and people whom they visit. The second half is devoted to hour-long progress reports and discussions of the work of people in the course.

ANTHR 455 Archaeological Analysis (also Anthropology 658 and Archaeology 458/658) @

Spring. 4 credits. Limited to 15 students. Prerequisite: One course in archaeology or permission of instructor. J. Henderson.

For course description, see section V.

ANTHR 474 Laboratory and Field Methods In Human Biology (also Biological Sciences 474)

Spring. 5 credits. Not offered 1997–98.

ANTHR 487 Field Research Abroad @

Fall or spring. Credit to be arranged.

Intended for undergraduate students only. Staff.

Field research abroad as part of the Cornell-Nepal Studies Program, the Cornell-Honduras Program, or other departmentally-approved programs. Topics are selected and project proposals prepared by students in consultation with faculty. Fieldwork typically involves extended research (usually 4–6 weeks) in a foreign setting with faculty supervision, culminating in a major paper or report.

ANTHR 494 Seminar in Archaeology: The Archaeology of Human Origins (also Anthropology 494) @

Spring. 4 credits. T. Volman.

For course description, see section V.

ANTHR 495 Classic Theorists Seminar

Fall. 4 credits. Not offered 1997–98.

VII. Understanding Cultures

Anthropologists examine the diversity of human behaviors, social relationships and structures, economies, political and legal orders, worldviews, logics, languages, symbols, myths, and religions among the many other means 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 217 Ethnicity, Identity, and the State

Spring. 4 credits. Not offered 1997–98.

ANTHR 305 Emotion, Gender, and Culture (also Women's Studies 305) @

Spring. 4 credits. Not offered 1997–98.

ANTHR 313 Anthropology of the City @

Spring. 4 credits. Staff.

An examination of the sociocultural structure and process in urban settings, with emphasis on the role of rural migrants, the relationship of urbanism to political and economic development, the role of voluntary associations, and the adjustment of family and
kinship groups to urban life. Asian, African, and Latin American urban centers are emphasized.

**ANTHR 321 Sex and Gender in Cross-Cultural Perspective (also Women's Studies 321)**
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, ideologically, and biological systems to emphasize the diversity in gender and sex-role definition around the world.

**ANTHR 323 Kinship and Social Organization**
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 its fate in utopian communities.

**ANTHR 326 Economic Anthropology**
Fall. 4 credits. Not offered 1997–98.

**ANTHR 328 Conflict, Dispute Resolution, and Law in Cultural Context**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 330 State, Nation, and Everyday Life**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 406 The Culture of Lives (also Women's Studies 406)**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 408 Gender Symbolism (also Women's Studies 408)**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 417 Person, Gender, and Song (also Women's Studies 416)**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 421 Anthropological Boundaries**
Fall. 4 credits. Not offered 1997–98.

**ANTHR 426 Ideology and Social Reproduction**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 432 Culture and Performance, and Performing Culture**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 435 Theatre of Anthropology (also Women's Studies 435)**
Fall. 4 credits. V. Munasinghe.

**ANTHR 441 Anthropological Perspectives**
Fall. 4 credits. Not offered 1997–98.

**ANTHR 453 Visual Anthropology**
Spring. 4 credits. Enrollment is limited by appropriate space for showing work. S-U grades only. Fee for film screening and maintenance, $20. R. Ascher. For course description, see section VI.

**ANTHR 455 Theatre of Anthropology**
Spring. 4 credits. Not offered 1997–98.

**ANTHR 456 Mesoamerican Religion, Science and History**
Fall. 4 credits. Not offered 1997–98.

**ANTHR 460 Culture and International Order**
Fall. 4 credits. J. Borneman. For course description, see section VII A.

**C. Cultures in Anthropological Perspective:**
Anthropology constructs its theories in the comparison of different social and cultural systems and thus depends integrally on knowledge about particular places. The courses below are all based on the cultures and societies of particular areas of the world and organize knowledge about these areas in reference to key anthropological questions. Students without prior experience in anthropology are welcome in these courses.

**ANTHR 221 Anthropological Representation: Ethnographies on Latino Culture (also Latino Studies Program 221)**
Spring. 3 credits. Not offered 1997–98.

**ANTHR 223 Religion and Culture**
Fall. 4 credits. B. Lambert.

**ANTHR 230 Cultures of Native North America**
Fall. 4 credits. B. Lambert.

A survey of the principal Eskimo and American Indian culture areas north of Mexico. Selected cultures will be examined to bring out distinctive features of the economy, social organization, religion, and worldview. Although the course concentrates on traditional cultures, some lectures and readings deal with changes in native ways of life that have occurred during the period of European-Indian contact.

**ANTHR 303 Asians in the Americas: A Comparative Perspective (also Asian American Studies 303)**
Fall. 4 credits. V. Munasinghe.

The common perception of ethnicity is that it is a “natural” and an inevitable consequence of cultural difference. “Asians” overseas, in particular, have won repute as a people who cling tenaciously to their culture and refuse to assimilate into their host societies and cultures. But, who are the “Asians”? On what basis can we label “Asians” an ethnic group? Although there is a significant Asian presence in the Caribbean, the category “Asian” itself does not exist in the Caribbean. What does this say about the nature of categories that label and demarcate groups of people on the basis of alleged cultural and phenotypical characteristics? This course will examine the dynamics behind group identity, namely ethnicity, by comparing and contrasting the multicultural experience of Asian populations in the Caribbean and the United States. Ethnographic case studies will focus on the East Indian and Chinese experiences in the Caribbean and the Chinese, Korean, Japanese, Filipino, and Indian experiences in the United States.
ANTHR 316 Power, Society, and Culture in Island Southeast Asia @
Fall. 4 credits. Not offered 1997-98.

ANTHR 333 Ethnology of the Andean Region @
Fall. 4 credits. B. J. Isbell. Cultural continuities in the development of Andean societies. The ecological, archaeo­
logical, ethnographical, and contemporary ethnological record. The Andean heritage as a resource for "modernization."

ANTHR 335 Subsistence, Polity, and Worldview in Mainland Southeast Asia @
Spring. 4 credits. Limited to 12 students. A. T. Kirsch. A survey of the peoples and cultures of Mainland Southeast Asia from prehistoric to contemporary times.

ANTHR 336 Change and Continuity in the Pacific Islands @
Fall. 4 credits. Not offered 1997-98.

ANTHR 339 Peoples and Cultures of the Himalayas @
Spring. 4 credits. Not offered 1997-98.

ANTHR 343 Religion, Family, and Community in China @
Fall. 4 credits. Not offered 1997-98.

ANTHR 344 Male and Female in Chinese Culture and Society (also Women's Studies 344) @
Fall. 4 credits. Not offered 1997-98.

ANTHR 345 Japanese Society @
Fall. 4 credits. Staff. A survey of the social structure of Japan and a discussion of trends in urban and rural life during the past century. Topics to be emphasized include family, ancestor worship, community and social organization, and urbanism and modernization.

ANTHR 350 Topics in the Anthropology of Europe
Spring. 4 credits. J. Borneman. This course explores ways in which Europe can and has been studied anthropologically. Emphasis will be on understanding processes of cultural differentiation and integration. The self-understandings of various peoples of Europe is accounted for in terms of the relation of local culture to national, transnational, and global processes. Among the topics to be explored: 1) the role of culture in nation-building; 2) the rise and decline of fascism and communism in the twentieth century; 3) Cold War division and everyday life; 4) the creation and displacement of culture areas (i.e., the Mediterranean, Scandinavia, Mitteleuropa, Slavic culture, the West, and the East).

ANTHR 355 Ancient Mexico and Central America (also Archaeology 355) @
Spring. 4 credits. Not offered 1997-98.

ANTHR 377 The United States (also Latino Studies Program 377)
Fall. 4 credits. Not offered 1997-98.

ANTHR 433 Andean Thought and Culture @
Spring. 4 credits. Not offered 1997-98.

ANTHR 434 Religion and Ritual in Chinese Society (also Religious Studies 443) @
Fall. 4 credits. P. S. Sangren. This course explores topics in the anthropological study of Chinese religion, including aspects of cosmology, ritual, and mythology as they relate to Chinese society. A premise of the course is that religion embodies values basic to Chinese culture. Consequently, study of Chinese religion provides important insights into Chinese society. By the same token, Chinese religion must be understood in the context of Chinese social institutions (family, community, state).

ANTHR 444 Japanese Social Organization @
Spring. 4 credits. Not offered 1997-98.

ANTHR 446 Mesoamerican Religion, Science, and History @
Fall. 4 credits. Not offered 1997-98.

ANTHR 477 Ethnology of Island Southeast Asia @
Fall. 4 credits. Not offered 1997-98.

ANTHR 493 Seminar in Archaeology (also Archaeology 493) @
Fall. 4 credits. Not offered 1997-98.

ANTHR 496 Seminar in Archaeology (also Anthropology 496) @
Fall. 4 credits. Not offered 1997-98.

Relevant courses in other departments
BIOPL 247 Ethnobiology Fall. 3 credits. D. Bates.
GOVT 444 Afrocentrism 4 credits. M. Bernal.
HIST 434/WOMNS 477 Gender in the Social History of Africa 4 credits. S. Greene.
MUSIC 245 Gamelan in Indonesian History and Cultures 3 credits. M. Hatch.
MUSIC 604 Ethnomusicology: Areas of Study and Methods of Analysis 4 credits. M. Hatch.

VIII. Graduate Seminars

The graduate program in anthropology is described in much greater detail in the Graduate Program brochure which is available through the Director of Graduate Studies. This document is also found on the Anthropology Department Internet page (http://falcon.arts.cornell.edu/~anthro/). The seminars described immediately below pertain to the program in socio-cultural anthropology. For information about graduate study in archaeology and biological anthropology, see the Anthropology Department Internet page.

A core set of seminars is required of all graduate students in socio-cultural anthropology: Anthropology 600, 601, and 602. Anthropology 603 is strongly recommended. These seminars are open to graduate students from other related fields. This sequence, and the graduate curriculum in general, is premised on the idea that anthropology is best defined as the comparative study of human social life. This definition resists institutional pressures in the academy to distinguish social science from humanistic or cultural studies and is supported by the integrationist approach to social groups and practices. The study of symbolic anthropology, structuralism, exchange, myth and ritual, religion, gender, personhood, linguistics, semiotics, etc., is linked to the practical exigencies of social life. While emphasizing aspects of the discipline generally associated with cultural anthropology, the course will endeavor to set the stage for a dialectical understanding of social, political, economic, and symbolic activities as interrelated phenomena. The works of de Saussure, Levi-Strauss, Dumont, Geertz, Victor Turner, Sahlin, among others, as well as contemporary theories are given careful attention.

ANTHR 600 Proseminar: Culture and Symbol
Spring. 6 credits. S. Sangren. This course focuses on an appreciation of symbolic, expressive, and representational forms and processes as both producers and products of social activities. Through the study of symbolic anthropology, structuralism, exchange, myth and ritual, religion, gender, personhood, linguistics, semiotics, etc., we will investigate how identity and meaning are linked to the practical exigencies of social life. While emphasizing aspects of the discipline generally associated with cultural anthropology, the course will endeavor to set the stage for a dialectical understanding of social, political, economic, and symbolic activities as interrelated phenomena. The works of de Saussure, Levi-Strauss, Dumont, Geertz, Victor Turner, Sahlin, among others, as well as contemporary theories are given careful attention.

ANTHR 601 Proseminar: Social Organization
Spring. 6 credits. S. Sangren. This course focuses on an appreciation of symbolic, expressive, and representational forms and processes as both producers and products of social activities. Through the study of symbolic anthropology, structuralism, exchange, myth and ritual, religion, gender, personhood, linguistics, semiotics, etc., we will investigate how identity and meaning are linked to the practical exigencies of social life. While emphasizing aspects of the discipline generally associated with cultural anthropology, the course will endeavor to set the stage for a dialectical understanding of social, political, economic, and symbolic activities as interrelated phenomena. The works of de Saussure, Levi-Strauss, Dumont, Geertz, Victor Turner, Sahlin, among others, as well as contemporary theories are given careful attention.

ANTHR 602 The Practices of Anthropology
Fall. 4 credits. D. Greenwood. The course builds on the foundation of the proseminar but broadens the concept of anthropological practices to include issues about the relations between theory and method, practice/theory relationships, the ethnography of anthropological practices themselves, the examination and critique of the concept of "participant observation," and a consideration of "ethical practices" in anthropology. The centerpiece of the seminar is the connection between the students' own
ANTHR 603 Research Design
Spring. 4 credits. V. Santiago-Izrayely. This seminar focuses on preparing a full-scale proposal for anthropological fieldwork for a dissertation. Topics include identifying of appropriate funding sources, defining a researchable problem, selecting and justifying a particular fieldwork site, situating the ethnographic case within appropriate theoretical contexts; selecting and justifying appropriate research methodologies, developing a feasible timetable for field research, ethical considerations and human subjects protection procedures, and preparing appropriate budgets. This is a writing seminar, students will complete a proposal suitable for submission to a major funding agency in the social sciences.

ANTHR 604 Praxis and Culture
Spring. 4 credits. Not offered 1997-98.)

ANTHR 605 Archaeological Research Design (also Anthropology 405 and Archaeology 405/605)
Spring. 4 credits. Not offered 1997-98.)

ANTHR 607 Special Problems in Anthropology
Fall or spring. Credit and hours to be arranged. 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 609 Approaches to Archaeology (also Anthropology 409 and Archaeology 409/609)
Spring. 4 credits. Prerequisite: permission of instructor(s). J. Henderson, T. Volman. An exploring of the concepts that have shaped modern archaeology. The course briefly examines the history of theoretical orientations in archaeology, then considers the variety of perspectives and interpretive frameworks that guide present-day investigations. Case studies illustrate the implications of the nature of the archaeological record for reconstructing subsistence and economic systems, trade, social and political organization, demography, and ideology. An undergraduate seminar especially recommended for undergraduate majors and graduate archaeologists but open to anyone with a serious interest in archaeology.

ANTHR 610 Language and Myth
Fall. 4 credits. J. T. Siegel. An analysis of the theories on language leading to Levi-Strauss and Derrida. Myth and the notion of the father.

ANTHR 614 Reading in the Ethnographic Tradition (1880-1960)
Fall. 4 credits. Not offered 1997-98.)

ANTHR 615 Reading Contemporary Ethnographies (1960-1990)
Fall. 4 credits. Not offered 1997-98.)

ANTHR 616 Cultural Production of the Person
Spring. 4 credits. Not offered 1997-98.)

ANTHR 619 Anthropological Approaches to the Study of Buddhism in Asia
Spring. 4 credits. A. T. Kirsch. This seminar will examine the various conceptual and analytical strategies employed by social scientists in the study of Buddhism especially in South and Southeast Asia. Problems of religious complexity, the social correlates of Buddhism, and the role of Buddhism in social change will be explored.

ANTHR 621 Gender and Culture (also Women's Studies 621)
Fall. 4 credits. Not offered 1997-98.)

ANTHR 629 Chinese Ethnology
Spring. 4 credits. Not offered 1997-98.)

ANTHR 632 Andean Symbolism
Spring. 4 credits. Not offered 1997-98.)

ANTHR 635 Southeast Asia: Readings In Special Problems
Fall or spring. Credit and hours to be arranged. 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 636 Cognition and Classification
Fall. 4 credits. Not offered 1997-98.)

ANTHR 637 Theorizing Social Movements, Human Rights and Democracy in Latin America
Spring. 4 credits. Not offered 1997-98.)

ANTHR 639 The Feminine Symbolic
Spring. 4 credits. Not offered 1997-98.)

ANTHR 641 South Asia: Readings in Special Problems
Fall or spring. Credit and hours to be arranged. 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 645 Japanese Ethnology
Fall. 4 credits. Not offered 1997-98.)

ANTHR 648 Marriage and Death
Fall. 4 credits. Not offered 1997-98.)

ANTHR 649 Narrative and the Analysis of Culture
Spring. 4 credits. J. Bomeman. The purpose of the course is to acquaint students with narrative form and the use of narrative tools in the analysis of cultural artifacts. Narrative—a specific set of genres of discourse sharing the property of temporally sequenced clauses—is the subject of much research within many disciplines. Narrative is often said to fashion diverse human experiences into a form assimilable to structures of meaning that are generally human rather than culture-specific. By making personal knowledge communicable, narrative is intrinsic to the making of culture, its representation, and its comprehension. Participants will be introduced to the work of major narrative theorists and to attempts at applying narrative theory to culture. They will also be asked to examine critically a variety of cultural artifacts—including ethnography, performance art, film/video, and law—in terms of the theories discussed.

ANTHR 660 Latino Languages, Ideology and Practice (also Latino Studies Program 660)
Spring. 4 credits. Not offered 1997-98.)

ANTHR 662 Democratizing Society: Participation, Action, and Research (also Anthropology 362)
Fall. 4 credits. D. J. Greenwood.
This course poses an alternative to distanced, "objectivist" social science by reviewing some of the many numerous approaches to socially engaged research. Among the approaches discussed are those centering on the pedagogy of liberation, feminism, the industrial democracy movement, and "Southern" participatory action research, action science, and participatory evaluation.

ANTHR 663 Action Research
Spring. 4 credits. Prerequisite: Anthropology 362/662. Enrollment limited to 20 students. D. J. 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 is expected.

ANTHR 665 Topics in Native American Societies and Cultures
Spring. 4 credits. Not offered 1997-98.)

ANTHR 670 Environmental Archaeology (also Anthropology 370 and Archaeology 370/670)
Fall. 4 credits. Not offered 1997-98.)

ANTHR 673 Human Evolution: Concepts, History and Theory (also Biological Sciences 673)
Fall. 4 credits. Not offered 1997-98.)
ANTHR 675 Evolutionary Theory and Human Behavior (also Anthropology 475)
Spring. 4 credits. M. Small. For course description, see ANTHR 475 in section IV.

ANTHR 680 Theory and Ethnography in the Anthropology of Southeast Asia
Fall. 4 credits. Not offered 1997–98.

ANTHR 682 Perspectives on the Nation (also Asian American Studies 682)
Spring. 4 credits. V. Munasinghe. This course will examine critically the key texts that have informed our understanding of the nation and nationalism. Beginning with 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? (1882), we will then move on to more contemporary writings by Gellner, Hobbsawen, and Anderson and end with alternate analytical approaches that have been informed by the "national question" in the "Third World" such as Pantha 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."

[ANTHR 685 Mothers, Priests, Rebels, and Indian Chiefs: New Social Movements in Latin America @ Fall. 4 credits. Not offered 1997–98.]

[ANTHR 690 Ritual and Myth: Structure, Process, Practice @ Spring. 4 credits. Not offered 1997–98.]

ANTHR 691 Filming Other Cultures (also Anthropology 291 and Theatre Arts 291/691 @ Spring. 4 credits. Fee for film screening and maintenance, $35. For description, see Anthropology 291 and Theatre, Film and Dance 291. Graduate students who register in this course attend the meetings of 291. In addition, they write in-depth studies of one or more films in consultation with the instructor.

ARABIC AND ARAMAIC
See Department of Near Eastern Studies.

ARCHAEOLOGY
See "Special Programs and Interdisciplinary Studies."

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. Asian studies courses 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 the humanities distribution requirement. Courses listed under Asian Studies offered through other departments may fulfill distribution requirements in history, social sciences, and arts.

The Major
The applicant for admission to the major in Asian studies must have completed at least one area studies course selected from among those listed under the Department of Asian Studies and 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 this course and in all other courses counted toward the major.

A student majoring in Asian studies is required to complete two courses at the 200 level (a minimum of 6 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 6 credits of further language study) selected by the student in consultation with his or her adviser from among the courses listed under the Department of Asian Studies and numbered 250 and above. Majors in Asian studies normally specialize in the language and culture of one country and often choose an additional major in a traditional discipline.

Concentration in Southeast Asia Studies
A candidate for the Bachelor of Arts or Bachelor of Science degree at Cornell may take a concentration in Southeast Asia Studies by completing 18 credits of course work. A recommended plan would include Asian Studies 208 and four courses at the intermediate or advanced stage, two of which could be a Southeast Asian language. Additional courses may be added if offered with comparable South Asia content.

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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.

Intensive Language Program (FALCON)
For those students desiring to accelerate their acquisition of Chinese, Japanese, or Indonesian, Cornell offers a full-time intensive language program, the Full-Year Asian Language Concentration (FALCON). FALCON students spend six hours a day, five days a week, for periods of up to a full year studying only the language and thus are able to complete as many as twelve hundred hours of supervised classroom and laboratory work in one year. For further information, students should contact the FALCON Program Office, Department of Modern Languages, 413 Morrill Hall (telephone: 607-255-0457, e-mail: FALCON@cornell.edu).
Study Abroad

Cornell is a member of the Inter-University Center for Chinese Language Study in Taipei and a member of the Council on International Educational Exchange offering study in China at Peking University and Nanjing University. These centers offer intensive training in both spoken and written forms of the languages. The Kyoto Center for Japanese Studies (KCJS) is an undergraduate program for students who want to spend one or two semesters in Japan studying both language and culture. Cornell is a class-A member of the American Institute of Indian Studies, which offers fellowships in India for intensive language study in Hindi, Bengali, and Tamil. Cornell and the central campus of the Nepalese national university—Tribhuvan—at Kathmandu, cosponsors an academic seminar or year in Nepal. North American students study and live with Nepalese students who come from outside the Kathmandu Valley to Tribhuvan University. Students may participate in one or two semesters. Courses are offered at the Cornell-Nepal Study Program House adjacent to the university. All courses are officially taught in English. A five-week, in-country orientation program includes classes in intensive Nepali conversation, cultural orientation programs, and a ten-day field trip and trek. Semester course offerings include Nepali language (Tibetan and/or Newari Languages also possible), contemporary issues in Nepalese studies, field research design and methods in sociology/anthropology and ecology/environment, and guided field research.

Juniors and seniors in good academic standing (3.0 GPA, or higher) from any major may participate. Students must have a desire to study on the other side of the world, to participate in a multicultural program, and to undertake rigorous field research. No experience in Nepali language and instruction is in English, but some prior Nepali language study is strongly recommended. Students interested in the study abroad in Nepal program should consult with Cornell Abroad (474 Uris Hall) for further information. Other opportunities include a junior year abroad at IKIP-Malang, in Indonesia, or at the School of Oriental and African Studies, University of London. Many other options for study in Asia exist, including in Indonesia, Thailand, and Vietnam through the Council for International Educational Exchange. Undergraduates should consult Cornell Abroad; graduate students should inquire at the East Asia Program, the South Asia Program, or the Southeast Asia Program Office.

General Education Courses

ASIAN 208 Introduction to Southeast Asia @

Spring. 3 credits. T. Chaloemtiarana.

This course is for anyone curious about the part of Asia with the most diversity; it defines Southeast Asia both as the nation-states that have emerged since 1945 (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam) and as a larger cultural world extending from southern China to Madagascar and Polynesia. Students will have 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, literary and literature, art and architecture, agriculture, industrialization and urbanization, politics and government, warfare and diplomacy, ecological and human degradation, business and marketing. The course aims to teach both basic information and different ways of interpreting that information.

ASIAN 211 Introduction to Japan @

Fall. 3 credits. B. de Bary.

An interdisciplinary introduction to Japanese society and its history especially designed for students not majoring in Asian Studies. The first part of the course focuses on the historical changes in Japanese society from the eighth century down to the nineteenth century; the second part analyzes modern society from a variety of perspectives. It also addresses the question of how Japan is presented in the U.S. mass media. Guest lecturers from five or six different fields offer their opinions on Japanese history, culture, and politics.

ASIAN 212 Introduction to China @

Spring. 3 credits (4 credits with a special project; consult instructor for information).

Staff.

An interdisciplinary introduction to Chinese culture especially designed for students not majoring in Asian Studies.

ASIAN 215 Introduction to South Asian Civilization @

Spring. 3 credits (4 credits with a special project; consult instructor for information).

Not offered 1997-98. C. Minkowski.

An interdisciplinary introduction to the culture and history shared by India and other states of South Asia. Designed for students not majoring in Asian Studies. Guest lecturers will provide the perspective of their disciplines to the general themes of the course: cultural diversity and the role of tradition in contemporary life.

ASIAN 218 Introduction to Korea @

Spring. 3 credits. Not offered 1997-98.

An interdisciplinary introduction to Korean history and culture, including language, literature, art, and music. The course begins with an overview of Korean history from the Three Kingdoms Period to the present. The course then focuses on major events in twentieth-century Korean history: the March 1, 1919, Independence Movement, the Korean War, the 1960 Student Revolution, the 1980 Kwangju Massacre, and others. Visiting lecturers will speak about Korea from a variety of disciplinary viewpoints, including linguistics, sociology, anthropology, political science, and law.

ASIAN 291 Classical Indian Narrative (also Classics 291) @

Spring. 3 credits. Not offered 1997-98.

D. Gold.

This course treats the development of tantric traditions in ancient India. Sources will include the Vedas, the Sanskrit epics, the Buddhist Jatakas, the Kathasaritsagara, the Panchatantra, and related collections. Attention will be given to comparisons with Greek narrative, and to the diffusion of Indian narratives into the world's literature.

ASIAN 301 Modern Korean Culture and Literature @

Fall. 4 credits. Offered alternate years. Not offered 1997-98.

Staff.

The course will explore the relationship between thematic and formal concerns of Japanese film and narratives of modern Japanese history dealing with such issues as the nature of the Meiji Restoration, the rise of Taisho commodity culture, the Pacific War, postwar reconstruction, postmodernity and "new nationalism." Weekly analyses of specific films will be accompanied by readings that provide historical context and pose relevant interpretive and theoretical questions, particularly those of gender and cultural difference. Study of works by Ozu, Mizoguchi, Kurosawa, and Naruse will constitute the introductory portions of the course, followed each year by a series featuring recent works of contemporary directors.

ASIAN 302 Tantric Traditions (also Classics 302) @

Spring. 3 credits. Not offered 1997-98.

J. Srivastava.

This course focuses on the major religious traditions of India, China, and Japan, focusing on Vedic ritual and Buddhist Tantrism; Indian, Chinese, and Japanese Buddhism; the major Chinese traditions of Confucianism and Taoism; and Shinto, Confucianism, and the new religions in Japan. Emphasis will be on the great traditions of these cultures, with frequent reference to the differing realms of popular religions.

ASIAN 303 Pre-Modern Indian Culture and Literature @

Fall. 4 credits. Not offered 1997-98.

C. Minkowski.

Readings in translation from the principal story collection of ancient India. Sources will include the Vedas, the Sanskrit epics, the Buddhist Jatakas, the Kathasaritsagara, the Panchatantra, and related collections. Attention will be given to comparisons with Greek narrative, and to the diffusion of Indian narratives into the world's literature.

ASIAN 310 Pre-Modern Korean Culture and Literature @

Fall. 4 credits. Not offered 1997-98.

B. Strauss.

A comparative study, the course will focus on the Korean War (1950-1953) and the Peloponnesian War (431-404 BC). It will examine the relationship between ideas of democracy and democratic government, and the conduct of war to advance or defend these. We will be reading and discussing Korean materials on the background and prosecution of the Korean War, American newspapers and historical records on U.S. involvement; and histories, debates, plays, and other contemporary works on the Athenian conduct of its war aginast Sparta.

ASIAN 311 Modern Korean Culture and Literature @

Spring. 4 credits. Not offered 1997-98.

C. Minkowski.

The course will explore the relationship between thematic and formal concerns of Japanese film and narratives of modern Japanese history dealing with such issues as the nature of the Meiji Restoration, the rise of Taisho commodity culture, the Pacific War, postwar reconstruction, postmodernity and "new nationalism." Weekly analyses of specific films will be accompanied by readings that provide historical context and pose relevant interpretive and theoretical questions, particularly those of gender and cultural difference. Study of works by Ozu, Mizoguchi, Kurosawa, and Naruse will constitute the introductory portions of the course, followed each year by a series featuring recent works of contemporary directors.

ASIAN 338 Democracy and War (also History 338)

Spring. 4 credits. Not offered 1997-98.

B. Strauss.

A comparative study, the course will focus on the Korean War (1950-1953) and the Peloponnesian War (431-404 BC). It will examine the relationship between ideas of democracy and democratic government, and the conduct of war to advance or defend these. We will be reading and discussing Korean materials on the background and prosecution of the Korean War, American newspapers and historical records on U.S. involvement; and histories, debates, plays, and other contemporary works on the Athenian conduct of its war against Sparta.

ASIAN 347 Tantric Traditions (also Religious Studies 347) @

Fall. 4 credits. Not offered 1997-98.

D. Gold.

This course treats the development of tantric traditions in the Indian subcontinent and beyond. Philosophical, socio-religious, cultural, and visionary dimensions of tantra will be discussed. We study different Hindu and Indo-Tibetan traditions, with some attention also paid to tantric developments in East Asian Buddhism.


ASIAN 351 The Religious Traditions of India (also Religious Studies 351) @
Spring. 4 credits. D. Gold.
A study of the relationships between the main currents of Indian religion. The course will focus on the Hindu tradition and its holistic worldview within the context of the caste system. It will then describe the rise of Jainism and Theravada and Mahayana Buddhism, as well as Hindu and Buddhist Tantrism, as religious phenomena reflecting the emergence of individualism.

ASIAN 354 Indian Buddhism (also Religious Studies 354) @
Fall. 4 credits. C. Minkowski.
A survey of Buddhist tradition in India from the life of the Buddha through the formation of the early schools, to the development of the Mahayana and the emergence of tantric Buddhism. Topics to be considered will include Buddhist concerns of human suffering and spiritual liberation, the nature of reality and human understanding, and the importance of compassion and emptiness. Attention will be paid to the institutional identity and social function of the Buddhist movements in classical India.

[ASIAN 355 Japanese Religions (also Religious Studies 355) @]
Fall. 4 credits. Not offered 1997-98.
J. M. Law.
This course is an exploration of major themes in Japanese religion through a focus on the category of religious practice. After an overview of the major sources of Japanese religion, we look at the dominant understandings of sacrality and the human soul. With the syncretic interaction between Shinto and Buddhism as our foundation, we will study four dynamic themes that express aspects of Japanese religious practice: 1) ritual purity and pollution, 2) the concept of matsuri (festival) and girei (rite), 3) the concept of shugyo (cultivation) as expressed in asceticism, pilgrimage, and aesthetic discipline, and 4) religious understandings of the human body, expressed in healing rituals.

[ASIAN 357 Chinese Religions (also Religious Studies 357) @]
Fall. 4 credits. Not offered 1997-98.

[ASIAN 359 Japanese Buddhism (also Religious Studies 359) @]
Spring. 4 credits. Not offered 1997-98.
J. M. Law.

ASIAN 360 Buddhist and Confucian Cultures of Asia
Spring. 4 credits. K. Taylor.
Combining two cultures that were contemporaries 2,500 years ago. Teachings attributed to them spread over large parts of Asia and were used to formulate expressions of cultural authority in many times and places. This course surveys historic themes in Buddhist and Confucian studies, such as Theravada and Mahayana, Pure Land, Zen, and other forms of Buddhist thought and practice, including interaction with and adaptation to local religions. Confucius and Mencius, Han eclecticism, Confucianism, Song Chu Hsi Confucianism, and dissenting or variant forms of Confucian thought. This course explores and compares specific examples of these themes in Japan, Korea, China, Vietnam, Thailand, and Burma.

This course is intended for Asian studies majors and other interested students. Premodern focus.

ASIAN 363 Contemporary Mass Culture in Japan and the U.S. (also Comparative Literature 343) @
Fall. 3-4 credits. B. de Bary.
A comparative study of Japanese and American mass cultures. Rather than seeking, through comparison, to delineate distinctive models of national cultures, the course will trace the complex relationships between cultural nationalist impulses and transnational economies, entertainers, processes of hybridity and fusion. The course will introduce students to a small number of important theoretical writings on mass culture. Areas of study will include the analysis of science fiction, comic books, film and video, popular music, and toy industries. Enrollment limited to 25 students.

ASIAN 371 Chinese Philosophical Literature @
Fall. 4 credits. T. L. Mei.
Readings in English translation of Confucian, Taoist, and Buddhist works.

ASIAN 373 Twentieth-Century Chinese Literature @
Fall. 4 credits. E. Gunn.
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 @]
Spring. 4 credits. Not offered 1997-98.
E. Gunn.
Selected works in classical Chinese fiction are read in translation. Major novels, such as The Dream of the Red Chamber and Water Margin, are emphasized.

[ASIAN 375 Japanese Poetry and Poetic Prose @]
K. Brazell.

[ASIAN 376 Modern Japanese Literature: From Meiji through the Pacific War (also Comparative Literature 369) @]
Fall. 4 credits. Not offered 1997-98.
B. de Bary.

[ASIAN 377 Japanese Narrative Literature @]
Spring. 4 credits. Alternates with AS 375.
K. Sakai.
A study in English translation of major narratives from the eighteenth to the twentieth century. Subject matter will include novelistic narratives like The Tale of Genji, biographical stories, poems, tales, war tales, and popular stories.

[ASIAN 378 The Postwar and the American Form in Japanese Literature @]
B. de Bary.

[ASIAN 380/680 Vietnamese Literature in Translation @]
Spring. 4 credits. Not offered 1997-98.
K. Taylor.
A study of Vietnamese poetry, short stories, and novels available in English translation. The course will focus primarily upon texts from the last three centuries, with particular attention to contemporary literature.

[ASIAN 382 The Tale of Genji in Art and Theater @]
Spring 4 credits. Not offered 1997-98.
K. Brazell and M. Watanabe.
After a careful reading of the Tale of Genji and the 12th-century Genji Picture Scroll, the class will explore representations of the Genji in the noh theater and in a wide variety of art forms. Extensive use will be made of materials in the Johnson Art Museum.

ASIAN 383 Introduction to the Arts of China
See ART H 380 for description.

ASIAN 385/685 Vietnamese Cultural Studies @
Spring. 4 credits. K. Taylor.
Issues related to constructions of Vietnamese histories and cultures, including languages and literatures, the visual and performing arts, families and societies, religions and ideologies, politics and governments, traditions and modernities, revolutions and wars, localization and regionalism, nationalism, and globalization. This course will fulfill a humanities distribution requirement.

[ASIAN 390 Comparative Sanskrit Myth and Epic in Translation (also Classics 390) @]
Fall. 4 credits. Not offered 1997-98.
C. Minkowski.
Readings in translation from the two Sanskrit epics, the Mahabharata and the Ramayana, and from the main cycles of the Puranas, the Sanskrit mythological literature. Special attention will be given to parallels and comparisons with Greek myth and epic, especially Homer and Hesiod. Classics 236 or 238 would be useful as background, but not presupposed.

[ASIAN 393 Images of Humanity in Medieval China (also History 393) @]
Not offered 1997-98. C. Peterson.
For description, see HIST 393.

[ASIAN 395 Classical Indian Philosophical Systems (also Classics 395 and Religious Studies 395) @]
Fall. 4 credits. Prerequisite: some background in philosophy or in classical culture. Not offered 1997-98.
C. Minkowski.

ASIAN 410 Chinese Performing Arts @
Spring. 4 credits. E. Gunn.
The course will survey drama, music theater, and film in twentieth-century China. Some material will require knowledge of Chinese.

[ASIAN 421 Religious Reflections on the Human Body (also Religious Studies 421) @]
Spring. 4 credits. Not offered 1997-98.
J. M. Law.
One undeniable and inescapable fact of human life is that it is experienced in a body. How this fact is understood to define the parameters of religious experience and expression will be the focus of this course. While the format will be comparative, the majority of cases will be drawn from East Asian, primarily Japanese, sources. We will explore how such aspects of the human body as ecstasy, gender, sexual passion, illness, the
dialectic of the physical and the spiritual, and corporeal ascetic discipline reveal models of religious reflection on this fact of human experience. Further, we will study how these models become represented in visual art, narrative, and ritual practice.

[ASIAN 440 Meditation Schools of East Asian Buddhism (also Religious Studies 440)]
Spring. 4 credits. Prerequisite: ASIAN 250 or equivalent. Not offered 1997-98.
[ASIAN 441 Mahayana Buddhism (also Religious Studies 441)]
Spring. 4 credits. Not offered 1997-98.
J. M. Law.
By reading successive examples of Mahayana Buddhist literature, we will study the formation and evolution of the ideal of the bodhisattva, the understanding of transcendental wisdom and the concept of emptiness; and the workings of both the conscious and subconscious mind in the course of spiritual practice. We will include discussion of major philosophical schools, as well as issues of social setting and popular religious practice, in both India and East Asia.

[ASIAN 449 History and Methods of the Academic Study of Religion (also Religious Studies 449)]
Spring. 4 credits. D. Gold.
For description, see RELST 449.

[ASIAN 451/625 Children, Literature, and Society (also Anthropology 441/625)]
Spring. 4 credits. Not offered 1997-98.
S. Shiraishi.

[ASIAN 460 Indian Meditation Texts (also Religious Studies 460)]
Spring. 4 credits. Not offered 1997-98.
D. Gold.
Because texts that record visionary experience, prescribe the practice of contemplation, and present enigmatic utterances are highly valued in Indian tradition, they need to be taken seriously by students of Indian and world civilizations. Yet the special problems of interpretation that they present have often caused meditation texts to be passed over in enthusiasm, sometimes reverent silence. In this course we will draw on approaches from literary criticism, anthropology, and religious studies to explore a number of the problems to which these texts give rise. In what ways are the apparent differences in experience presented in meditation texts shaped by different cosmologies and ritual practice? Do different literary genres have particular religious implications? What are the relations between cognition and experience in the creation of the texts? Readings will be drawn from the Upanishads and Tantra, devotional verse in the vernaculars, and the classical meditation manuals of Hinduism and Buddhism. Some attention may be given to Indian Sufi materials. No knowledge of Indian languages is required.

[ASIAN 463 Readings in Hindi and Urdu Literature]
Fall. 4 credits. Not offered 1997-98.
D. Gold.
Selected topics in Hindi and Urdu literature, with readings in the original, discussions in Hindi-Urdu and English. May be repeated for additional credit with consent of instructor.

[ASIAN 464 Readings in Urdu Literature]
Spring. 2-4 credits. Not offered 1997-98.
D. Gold.
Selected topics in Urdu literature, with readings in the original; discussions in Urdu and English.

[ASIAN 470 The Japanese Noh Theater and Modern Dramatists (also Comparative Literature 470 and Theatre Arts 470)]
Several weeks will be spent studying the literary, performance, and aesthetic aspects of the noh theater. Emphasis will be on noh as a performance system, a total theater in which music, dance, text, costume, and props all interact to create the total effect. Then attention will turn to modern theater people who have reacted to noh in some creative way. Choice of dramatists will depend partly on student interests but will probably include Yeats, Brecht, Britten, Claudel, Grotowski, and Mishima. All readings may be done in English translation.

[ASIAN 471 Japanese Theatre (also Theatre Arts 471)]
Fall. 4 credits. Alternates with ASIAN 470.
K. Brazell.
A study of traditional forms of Japanese theatre. Topics will include ritual and theatre, noh and kyogen, kabuki, and the puppet theatres, and contemporary theatrical use of the traditional forms. Special emphasis will be placed on dramaturgy, acting styles, performance aesthetics, and theories of performer training.

[ASIAN 475 Modernization and the Korean Family (also HSS 490 sec 30)]
Fall. 3 credits. Not offered 1997-98. J. Mueller.

[ASIAN 481 Translation and Identities]
Fall. 4 credits. Not offered 1997-98.
N. Sakai.

[ASIAN 483 Internationalism, Nationalism, and Modern Japanese Discursive Space]
Fall. 3 credits. Not offered 1997-98.
N. Sakai.
The late 19th century marks an important transitional period; nation-states formed in Britain, France, Japan, Germany, the United States, and elsewhere sought to become imperial powers; and “internationalism” virtually collapsed. Focusing on Japanese examples but not excluding other cases, we will study the discursive spaces of modern national subjectivity with a view to the problems of ethnicity, colonialism, imperial sexism, violence, historical memory, post-coloniality and academic knowledge. A major critical paper will be required.

[ASIAN 496 Tokugawa Literature and Thought]
Spring. 4 credits. 1997-98. N. Sakai.
An introduction (in English translation) to literary, theatrical, and intellectual works of the Tokugawa period (1600-1868). We will examine the characteristics of early Tokugawa literary and theatrical works and see how different they are from the literary works of the later Tokugawa period. We will also read the philosophical and philological works on the classics by writers such as Oguy Sorai and Motoori Norinaga to understand the ways contemporary Japanese intellectuals understood cultural activities and literature during the Tokugawa period.

Asia—Graduate Seminars
For complete descriptions of courses numbered 600 and above, consult the director of graduate studies.

ASIAN 601 Seminar: Upland Peoples of Southeast Asia
Fall. 3-4 credits. H. Jonsson.

ASIAN 602 Southeast Asia Seminar: Topic TBA
Spring. 4 credits. Not offered 1997-98.
Staff.
See ASIAN 607.

ASIAN 605-606 Master of Arts Seminar in Asian Studies
605, fall; 606, spring. 2-4 credits. Staff.

ASIAN 607-608 The Plural Society Revisited (also Government 653)
Spring. 4 credits. 607 may be taken independently for credit; 607 is a prerequisite for 608. B. Anderson.
For description, see GOVT 653.

ASIAN 609 Modern Japanese Studies: The Formation of the Field in History and Literature (also History 609)
N. Sakai, J. V. Koschmann.
For description, see HIST 609.

ASIAN 611 Chinese Bibliography and Methodology
Spring. 1 credit. Prerequisite: permission of instructor. Required of honors students and M.A. candidates. D. O’Rban.

ASIAN 612 Japanese Bibliography and Methodology
Fall. 1 credit. Prerequisite: permission of instructor. Required of honors students and M.A. candidates. F. Kotas.

ASIAN 613 Southeast Asian Bibliography and Methodology
Fall. 1 credit. Prerequisite: permission of instructor. A. Riedy.
This course is designed to instruct students in methods of identifying and locating sources for the study of Southeast Asia. Emphasis will be on the practical aspects of using various types of bibliographical tools to identify both primary and secondary sources in Southeast Asian and Western languages. The use of electronic databases and online services as well as traditional printed resources will be covered. Sources which are more general in nature, but have a significant Southeast Asia component will be discussed. Relevant arcana of library science will be explained as necessary. Required of honors students and Master of Arts candidates. No foreign language competence is required but a reading knowledge of at least one Southeast Asian language or one South Asian language (especially Chinese or Japanese) and a major European language (especially French, Spanish, or Dutch) is highly desirable.

ASIAN 621-622 South Asia Seminar: Topic to be announced
621, fall; 622, spring. 4 credits. Not offered 1997-98.

ASIAN 623-624 Topics In South Asia
623, fall; 624, spring. 1 credit. Staff.
A series designed to introduce as well as enhance and build on students’ knowledge of various topics of importance to South Asia (Bangladesh, India, Nepal, Pakistan, and Sri
Lanka). Weekly lectures will survey contemporary themes in South Asian scholarship where visiting scholars and members of the Cornell community will discuss a multidisciplinary range of issues. These may include science and nation building; ritual power and resistance; tribal communities and the environment; industrial and agrarian relations; gender and the media; and economic liberalization. A short essay will be required at the end of the course.

**ASIAN 630 Seminar in Translation Studies**
Spring. 4 credits. K. Taylor.
A graduate seminar designed to introduce students to theoretical writings about, and related to, translation, conceived both as a linguistic exercise and as a broader field of cultural activity; will include the practice of translation. Limited to graduate students by permission of instructor; must have skill in Classical Chinese, French, or Vietnamese sufficient to begin translating.

**ASIAN 650 Graduate Seminar in Asian Religions**
Spring. 2-4 credits. Prerequisite: permission of instructor. Not offered 1997-98. J. M. Law.

**ASIAN 676 Southeast Asia Research Training Seminar**
Fall or spring. 3-4 credits. Staff.

**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.

For additional courses on Asian religion, see “Related Courses” in the China and Japan area courses listing.

**Asia—Honors Courses**

**ASIAN 401 Asian Studies Honors Course**
Fall or spring. 4 credits. Intended for seniors who have been admitted to the honors program. Supervised reading and research on the problem selected for honors work.

**ASIAN 402 Asian Studies Honors: Senior Essay**
Fall or spring. 4 credits. Prerequisite: admission to the honors program. The student, under faculty direction, prepares an honors essay.

**ASIAN 403-404 Asian Studies Supervised Reading**
Fall, spring, or both. 1-4 credits. Prerequisite: permission of instructor. Open to majors and other qualified students. Intensive reading under the direction of a member of the staff.

**Literature in Chinese**

**CHLIT 213-214 Introduction to Classical Chinese**
213, fall; 214, spring. 3 credits each term. Prerequisite: qualification in Chinese or permission of instructor. May be taken concurrently with Chinese 101-102, 201-202, 301-302. T. L. Mei.

**CHLIT 420 T'ang and Sung Poetry**
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. T. L. Mei.
Readings in the original Chinese, together with secondary works by Chinese and Western critics.

**CHLIT 421-422 Directed Study**
Fall or spring. 2-4 credits each term. Prerequisite: permission of instructor. Staff.

**CHLIT 424 Readings in Literary Criticism**
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. T. L. Mei.

**CHLIT 435 Chinese Buddhist Texts**
Spring. 4 credits. Not offered 1997-98.

**CHLIT 603 Seminar in Chinese Fiction and Drama**
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. E. Gunn.

**CHLIT 605 Seminar in Chinese Fiction and Drama**
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. E. Gunn.

**CHLIT 610 Chinese Cultural Criticism**
Fall. 4 credits. E. Gunn.

**CHLIT 621-622 Advanced Directed Reading: Chinese Historical Syntax**
621, fall; 622, spring. 2-4 credits. Prerequisite: permission of instructor. Staff.

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**Japanese Language**

See Language Courses.

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**FALCON Program**


**Literature in Japanese**

**JPLIT 406 Introduction to Classical Japanese**
Spring. 4 credits. Prerequisite: permission of instructor. K. Brazell.

**JPLIT 407 Advanced Classical Japanese**
Spring. 4 credits. Prerequisite: JPLIT 406 or permission of instructor. Not offered 1997-98. K. Brazell.

**JPLIT 421-422 Directed Readings**
421, fall; 422, spring. 2-4 credits. Prerequisite: for JPLIT 421, Japanese 402 or equivalent; for JPLIT 422, Japanese 421 or equivalent. Staff. Note: For complete descriptions of courses numbered 600 or above, consult the appropriate instructor.

**JPLIT 611 Seminar in Classical Japanese Literature**
Spring. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1997-98. K. Brazell.

**JPLIT 612 Seminar in Medieval Genres**
Spring. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. K. Brazell.
This seminar will explore medieval literary genres in terms of the contemporary religious, social, political, and aesthetic discourses. Readings will be in classical and modern Japanese as well as in English.

**JPLIT 613 Seminar in Tokugawa Culture and Thought: Otherness, Text, and Body**
Spring. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1997-98. N. Sakai.

**JPLIT 614 Seminar in Modern Japanese Literature**
Spring. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1997-98. N. Sakai.

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**Graduate-Level Reading Courses**

**JPLIT 621 Advanced Readings in Pre-Modern Japanese Narrative Literature**
Fall or spring. 2-4 credits. Prerequisite: permission of instructor. Not offered 1997-98. K. Brazell.

**JPLIT 622 Advanced Readings in Pre-Modern Japanese Poetry**
Fall or spring. 2-4 credits. Prerequisite: permission of instructor. Not offered 1997-98. K. Brazell.

**JPLIT 623 Advanced Readings in Pre-Modern Drama**
Fall or spring. 2-4 credits. Prerequisite: permission of instructor. Not offered 1997-98. K. Brazell.

**JPLIT 624 Advanced Readings in Modern Japanese Literature**
Fall and spring. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1997-98. B. de Bary.
Note: See courses listed under Asia—Literature and Religion courses—for Japanese literature courses in translation.

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**Japanese Language**

See Language Courses.

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**FALCON Program**


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**Indonesian Language**

See Language Courses.

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**FALCON Program**

### Literature in Korean

**[KRLIT 405 Readings in Korean Literature](#)**  
Fall. 4 credits. Not offered 1997-98.

**[KRLIT 406 Korean Literature Translation Workshop](#)**  
Spring. 2-3 credits. Prerequisite: Korean 301-302 or equiv.; permission of instructor. Not offered 1997-98.

### Sanskrit

**SANSK 131–132 Elementary Sanskrit**  
(also Classics 131–132 and Linguistics 131–132)  
131, fall; 132, spring. 4 credits each term.  
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 Classics 251–252 and Linguistics 251–252)  
251, fall; 252, spring. 3 credits each term.  
Prerequisite: Sanskrit 132 or equivalent. A. Nussbaum, fall; C. Minkowski, spring.

Readings from the literature of classical Sanskrit. Fall: selections from the two Sanskrit epics, the Mahabharata and the Ramayana. Spring: more selections from the epics and selections from either Sanskrit story literature or from Sanskrit dramas.

### Literature in Sanskrit

**[SNLIT 467–468 Reading in Sanskrit Literature: The Vedas](#)**  
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1997-98. C. Minkowski.

### 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 offering status of the following courses. Check the primary department section for the and Colleges of Arts and Sciences credit only for Asian Courses in other colleges will count as College.

**Asia/General Courses**

- **ABEN 754** Sociotechnical Aspects of Watershed Development (also ARME 754 and GOVT 644)
- **ANTHR 313** Anthropology of the City
- **ANTHR 619** Anthropological Approaches to the Study of Buddhism in Asia
- **ARME 464** Economics of Agricultural Development (also ECON 464)
- **ARME 660** The World’s Food
- **ARME 685** Food and Nutrition Policy (also NS 685)
- **ARME 686** Economics of Development (also ECON 466)
- **ARME 763** Macro Policy in Developing Countries (also ABEN 754 and GOVT 644)
- **COMM 424/624** Communication in the Developing Nations
- **COMM 485** Training and Development: Theory and Practice (also INTAG 685 and

**EDUC 685**

- **CRP 777** Theories of Development and Underdevelopment
- **ECON 473** Economics of Export-Led Development
- **GOVT 348** Politics of Industrial Societies
- **GOVT 349** Political Role of the Military
- **GOVT 648** Graduate Seminar in Political Economy of Change: Rural Development in the Third World
- **ART H 280** Introduction to Art History: Approaches to Asian Art
- **ART H 580** Problems in Asian Art
- **ILRIC 367** Labor Relations in Asia
- **R SOC 205** Rural Sociology and International Development
- **R SOC 492** Development in the Pacific Rim
- **THETR 307** Asian Dance
- **THETR 317** Asian Dance II

### China—Area Courses

**ANTHR 211** Nature and Culture
**ANTHR 326** Economic Anthropology
**ANTHR 343** Religion, Family, and Community in China
**ANTHR 426** Ideology and Social Production
**ANTHR 443** Religion and Ritual in Chinese Society (also RELST 443)
**ANTHR 655** East Asia: Readings in Specific Problems
**ART H 380** Introduction to the Arts of China
**ECON 469** Economy of China
**ECON 772** Economics of Development
**GOVT 394** Political Economy of East Asia
**GOVT 347** Government and Politics of China
**GOVT 382** International Relations of East Asia
**GOVT 391** Chinese Foreign Policy
**GOVT 438** Contemporary China: Political Economy
**GOVT 482** International Relations of East and Southeast Asia
**GOVT 642** Comparative Political Economy: East Asia
**GOVT 645** Chinese Politics
**HIST 243** China and the West before Imperialism
**HIST 293** History of China up to Modern Times
**HIST 294** History of China in Modern Times
**HIST 360** Early Warfare, East and West
**HIST 492** Undergraduate Seminar in Medieval Chinese History
**HIST 493** Problems in Modern Chinese History
**HIST 494** The Japanese in Asia
**HIST 499** Problems in Modern Chinese History

**HIST 691** Chinese Historiography and Source Materials
**HIST 693-694** Problems in Modern Chinese History
**HIST 791-792** Seminar in Medieval Chinese History
**ART H 481** The Arts in Modern China
**ART H 482** Ceramic Art of China and Southeast Asia
**ILRIC 332–333** Labor in Developing Economies

### China—Language Courses

**CHIN 101–102** Elementary Standard Chinese
**CHIN 109–110** Beginning Reading and Writing (Standard Chinese)
**CHIN 111–112** Beginning Cantonese
**CHIN 113–114** Beginning Reading for Cantonese Speakers
**CHIN 161–162** FALCON
**CHIN 201–202** Intermediate Standard Chinese
**CHIN 215–216** Mandarin for Cantonese Speakers
**CHIN 301–302** Advanced Standard Chinese
**CHIN 303–304** Advanced Standard Chinese Conversation
**CHIN 411–412** Advanced Chinese: Focus on Fiction
**CHIN 413–414** Advanced Chinese: Focus on Current Events

### Japan—Area Courses

**ANTHR 345** Japanese Society
**ANTHR 645** Japanese Ethnology
**ANTHR 655** East Asia: Readings in Specific Problems
**GOVT 344** Government and Politics of Southeast Asia
**GOVT 346** Modern Japanese Politics
**GOVT 396** The Past as Prelude? Japan in Asia, Germany in Europe (also HIST 352)
**GOVT 482** International Relations of East Asia
**GOVT 642** Comparative Political Economy: East Asia
**HIST 298** State, Society, and Culture in Modern Japan
**HIST 420** Tale of Genji in Historical Perspective
**HIST 489** Undergraduate Seminar in Modern Japanese History
**HIST 494** The Japanese in Asia
**HIST 497** Premodern Japanese-Historical Perspectives
**HIST 797–798** Seminar in Japanese Thought
**ILRHR 656** International Human Resource Management
**ILRHR 690** Comparative Human Resource Management
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THAI 401–402 Directed Individual Study
VIET 101–102 Elementary Vietnamese
VIET 201–202 Intermediate Vietnamese Reading
VIET 301–302 Advanced Vietnamese
VIET 401–402 Directed Individual Study

ASTRONOMY


Cornell's astronomy faculty, research staff, and graduate students are active in diverse areas of modern astronomy ranging from theoretical astrophysics and general relativity to radio and radar astronomy, infrared and optical astronomy, and the exploration of the solar system. Cornell operates two local optical observatories, the world's largest radio telescope at Arecibo, Puerto Rico, and with two other institutions, the 200-inch optical telescope at Mt. Palomar in California.

The department offers a number of courses to satisfy a general interest in astronomy. These courses have few or no prerequisites and are not intended for the training of professional astronomers. Among the introductory courses, several choices are available, depending on background and on the requirements to be fulfilled. The 100-level courses are designed primarily for non-science majors. The alternative introductory sequence Astronomy 211–212 is geared toward sophomores planning to concentrate in astronomy.

Special topics courses are also urged to acquire computer literacy.

Acceptance to the major is normally required:

Mathematics 412 and 422 (or equivalent, e.g. A&EP 321–2)

Astronomy 410, 431, and 432

Students interested in planetary studies may substitute one or more appropriate advanced courses upon consent of the major advisor or may pursue an independent major under the program in the Science of Earth Systems. In addition, majors are also encouraged to supplement the above courses with any astronomy, physics, or other appropriate courses at or above the 300 level. Advanced seniors can enroll in astronomy graduate courses with the consent of the instructor. Students are also encouraged to work with faculty members on independent study projects under the course Astronomy 440 or to apply to a variety of programs at Cornell, Arecibo, and elsewhere that offer undergraduate research opportunities.

The major prepares the student for a variety of graduate programs.
Distribution Requirement

All courses in astronomy, except Astronomy 233, may be used to fulfill the science distribution requirement in the Colleges of Arts and Sciences.

Courses

ASTRO 101 The Nature of the Universe
Fall. 4 credits. No prerequisites. Labs and discussions limited to 30 students each. T. Herter, labs: G. Stacey.

The history of the universe and the physical nature of existence. An examination of the universe and our place in it and the possible existence of life and intelligence elsewhere in the cosmos. The nature of stars, galaxies, and quasi-stellar sources. The birth, evolution, and death of stars and the formation of the chemical elements, including discussions of supernovae, pulsars, neutron stars, and black holes. The physical state and composition of the interstellar material and its influence on the evolution of our galaxy. An introduction to the special and general theories of relativity. The nature of time. Modern theories of cosmology and the structure and evolution of the universe. The complete lecture notes are made available on the World Wide Web.

ASTRO 102 Our Solar System
Spring. 4 credits. No prerequisites. Labs and discussions limited to 30 students each. J. Veverka; labs: G. Stacey.

A survey of the current state and past evolution of our solar system, with emphasis on results from the direct exploration of planets by spacecraft. The course is divided into four parts: theories of formation, the inner planets, the outer solar system; and the search for life in the solar system and elsewhere. Stress is placed on the important processes that have shaped the evolution of planets and satellites.

ASTRO 103 The Nature of the Universe
Fall. 3 credits.

Identical to Astronomy 101 except for omission of the laboratory (see description above).

ASTRO 104 Our Solar System
Spring. 3 credits.

Identical to Astronomy 102 except for omission of the laboratory (see description above).

ASTRO 105 An Introduction to the Universe
Summer. 3 credits.

How do we measure the size of our galaxy and the size of the universe? Is the universe round or flat? How are the stars born, why do they shine, and how do they die? What are the chemical elements, and how were they formed in stars? What are quasars, pulsars, and black holes? How was the solar system formed? What are the environments of other planets like? What is the basic structure of Earth and the other planets? Will we catastrophically alter the earth? Does life exist elsewhere in the universe? How can we find it? Each student has an opportunity to make observations with small telescopes.

ASTRO 106 Essential Ideas in Relativity and Cosmology
Summer. 3 credits. Prerequisites: high school algebra and trigonometry. Einstein’s theory of special and general relativity, which brought about a fundamental change in our conceptual understanding of space and time, will be studied. Correspondence to, and conflicts with, common sense will be pointed out. Applications to various areas will be studied: in special relativity—space travel, equivalence of mass and energy, nuclear fission and fusion, and thermonuclear processes in the sun; in general relativity—motion of light and particles in curved space-time, cosmology in models, and the question of whether the universe is open or closed.

ASTRO 107 An Introduction to the Universe
Summer. 4 credits.

Identical to Astronomy 105 except for the addition of the afternoon laboratory.

ASTRO 195 Observational Astronomy
Fall. 3 credits. Limited to 20 students. G. Stacey.

This course provides a "hands-on" introduction to observational astronomy intended for students at the freshman and sophomore level in the liberal arts. The course has no prerequisites—its goal is to teach us what we know about the Universe. The course consists of 14 lectures, 10 to 12 formal laboratory exercises, plus one or two "take home" labs. Planned exercises include a few observational labs (star gazing with binoculars, telescopic investigations of star clusters, nebulae and the planets, and radio observations of the Milky Way Galaxy), computer simulations of planetary orbits, including the effects of orbits and obliquity on planetary weather, construction and use of simple instruments (optical spectroscopes, and sun dials), experiments in radioactive dating and planetary cratering, and cosmological explorations using data from the Hubble Space Telescope available on the World Wide Web.

ASTRO 201 Our Home in the Universe
Fall. 3 credits. Assumes no scientific background or preference given to freshmen and sophomores. D. Chervoff, Y. Terzian.

A general discussion of our relation to the physical universe and how our view of the universe has changed from ancient to modern times. Several main themes are covered over the course of semester: (1) our view of the night sky from the ancient Greeks to the Hubble Space Telescope, (2) the death of stars and the formation of black holes, (3) dark matter and the structure of galaxies, and (4) the origin, evolution, and fate of the universe. We present a nonmathematical introduction to these subjects and discuss uncertainties and unresolved issues in our understanding.

ASTRO 202 Our Home in the Solar System
Spring. 3 credits. Prerequisite: some background in science. Course intended for freshmen and sophomores. Staff.

A comparison of the Earth with the other worlds in our solar system, with an emphasis on the nature and fragility of planetary environments. Topics to be discussed include the climate and weather, species extinctions, the history of climate change, evolution of the atmosphere of the Earth and other planets, ecology and biological interdependence, and threats to the current global environment— including ozone layer depletion, greenhouse warming, and nuclear winter. Possible solutions to these problems, including their economic and social costs and their ethical implications, will be considered. The course will attempt to develop skills in writing and in elementary physics and chemistry.

ASTRO 211 Astronomy: Stars, Galaxies, and Cosmology
Fall. 4 credits. Intended for engineering and physical sciences freshmen and sophomores. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191. J. Houck.

The formation and evolution of normal stars, supernovae, pulsars, quasars, and black holes. The interstellar medium. Cosmology and the structure and evolution of galaxies.

ASTRO 212 The Solar System: Planets, Satellites, and Rings
Spring. 4 credits. Intended for first and second year engineering and physical sciences students. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191, some knowledge of classical physics (mechanics and thermodynamics). P. Gierasch.

Celestial mechanics; tidal evolution; the physics and chemistry of planetary surfaces, atmospheres, and satellites; planetary interiors; planetary rings; asteroids, comets, and meteorites; searches for other planetary systems.

ASTRO 223 Topics in Astronomy and Astrophysics
Fall. 2 credits. Prerequisites: Physics 112 and 213, Mathematics 112 and 221, or permission of instructor. Intended for sophomores planning to major in astronomy or related fields. S. Squyres.

A seminar course on selected topics in astronomy and astrophysics designed for prospective astronomy majors. Content will vary from year to year, but will include topics from the fields of planetary, galactic, and extragalactic research.

ASTRO 280 Space Exploration
Fall. 3 credits. S. Squyres.

This course provides an overview of space science, with particular emphasis on the solar system, and a detailed examination of a few selected objects, including the planet Mars, the satellites in the outer solar system, and comets. The focus is on methods of collecting information and especially on spacecraft and space missions. Topics will include the design and limitations of instruments. Ethical and political questions associated with space exploration will be 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
Spring. 4 credits. Prerequisites: freshman physics and calculus; knowledge of geometry. T. Wasserman.

This course provides a geometrically based introduction to special and general relativity, followed by consideration of astrophysical applications. Included will be discussion of tests of Einstein’s theory of space, time, and gravitation; physics of white dwarfs, neutron stars, and black holes; introduction to modern cosmology.
This course is divided into two broad topics; the level of transfer, and the interstellar medium. At the majors. Atomic and electromagnetic processes in space. Introduction to star formation, instrumentation and data analysis as applied to galaxies. The contents of the universe will be surveyed. Theories of cosmic and stellar evolution, and of the formation and evolution of planetary systems, planetary atmospheres and surfaces will be reviewed. Questions regarding the evolution of life and the development of technology will be discussed. Methods to detect extraterrestrial life with emphasis on radio telescopes and associated instrumentation will be presented. Hypothetical cosmic communication systems will be developed and discussed.

ASTRO 331 Climate Dynamics (also SCAS 331)

ASTRO 332 Elements of Astrophysics

ASTRO 400 Experimental Astronomy

ASTRO 431 Introduction to Astrophysics and Space Sciences I

ASTRO 432 Introduction to Astrophysics and Space Sciences II

ASTRO 434 The Evolution of Planets

ASTRO 440 Independent Study in Astronomy

ASTRO 485 Atmospheric and Interstellar Physics (also ELE E 485)

ASTRO 490 Senior Seminar Critical Thinking

ASTRO 509 General Relativity

ASTRO 510 Applications of General Relativity

ASTRO 511 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Physics 525)

ASTRO 516 Galactic Structure and Stellar Dynamics

ASTRO 520 Radio Astronomy

ASTRO 523 Signal Processing and Data Analysis in Astronomy

ASTRO 525 Techniques of Optical/Infrared and Submillimeter Astronomy
ASTRO 530: Astrophysical Processes
- Topics: Fundamentals of radiative transfer, bremsstrahlung, synchrotron radiation, and Compton scattering; spectral line transfer, gas heating and cooling, and topics in atomic and molecular spectroscopy.

ASTRO 555: Theory of the Interstellar Medium
- Topics: Observations techniques, current problems and results.

ASTRO 560: Theory of Stellar Structure and Evolution (also Physics 667)
- Fall: 4 credits. Not offered 1997-98.
- Observational overview; hydrostatic equilibrium; equations of state; radiative and convective energy transport, nuclear burning, solar neutrinos, rotation and magnetic fields; stellar seismology; brown dwarfs; pre-main sequence contraction.

ASTRO 570: Physics of the Planets
- Fall: 4 credits. P. Nicholson.
- Topics: 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.

ASTRO 571: Mechanics of the Solar System (also Theoretical and Applied Mechanics 673)
- Spring: 3 credits. J. Burns.

ASTRO 575: Theory of the Interstellar Medium
- Spring: 4 credits. T. Herter.
- Topics: Fundamental radiative transfer, bremsstrahlung, synchrotron radiation, and Compton scattering. These topics will be discussed in a framework of astrophysical situations, such as star formation, interstellar gas and dust clouds, jets, active galactic nuclei, clusters of galaxies, and cosmology.

ASTRO 590: Galaxies and the Universe

ASTRO 599: Cosmology (also Physics 599)
- Spring: 4 credits. Prerequisites: statistical physics, quantum mechanics and electromagnetic theory. I. Wasserman.
- This course is intended to provide a detailed theoretical development of current ideas in cosmology. Topics will 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, *Principle of Physical Cosmology*.

ASTRO 620 Seminar: Advanced Radio Astronomy
- Spring: 2 credits. Prerequisites: some background in extragalactic astronomy and/or radio astronomy suggested. Open to advanced undergraduates by permission of instructor. Not offered 1997-98.

ASTRO 621 Seminar: Planetary Radar Astronomy
- Spring: 2 credits. Prerequisites: permission of instructor. Not offered 1997-98.

ASTRO 621: Seminar: Planetary Radar Astronomy
- Spring: 3 credits. Prerequisites: acceptable completion of undergraduate mathematics and physics sequences for physical science/engineering majors, or permission of instructor. Not offered 1997-98.

ASTRO 640 Advanced Study and Research
- Fall or spring. Credit to be arranged.

ASTRO 660 Cosmic Electrodynamics (also Applied and Engineering Physics 608)
- Spring: 2 credits. Not offered 1997-98.

ASTRO 671 Seminar: Planetary Science
- Fall: 3 credits. J. Veverka.
- An informal series of lectures discussing the techniques used to obtain and interpret spacecraft and earth-based remote sensing data to the planets and smaller bodies in the solar system. Intended for graduate students and seniors. The emphasis this year will be on the exploration of asteroids, including recent results obtained by the Galileo spacecraft and data expected from the NEAR spacecraft currently on its way to asteroid 433 Eros.

ASTRO 673 Seminar: Planetary Atmospheres
- Spring: 2 credits. Not offered 1997-98.

ASTRO 680 Seminar: Cosmic Rays and High-Energy Electromagnetic Radiation
- Spring: 2 credits. Not offered 1997-98.

ASTRO 681 Seminar: Computational Astrophysics (also Physics 680)
- Spring: 3 credits. Prerequisites: working knowledge of FORTRAN. C. S. Teukolsky.

ASTRO 689 Seminar: Problems in Theoretical Astrophysics (also Physics 665)
- Fall: 3 credits. Not offered 1997-98.

ASTRO 690 Seminar: Theoretical Astrophysics (also Physics 680)
- Spring: 2 credits. Prerequisites: permission of instructor. Not offered 1997-98.

ASTRO 695 Seminar: Advanced and Practical Numerical Recipes
- Fall: 2 credits. J. Flannery.
- Topics will include solving ordinary and partial differential equations, linear algebra and eigenvalue problems, Monte Carlo techniques, fast Fourier transforms, etc. In contrast to traditional numerical analysis courses, the flavor of the course will be "how-to," rather than theoretical. No theorems will be proved. Students will be allotted computer time to solve, both individually and in small teams, assigned numerical exercises. Text: *Numerical Recipes* by Press, Teukolsky, Vetterling, and Flannery.

ASTRO 699 Seminar: Problems in Theoretical Astrophysics (also Physics 665)
- Spring: 2 credits. Not offered 1997-98.

ASTRO 699 Seminar: Theoretical Astrophysics (also Physics 680)
- Spring: 2 credits. Not offered 1997-98.
- An informal seminar for advanced graduate students in astronomy or physics. Topics will include the Hubble space telescope results.
CHEMISTRY

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, chemical physics, geochemistry, chemical engineering, materials science, solid state physics, and secondary education. The required courses for the major can be completed in three years, leaving the senior year open for advanced and independent work under the supervision of a professor.

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 Chemistry 215–216 although Chemistry 207–208 is acceptable), mathematics, a freshman writing seminar, a foreign language if necessary, or physics. Chemistry 215–216 is aimed at those students with good preparation and a strong interest in chemistry. Students who do not know if their preparation is adequate should consult the instructor. In the second year a student should complete calculus and take physics and organic chemistry. Chemistry 359–360 is preferred to Chemistry 357–360. The second-year laboratory courses include 300, Quantitative Chemistry, if needed, and 301, Experimental Chemistry I. Chemistry 389–390, Physical Chemistry I and II, and Chemistry 302–303, Experimental Chemistry II and III, should be completed in the third year. Chemistry 410 should be completed in the third or fourth year. Advanced work in chemistry and related subjects can be pursued in the fourth year and in the earlier years as well. The opportunity for independent research is also available. All students with questions about the major are encouraged to consult the chair of the Department of Chemistry or the chair's representative. Entering students who are exceptionally well prepared in chemistry may receive advanced placement credit for Chemistry 207.

Prerequisites for admission to a major in chemistry are (1) Chemistry 215–216; or 207–208; 300; or 211–208, 300; or 105, 208, 300; (2) Physics 207 or 112; and (3) Mathematics 111 or 191. Students are encouraged to undertake a major in chemistry unless they have passed those prerequisite courses at a good level of proficiency. The minimum additional courses that must be completed for the standard major in chemistry are listed below.

1) Chemistry 301–302–303, 359–360 (357–358 may be substituted), 389–390, and 410
2) Mathematics 112, 213, or 122, 221–222, or 192–293–294
3) Physics 208

Potential majors electing to take Mathematics 213 are strongly urged to do so in their sophomore year to avoid scheduling conflicts with Chemistry 389 in their junior year.

The sequence described above is a basic program in chemistry that students can extend substantially in whatever direction suits their own needs and interests. Those going on to do graduate work in chemistry should recognize that these requirements are minimal and should supplement their programs, where possible, with further courses such as Chemistry 405, 605, 606, 666, 668, and 681. Even students not planning graduate work in chemistry should consider advanced work in physics and mathematics, courses in the biological sciences, and advanced work in chemistry as possible extensions of the basic program.

Honors. The honors program in chemistry offers superior students in the standard major an opportunity to study independently in seminars and to gain additional experience by engaging in research during the senior year. It is particularly recommended to those who plan graduate work in chemistry. Prospective candidates should complete the introductory organic chemistry and physical chemistry sequences by the end of the junior year, although failure to have completed those courses in the junior year does not in itself disqualify a student from the honors program. Completion of the program at a high level of performance leads to the degree of Bachelor of Arts with honors in chemistry. 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 a prior research program.

Prospective candidates should discuss their plans with advisers by March 1 of 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 8 credits of undergraduate research such as is offered in Chemistry 421, 433, 461, or 477. In addition, the taking of a thesis for honors seminar (Chemistry 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...
Students are required to pay for glassware and any other items broken or missing from their laboratory desks at the close of each semester. Students who fail to inventory their desks at the appointed time in the presence of their instructor are charged a $1.00 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 103 Introduction to General Chemistry**

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 Chemistry 107. Lecs. M W F 11:15; lab, T R or F 8:00-11:00, or M W or F 1:25-4:25. Prelims: 7:30-9 p.m., Oct. 7, Nov. 13. D. Y. Sogah.

An introduction to general chemistry, with emphasis on important principles and facts. Chemistry 103 covers much of the same material as Chemistry 207 plus chemical equilibrium and introduction to chemical kinetics, but does so at a slower pace.

**CHEM 203 Strategies in Science: The World of Chemistry**

Spring. 3 credits. No prerequisite. This course plus Chemistry 103, 204, or 207 or 211 satisfies the College of Arts and Sciences physical science distribution requirement. Chemistry 203 also satisfies the C.A.L.S. physical science requirement of one course in chemistry. S-U or letter grades. Lecs. M W F 11:15. Prelims: 7:30-9 p.m., Feb. 24, March 31. F. J. DiSalvo.

A general appreciation of chemistry in the everyday world which will highlight for nonscientists the way the scientific method works. Using several case studies, the course will focus not only on what modern chemistry has accomplished, but more generally on the way scientists think, how they function, what they accomplish, and the way the scientific method works. Students who fail to inventory their desks at the appointed time in the presence of their instructor are charged a $1.00 fee in addition to charges for any breakage.

**CHEM 204 The Language of Chemistry**

Fall. 3 credits. This course contributes to meeting the College of Arts and Sciences "Physical and Biological Sciences" (Group D) distribution requirement, as well as the C.A.L.S. physical science requirement of one course in chemistry. S-U or letter grades. Lecs. M W F 12:20. Prelims: 12:20 p.m. Not offered 1997-98. J. Metzwald.

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 recent discoveries that illustrate the nature of chemistry, the students will be shown to the beauty, the elegance, and the underappreciated vastness of the physical world.
CHEM 215-216 General and Inorganic Chemistry

CHEM 222 Molecular Messengers in Nature
Spring. 3 credits. Prerequisite: one year of high school chemistry, Chemistry 103 or 207, or permission of instructor. Not offered 1997-98.

Organisms communicate with one another in nature chiefly by means of chemical signals. We will examine this intriguing mode of communication as it applies to a wide variety of species ranging from bacteria to insects and mammals, including humans. Essential concepts of organic chemistry and biology will be introduced and illustrated. Each student will be expected to prepare a term paper, and there will be an opportunity for oral presentation of some of these papers for class discussion.

CHEM 225 Introduction to Experimental Organic Chemistry
Fall, spring, or summer. 2 credits. Recommended for non-chemistry majors. Enrollment limited. Prerequisites: coregistration in Chemistry 257 or 357. Lect: fall, R 11:15 or F 8:00; spring, F 8; lab, M T W R or F 1:25-4:25, or T or R 8-11. Prelims: 7:30-9 p.m., Fall; Nov. 6. Spring: April 7. Fall: S. Russo; Spring: 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 or summer. 2 credits. Recommended for non-chemistry majors. Prerequisite: Chemistry 251. Lect, R 11:15; lab, M T W R or F 1:25-4:25, or T or R 8-11. Prelims: 7:30-9 p.m. April 7. S. Russo.

A continuation of Chemistry 251.

CHEM 257 Introduction to Organic and Biological Chemistry
Spring. 3 credits. Prerequisite: Chemistry 103 or 207. Because Chemistry 257 is only a three-credit course, it does not provide a practical route to satisfying medical school requirements. Lect: MWF 11:15. Prelims: 7:30-9:00 p.m., Feb. 26, April 9. D. A. Usher.

A continuation of Chemistry 251.

CHEM 258-259 Introductory Physical Chemistry Laboratory
258, fall; 259, spring. 3 credits each term. Prerequisites: Chemistry 208 or 216 and Mathematics 111-112, or permission of instructor. Prerequisite for Chemistry 259: Chemistry 258 or 258. Lects, MWF W 9:05; 258: rec, M or W 1:25, T 9:05; 258: rec, M or W 1:25. Prelims: 7:30-9 p.m., 287: Sept. 30, Nov. 6, Dec. 2. 287: March 5, April 16. Fall: H. D. Abrudia; spring: A. C. Albrecht.

A systematic treatment of the fundamental principles of physical chemistry, focusing in the fall on thermodynamics and the quantum mechanics of the periodic table and chemical bonding. In the spring the course will be oriented toward the physical chemistry of biological systems, including transport, kinetics, electrochemistry, spectroscopy. Chemistry 287 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

CHEM 289-290 Introductory Physical Chemistry Laboratory
289, fall; 290, spring. 2 credits each term. Lect: fall, R 8:00 a.m.; spring, R 9:05. Lab: fall, M T 1:25-4:25; spring, M T W R F 1:25-4:25. Fall: J. H. Freed; spring: T. McCarrick.

Qualitative and qualitative methods basic to the experimental study of physical chemistry.

CHEM 300 Quantitative Chemistry
Fall. 2 credits. Prerequisite: Chemistry 208 or advanced placement in chemistry. Lect, R 10:10; lab, M T W R F 1:25-4:25 or T 8-12. Prelim: 7:30-9 p.m., Oct. 23, Nov. 20. J. J. Rusco.

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
Spring. 4 credits. Prerequisites: Chemistry 216 or 250, and 253 or 357 or 359. Lect, MWF 8:00; 2 labs, M 1:25-4:25 or T R 8-11 or T R 1:25-4:25. T. P. Begley.

An introduction to the techniques of synthetic organic chemistry. A representative selection of the most important classes of organic compounds will be explored in the laboratory. The theoretical basis for these reactions and the separation techniques used will be discussed in the lectures.

CHEM 302 Experimental Chemistry II
Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisite: Chemistry 301. Lects, MWF W 9:05; 2 labs, M 1:25-4:25, T R 8-11 or T R 1:25-4:25. M. A. Hines.

Instrumental methods of analysis, including UV, IR and AA spectroscopies, gas chromatography, and electrochemical methods. The design of experiments is stressed.

CHEM 303 Experimental Chemistry III
Spring. 4 credits.Each lab limited to 11 students. Prerequisites: Chemistry 302, 389, 390; coregistration in the latter is permissible. Lects, M W F 9:05; 2 labs, M 1:25-4:25, or T R 9:00-12 or T R 1:25-4:25. M. Hines.

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
357, fall or summer; 358, spring or summer. 3 credits each term. Prerequisite for Chemistry 357: Chemistry 208 or 216 or advanced placement; recommended: concurrent registration in Chemistry 251 or 300. Prerequisite for Chemistry 358: Chemistry 357 or permission of the instructor. Lects, M W F 9:05 or 10:10, optional rec may be offered. Prelims: 7:30-9 p.m., Sept. 23, Oct. 21, Nov. 18, Feb. 12, March 10, April 14. Fall: B. K. Carpenter; spring: J. C. Claridy.

A study of the more important classes of carbon compounds—especially those encountered in the biological sciences. Emphasis will be 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 Chemistry 257 and 357 will receive graduation credit only for Chemistry 257.

CHEM 359-360 Organic Chemistry I and II
359, fall; 360, spring. 4 credits each term. Recommended for students who intend to specialize in chemistry or closely related fields. Enrollment limited. Prerequisites: Chemistry 216 with a grade of B or better, Chemistry 208 with a grade of A or better, or permission of instructor. Prerequisite for Chemistry 360: Chemistry 359. Recommended: coregistration in Chemistry 300-301–302. Lects, MWF 9:05; dis sec, W 7:30 p.m. Sept. 24, Oct. 22, Nov. 12, Spring: 7:30-9:00 p.m., Feb. 25, April 8. Fall: D. A. Usher; spring, D. B. Collum.

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 389-390 Physical Chemistry I and II
389, fall; 390, spring. 4 credits each term. Prerequisites: Mathematics 213 or, ideally, 212-212; Physics 208; Chemistry 208 or 216 or permission of instructor. Prerequisite for Chemistry 390: Chemistry 389. Lects, 389: M W F 10:10; rec M or W 1:25 or T 9:05. Lects, 390: M W F 10:10; prelims: 7:30-9 p.m. Sept. 23, Nov. 20, Feb. 12, March 10, April 14, April 21. Fall: G. S. Ezra; spring: 390: R. 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 E 391)
Spring. 4 credits. Enrollment limited to engineering students only. Prerequisites: Mathematics 293; Physics 112, 213; Chemistry 208 or 216 or permission of instructor. Co-requisite: Math 294. Prerequisites for Chemistry 391. Chemistry 389. Lec 2 M W F 9:05; rec. M 9:00 or T 9:05; prelims: 7:30-9 p.m. Mar. 3, Apr. 7.
B. Anton.
The principles of physical chemistry are studied from the standpoint of the laws of thermodynamics, kinetic theory, statistical mechanics, and quantum chemistry.

[CHEM 405 Techniques of Modern Synthetic Chemistry]
Spring. 3 or 6 credits. Enrollment limited. Prerequisites: Chemistry 302 and permission of instructor. To receive three credits, students must perform a minimum of three two-week experiments. Six credits will be given for three additional experiments. Completion of five exercises in elementary glass-blowing will count as one experiment. Lab time required: 16 hours each week, including at least two 4-hour sessions in one section (M W 1:25). First meeting will be at 1:30 on first class day of semester.LEC. first week only, at times to be arranged. Not offered 1997–98. J. M. Burlich.

The syntheses of complex organic, organometallic, and inorganic molecules are carried out with emphasis on the following techniques: vacuum line, high pressure, high-temperature solid, inert atmosphere, nonaqueous solvents, radioactive labeling, sol-gel, photochemical and electrochemical methods, solid phase peptide synthesis, and polymer synthesis. [Elementary glassblowing.]

CHEM 410 Inorganic Chemistry
Fall. 4 credits. Prerequisites: Chemistry 255, 358 or 390, or 287 or 390. Lec, M W F 2:20–3:10 p.m. or MWF 1:15–2:05 p.m. or MWF 9:05–10:00 a.m. or rec. F 11:15–12:05 or T 9:05 or T 11:15 (Fall, Spring). R. C. Fay.

A systematic study of the synthesis, structure, bonding, reactivity and uses of inorganic molecular and solid state compounds.

CHEM 421 Introduction to Inorganic Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 390, or Chemistry 287–288, and Chemistry 269–290 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 consultaion with a faculty member.

CHEM 433 Introduction to Analytical Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 302 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 461 Introduction to Organic Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 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 credits. Prerequisite: Chemistry 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 Chemistry 421, 433, 461, or 477; or (2) one 4-credit unit in a course such as Chemistry 421, 433, 461, or 477 and summer research equivalent to at least 4 credits in the same subject W 2:30–4. R. Hoffmann.

Informal presentations and discussions of selected topics in which all students participate. Chemistry as a profession, chemistry in culture. Individual research is on advanced problems in chemistry or a related subject under the direction of a faculty member, culminating in a written report.

CHEM 600–601 General Chemistry Colloquium
Fall, Spring. 2–4 credits. No credit. Required of all graduate students except those majoring in organic or bioorganic chemistry. Juniors and seniors are encouraged to attend. R 11:15. Fall: J. H. Freed; spring: R. Hoffmann.

A series of talks representative of all fields of current research interest in chemistry other than organic chemistry, given by distinguished visitors and faculty members.

CHEM 602 Information Literacy for the Physical Scientist
Spring. 1 credit. Primarily for undergraduate chemistry majors doing research and first-year graduate students. Lec, W 4:45–6:00. P. O’Neill.

An introduction to physical science information research methods, including use of paper and electronic resources. With the continued information explosion, much time can be wasted and important information missed unless an efficient information research strategy is developed. This course demonstrates the use of library and information resources as a method to start and critically evaluate the success of research projects. Text: Journal Literature of the Physical Sciences by Alice Leffer Primack and Chemical Information Sources by Gary Wiggins.

CHEM 605 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity
Fall 4 credits. Prerequisite: Chemistry 389–390 or equivalent or permission of instructor. Lec, M W F 11:15. J. M. Burlich.

Selected topics in structure, bonding, and reactivity of inorganic compounds with emphasis on main group elements; at the level of Chemistry of Inorganic Elements by Greiner and Earnshaw. Group theory applications: hybrid orbitals, molecular orbitals, molecular vibrations, and ligand field theory; at the level of Cotton’s Chemical Applications of Group Theory.

CHEM 606 Advanced Inorganic Chemistry II: Synthesis, Structure, and Reactivity of Inorganic and Organotransition Metal Compounds
Fall. 4 credits. Lecs, M W F 10:10. P. T. Wołczanski.

Synthesis, structure, and reactivity of coordination compounds and organometallic complexes. Emphasis on bonding models, structure, and reactivity, including the elucidation of mechanisms. Readings at the level of Purcell and Koza’s Inorganic Chemistry, and Collman, Hegedus, Finke, and Norton’s Principles and Applications of Organotransition Metal Chemistry.

CHEM 607 Advanced Inorganic Chemistry III: Solid-State Chemistry
Spring. 4 credits. Prerequisite: Chemistry 605 or permission of instructor. Lecs, M W F 11:15. Not offered 1997–98. F. J. DeSalvo.


CHEM 622 Chemical Communication
Fall. 3 credits. Not offered 1997–98. J. Meinwald.

For description, see BION 623.

CHEM 625 Advanced Analytical Chemistry I
Fall. 4 credits. Prerequisite: Chemistry 288 or 390 or equivalent. Lecs, M W F 9:05; occasional prelims W 7:30 p.m. C. F. Wilcox.

The application of molecular spectroscopy to chemical problems. Topics in infrared, NMR, and mass spectroscopy are discussed.

CHEM 627 Advanced Analytical Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 390 or equivalent; but Chemistry 793 or equivalent would be helpful. Lecs, M W F 12:20. D. B. Zax.

Modern techniques in nuclear magnetic resonance. Little overlap is expected with Chem 625, as this course will focus on more general questions of experimental design, understanding of multipulse experiments, and aspects of coherent averaging theory. Example to be taken from both liquid and solid-state NMR. May also be of interest to other coherent spectroscopies.

CHEM 628 Trace Element and Isotopic Analysis (also Nutritional Sciences 690)
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390, or Chemistry 208 and Mathematics 112, or permission of instructor. Offered alternate years. Lecs, T R 10:10. J. T. Brenna.

Modern trace, micro, and surface methods of analysis, including atomic spectrometry, solids mass spectrometry, high precision isotope ratio techniques, microscopic, microprobe, and electron spectroscopy. Applications to biological and solid state problems.
The first part of the course deals with general concepts and techniques for the elucidation of enzyme reactions will be examined from a mechanistic perspective. Topics discussed will include the important classes of enzyme-catalyzed reactions; statistical mechanics of helix-coil transition in biopolymers; conformation of biopolymers; protein folding. Modern concepts in synthetic polymer chemistry. The application of organic synthetic methods to the development of new polymers and copolymers and the control of their architecture. Topics include main and step growth polymerizations, reactions of polymers, block and graft copolymers, dendrimers and star polymers. A broad spectrum of applications from recent literature will also be discussed.

CHEM 672 Protein Kinetics
Fall. 4 credits. Primarily for graduate students in Chemistry and Biochemistry. Prerequisite: Chemistry 390, Biological Sciences 331, or equivalents or permission of instructor. Lecs, M W F 10:10.

Focus is on protein interactions with ligands and consequence 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; role of membrane receptors in regulating cellular activities.

[CHEM 677 Chemistry of Nucleic Acids
Spring. 4 credits. Primarily for graduate students. Prerequisites: Chemistry 358 or 360, and 390 or equivalents. S-U grades. Letter grades for undergraduates. Offered alternate years. Not offered 1997-98. Chemical constitution, molecular weight, and structural basis of proteins, thermodynamic, hydrodynamic, optical, spectroscopic, and electrical properties; protein and enzyme reactions; statistical mechanics of helix-coil transition in biopolymers; conformation of biopolymers; protein folding.]

CHEM 700 Baker Lectures
Fall, on dates to be announced. No credit. Distincted scientists who have made significant contributions to chemistry present lectures for periods varying from a few weeks to a full term. This year's lecturer: Prof. Michael E. Fisher, University Maryland.

[CHEM 701-702 Introductory Graduate Seminar in Analytical, Inorganic, and Physical Chemistry
Fall. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 equivalents. MWF 10:10. D. Y. Soga.

The purpose of this course is to build a qualitative picture of the bonding in all molecules, including organic, inorganic, organometallic systems and extended structures (polymers, surfaces and threedimensional materials). The approach uses molecular orbital theory to shape a language of orbital interactions. Most quantum mechanic ideas needed will be taught along the way; the course is specifically directed at organic, inorganic, and polymer chemists who are not theoreticians.]

[CHEM 745 Physical Polymer Science I (also Chemical Engineering 745)
[CHEM 762] Special Topics in Organic Chemistry: Fundamentals of Polymer Chemistry
Fall. 4 credits. Prerequisite: Physical Chem 389/390 and Organic Chem 359/360 or equivalent or permission of instructor. Primarily for graduate and advanced undergraduate students. Lects, T R 8:30-10:00. Not offered 1997-98. Introduction to polymer physical chemistry. Kinetics and mechanisms of Polymerization methods: ionic, radical, step-growth and group transfer polymerization. Polymer Stereoregular, Solution properties: Molecular weight characterization and polymer solubility. Mechanical and Thermal Properties. Structure-Property Relations. The discussions will focus on chemistry rather than engineering of polymers and examples will be taken from current literature.

[CHEM 765] Physical Organic Chemistry I
Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 665 or permission of instructor. Lects, M W F 10:10. C. F. Wilcox.

Application of computational and experimental techniques to studies of organic reaction mechanisms and the properties of reactive intermediates.

[CHEM 766] Physical Organic Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 765 or permission of instructor. Not offered 1997-98.

[CHEM 774] Chemistry of Natural Products

Particular attention is devoted to methods of structure determination and synthesis as applied to selected terpenes, steroids, alkaloids, and antibiotics.

[CHEM 780] Principles of Chemical Kinetics
Fall. 4 credits. Prerequisite: Chemistry 681 or permission of instructor. Lects, T R 10-11:35. H. F. Davis.

Principles and theories of chemical kinetics; special topics such as surface reactions, photochemistry, enzymatic reactions, energy transfer, and molecular beams.

[CHEM 782] Special Topics in Biophysical and Bioorganic Chemistry
Spring. 3 credits. Lects, T R 11:15. Not offered 1997-98. Topics vary from year to year.

[CHEM 788] Macromolecular Crystallography (also BIOBM 738)

Lectures briefly cover the fundamentals of crystallography and focus on methods for determining the 3-dimensional structures of macromolecules. These include crystallization, data collection, multiple isomorphous replacement, molecular replacement, model building, refinement, and structure interpretation.

[CHEM 789] X-ray Crystallography
Spring. 4 credits. Prerequisite: Chemistry 288 or 390 or permission of instructor. Offered alternate years. Lects, M W F 10:10. Not offered 1997-98. J. Clardy.

A beginning course in the applications of X-ray crystallography to chemistry. Topics include symmetry properties of crystals, diffraction of X-rays by crystals, interpretation of diffraction data, and refinement of structures. The chemical information available from a diffraction experiment is stressed, and practical aspects are incorporated.

[CHEM 791] Spectroscopy
Fall. 4 credits. Prerequisite: Chemistry 793 or Physics 443 or equivalent. Lects, T R 8:40-9:55. A. C. Albrecht.

This course will explore the interaction of light with matter. We will start with the quantum mechanical foundations of spectroscopy and develop its statistical basis in the density matrix language. Emphasis will be on the many electric-field-based linear and nonlinear spectroscopies from vibrational to electronic.

[CHEM 792] Molecular Collision Theory

The concepts and methods of scattering theory are described with particular emphasis on applications to problems of chemical interest. At the level of Child's Molecular Collision Theory and Taylor's Scattering Theory.

[CHEM 793] Quantum Mechanics I
Fall. 4 credits. Prerequisites: Chemistry 390, coregistration in ACC 321 or equivalents or permission of instructor. Lects, M W F 11:15. R. Loring.

Schrödinger's equation, wave packets, uncertainty principle, WKB theory, matrix mechanics, orbital and spin angular momentum, exclusion principle, perturbation theory, variational principle. At the level of Cohen-Tannoudji's Quantum Mechanics.

[CHEM 794] Quantum Mechanics II
Spring. 4 credits. Prerequisites: Chemistry 793 or equivalent and the equivalent of Mathematics 422 or Physics 443, or the equivalent of Mathematics 422, or permission of instructor. Lects, M T W F 9:05. G. S. Ezra.


[CHEM 796] Statistical Mechanics
Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 678 and 793 or equivalent. Lects, T R 8:30-9:55. B. Widom.

Statistical mechanics of systems of interacting molecules. Structure and thermodynamics of classical liquids. Phase transitions and critical phenomena. Inhomogeneous fluids. Introduction to non-equilibrium statistical mechanics. Students are presumed to have taken a course in statistical thermodynamics at the level of the first twelve chapters of Statistical Mechanics, by McQuarrie.

[CHEM 798] Special Topics in Physical Chemistry
Spring. 4 credits. Prerequisite: Chemistry 605, or 681, or 793, or Physics 443, or the equivalent. Lects, T R 10-11:25. Not offered 1997-98. R. Hoffmann.

CHINESE
See Language Courses under Languages and Linguistics.

FALCON Program (Chinese)
J. Wheatley, 416 Morrill Hall, 255-9301.

CLASSICS
J. Rusten (chair). L. S. Abel, F. M. Ahl, C. Brittain, K. Clinton, J. E. Coleman, J. R. Ginsburg, E. Hohenadl, G. Holst-Warhaft, G. M. Kirkwood (emeritus), H. Kolias, M. Landon, D. Mankin (director of graduate studies), G. M. Mesier (emeritus), C. Minkowski, A. Nussbaum, H. Pelliccia (director of graduate studies), P. Pucci, H. R. Rawlings III, J. Reed, D. M. Shanz (acting chair, 1997-98). Cornell University has long recognized the importance of studying the civilizations of ancient Greece and Rome. Particularly in an age of increasing specialization, study of the Classics is widely viewed as an excellent means of acquiring a liberal education; at Cornell, we are deeply interested in the continuing humanistic values contained in the literature of the ancient world and in gaining a fuller understanding of these important cultures and their imprint upon subsequent ages.

The Department of Classics at Cornell is one of the oldest and largest in the country. With nineteen faculty members, together with professors of related interests in the departments of History, Philosophy, Comparative Literature, History of Art, Modern Languages and Linguistics, and Near Eastern Studies and in the Archaeology, Medieval Studies, and Religious Studies programs, the range of instruction available is very large, including not only the traditional study of language, literature, and ancient history, but also newer developments in the field, such as comparative study of Mediterranean civilizations and modern literary theory.

Although Classics, like other areas of humanistic study, does not aim at providing specific preprofessional training, over the years Classics majors from Cornell have gone on to a wide variety of careers: in law, teaching, medicine, diplomacy, management, educational administration, government, and many others.

The department offers courses in Bronze Age and Classical archaeology and is active in field projects in Classical lands. It sponsors archaeological excavations at Halai in Greece, which serves as a field laboratory for Cornell undergraduate and graduate students. On campus there are also collections of ancient artifacts, reproductions of ancient sculpture, and one of the few laboratories in the world to concentrate on the tree-ring dating of ancient monuments from Greece, Cyprus, and Turkey. The archaeology courses may be used to satisfy some of the require-
ments for the Intercollegiate Program in Archaeology or for the major in Classical Civilization. They require no knowledge of either Greek or Latin. Similarly, the department offers a variety of courses and seminars in English on such subjects as Greek mythology, Greek and Roman mystery religions, early Christianity, and Greek and Roman society, as well as ancient epic, tragedy, history, and philosophy. For those whose interest in things Greek and Roman extends no further than a desire to understand the English language a little better, the department offers one course in the Greek and Latin elements that make up a huge proportion of the vocabulary of Modern English, and another that deals more specifically with the Greek and Latin ingredients of bioscientific vocabulary. Programs in Greek and Latin at the elementary level are also offered, of course; and for the more ambitious there are courses involving reading, in the original, of Greek and Latin authors from Homer to St. Augustine and Bede and, periodically, the Latin works of Dante, Petrarch, and Milton. Sanskrit, the classical language of ancient India, is also offered, along with courses in translation on Indic religion, myth, and literature. The department makes every attempt to adapt its program to the needs of each student. If there is a Classical writer you would like to study, the department will do its best to help you do so whether you are a major in the department or not.

Majors

The Department of Classics offers majors in Classics, Greek, Latin, and Classical Civilization.

Classics

Those who major in Classics must complete 24 credits in advanced Greek or Latin (numbered 201 or above) and 15 credits in related subjects selected in consultation with the adviser.

Classical Civilization

Those who major in Classical Civilization must complete (a) qualification in Latin and Greek or proficiency in either; (b) 24 credits selected from the courses listed under Classical civilization, Classical archaeology, Latin, and Greek; and (c) 15 credits in related subjects selected in consultation with the adviser.

Greek

Those who major in Greek must complete 24 credits of advanced courses in Greek and 15 credits in related subjects (including Latin).

Latin

Requirements for the major in Latin parallel those of the major in Greek.

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 study as given above and must also successfully complete the special honors courses 370, 471, and 472. Credit for honors courses may be included in the credits required for the major study. Students who wish to become candidates for honors, who have a cumulative average of B+ or better, and who have demonstrated superior performance in Classical courses (Greek, Latin, and Classical Civilization), submit an outline of their proposed honors work to the honors committee during the first month of their fifth semester. The chair will appoint a committee of three faculty members for each candidate, and the committee will be responsible for evaluating the candidate’s proposal and subsequently supervising his or her work. At the completion of the honors thesis, which must demonstrate knowledge of the main bibliographical sources, give promise of scholarly talent, and show creativity, the committee will determine the level of honors to be awarded.

Study Abroad

Cornell participates in the Intercollegiate Center for Classical Studies in Rome, which offers courses in Latin, Greek, ancient history, art, archaeology, and Italian. Another opportunity for a semester’s study abroad is available through Cornell Abroad in Greece at the Athens Centre. (Contact Cornell Abroad for details.) In addition, Cornell is a member institution of the American School of Classical Studies at Athens, whose Summer Program is open to graduate students and qualified undergraduates. The American Academy in Rome, of which Cornell is also a member institution, offers full-year and summer programs for qualified graduate students. For graduate students the Department of Classics offers a few travel grants each year from the Townsend Memorial Fund. Detailed information on these programs is available in the Department of Classics Office, 120 Goldwin Smith Hall.

Summer Support for Language Study

The Beatrice R. Kanders Memorial Scholarship (for the summer immediately following the freshman or sophomore year; preference given to dyslexic students) and a certain amount of tuition aid made possible by gifts from the Constantinos C. Polychronis Foundation are normally available to students who want 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. Applications are due to the chair of the Department of Classics by March 27.

Placement in Latin, Ancient Greek, and Modern Greek

Placement of first-year students in Latin, ancient Greek, and modern Greek courses is determined by an examination given by the Department of Classics during orientation week or by arrangement with the director of undergraduate studies.

Freshman Writing Seminars

The department offers freshman writing seminars on a variety of topics. Consult John S. Knight Writing Seminar Program brochures for times, instructors, and descriptions.

Classical Civilization

CLASS 100 Word Power: Greek and Latin Elements in the English Language

Spring. 3 credits. I. Hohendahl.

This course gives the student with no knowledge of the Classical languages an understanding of how the Greek and Latin elements that make up over half our English vocabulary operate in both literary and scientific English usage. Attention is paid to how words acquire their meaning and to enlarging each student’s working knowledge of vocabulary and grammar.

CLASS 102 Bioscientific Terminology

Summer. 3 credits. H. Roisman.

A study of the Greek and Latin word elements that combine to form most of the specialized terms in the biological sciences. The student who learns the meanings of those elements and the rules of word formation usually can recognize the basic meaning of any unfamiliar word in that field. The class also gives attention to misformations and words still in use that reflect outdated scientific theories.

CLASS 211 The Greek Experience #

Fall. 3 credits. Limited to 50 students. F. Ahl.

An introduction to the literature and thought of ancient Greece. Topics will include epic and lyric poetry, tragedy and comedy, and historical, political, philosophical, and scientific writings. Some attention will also be given to the daily life of ordinary citizens, supplemented by slides of ancient art and architecture.

CLASS 212 The Roman Experience #

Fall. 4 credits. Limited to 18 students. 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 #

Fall. 4 credits. Limited to 18 students. D. Mankin.

This course is intended especially for freshmen (a few exceptionally motivated sophomores or upperclassmen may be accepted). Apply in writing to the chair, Department of Classics, 120 Goldwin Smith Hall. P. Pucci and J. Reed.

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-hour (occasionally two-hour) session, during which the class will participate in workshops with specially invited guests.

This course will examine the development in Greek thought from mythological to philosophical explanations of the world and man’s place in it. Readings will include Homer, Aeschylus, Sophocles, Euripides, the pre-Socratics, Plato, and Aristotle, as well as works by such seminal modern thinkers as Hegel, Nietzsche, Heidegger, and Derrida.

CLASS 223 The Comic Theater (also Comparative Literature 223 and Theatre Arts 223)

Next offered summer of 1998 and spring 1999. 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 will include: the growth of the comic theatrical tradition and conventions; techniques and theories of mimicry (farce, caricature); and the role of comedy in society. All readings in English.

CLASS 231 Ancient Philosophy (also Philosophy 211)
Fall. 4 credits. C. Britain.
For description, see PHIL 211.

CLASS 236 Greek Mythology (also Comparative Literature 236)
Fall 1997 and summer 1998. 3 credits.
Limited to 200 students. D. Martin.
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 for our understanding of Greek literature, religion, and moral and political concepts.

CLASS 237 Greek Religion and Mystery Cults (also Religious Studies 237)
Greek religion constituted one of the essential features of ancient Greek civilization and distinguished 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 will investigate 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 will be studied with special emphasis on mystery cults, such as the Eleusinian mysteries of Demeter and Persophone, the Kabirai, the Great Gods of Samothrace, and Bacchic rites.

CLASS 238 The Ancient Epic and Woman
We will move, Odysseus-like, to the West: beginning with Homer’s Iliad (and including the British poet Christopher Logue’s “account” of the opening books) and Odyssey, we will continue in the Hellenistic and Augustan eras with Apollonius of Rhodes’ Argonautica and Virgil’s Aeneid. A violent shift in space and time will have us conclude with two New World maritime epics: Herman Melville’s Moby Dick and Derek Walcott’s Omeros.

CLASS 291 Classical Indian Narrative (also Asian Studies 291)
For description, see ASIAN 291.

CLASS 323 Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 323)
A study of the controversial question of religious continuity between paganism and early Christianity. After a brief survey of Classical mystery cults and Hellenistic religion, the course will focus on such Hellenistic cults as the mystery cults of Isis, Bacchus, and Attis and the Great Mother and on the distinctive features that contributed to their success. Discussion of Christian liturgy and beliefs both in the East and the West to determine what Christianity contributed to its pagan predecessors and to isolate the factors that contributed to its triumph over the “rival” pagan cults of late antiquity.

CLASS 345 The Tragic Theater (also Comparative Literature 344 and Theatre Arts 345)
Spring. 4 credits. Limited to 40 students. F. Ahl.
Tragedy and its audiences from ancient Greece to modern theater and film. Topics: origins of theatrical conventions; Shakespeare and Seneca; tragedy in modern theater and film. Works studied 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, Dürrenmatt’s The Visit, Bergman’s Seventh Seal, Cacoyannis’ Iphigenia.

CLASS 363 Representations of Women in Ancient Greece and Rome (also History 367 and Women’s Studies 363)
Spring. 4 credits. L. S. Abel and J. Ginsburg.
The task of this course is to analyze ancient Greek and Roman representations of women—some famous, some infamous, some nameless—within their historical and cultural contexts and to understand those underlying these representations. Using literary, historical, legal, and artistic sources (in translation) and examining the historiographical and methodological problems of the support of such evidence, the class will assess the changing social conditions that relate to the roles, status, and images of women in antiquity. Among the topics considered are: myth and ideology, women’s role in the family and society, views of the female body and female sexuality, the place of women in creative art.

CLASS 382 Greeks, Romans, and Victorians (also Comparative Literature 382)
Modern popular and scholarly views of Greek and Latin literature were shaped in the Victorian years of the nineteenth century, between the years of Republican and Marxist revolution. This course explores some of the ways in which nineteenth-century social and intellectual upheavals, and changes in scholarly techniques and approaches, may have affected how English and Irish writers presented Greco-Roman antiquity and, especially, how they began to discard an idealized past based on a Roman model for one based on a Greek model. The focus will be on poets and dramatists (and a few novelists and novelists rather than on philosophers and scientists). The varied influences of Vergil and Homer, Seneca and Sophocles, Plautus and Aristophanes, Horace, and Greek lyric poetry will be discussed in selected works of writers such as Tennyson, Shelley, Byron, Swinburne, Arnold, Tennyson, W. S. Gilbert, Oscar Wilde, Samuel Butler, and others, including important artists such as Aubrey Beardsley.

CLASS 390 Comparative Sanskrit Myth and Epic (also Asian Studies 390)
Fall. 4 credits. Not offered 1997–98. C. Minkowski.
For description, see ASIAN 390.

CLASS 395 Classical Indian Philosophical Systems (also Asian Studies 395 and Religious Studies 395)
4 credits. Prerequisite: some background in philosophy or classical Indian culture. Not offered 1997–98. C. Minkowski.
For description, see ASIAN 395.

CLASS 463 Gender and Politics in the Roman World (also History 463 and Women’s Studies 464)
An undergraduate seminar examining the relationship between gender and politics in the late Roman Republic and early Empire. Among the questions this course will address are: what 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 political activity in ancient Rome might take allow a place for women in Roman political life? What role does gender have in Roman political discourse and ideology? Why do issues such as family, marriage, and sexuality become subjects of political debate and legislation?

CLASS 465-466 Independent Study in Classical Civilization, Undergraduate Level
465, fall, 466, spring. Up to 4 credits.

CLASS 480 Roman Society and Politics under the Julio-Claudians (also History 473)
Spring. 4 credits. Prerequisite: Classics 212, History 268, or permission of instructor. J. Ginsburg.
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 rise 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 711-712 Independent Study for Graduate Students in Classical Civilization
711, fall; 712, spring. Up to 4 credits.

Greek

CLASS 101 Greek for Beginners
Fall. 4 credits. H. Pelliccia.
Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible.

CLASS 103 Attic Greek
Spring. 4 credits. Prerequisite: 101 or equivalent. M. Landon.
A continuation of Classics 101.
CLASS 104 Intensive Greek
Summer. 6 credits. Staff.
An intensive introduction to the fundamentals of ancient Greek grammar. Prepares students in one term for 200-level Greek.

CLASS 111-112 Modern Greek
111, fall; 112, spring. 3 credits each term. Not offered 1997-98. H. Kotas.

CLASS 201 Attic Authors #
Fall. 3 credits. Prerequisite: Classics 103 or 104 or equivalent. H. Pelliccia.
Selected readings from Greek prose.

CLASS 202 The Greek New Testament (also Near Eastern Studies 220 and Religious Studies 202) #
3 credits. Prerequisite: at least one year of ancient Greek (Classics 101-103) or permission of instructor. Not offered 1997-98. Staff.
Selections from Greek new testament.

CLASS 203 Homer #
Spring. 3 credits. Prerequisite: Classics 103 or equivalent. P. Pucci.
Readings in the Homeric epic with emphasis on formulative style.

CLASS 206 Herodotus #
Spring. 3 credits. Prerequisite: Classics 103 or equivalent. Not offered 1997-98.
Selected readings from Herodotus’ Histories.

CLASS 209 Greek Composition
Fall. 3 credits. Prerequisite: one term of 200-level Greek or equivalent. Not offered 1997-98; next offered 1998-99.

CLASS 213 Intermediate Modern Greek
Fall. 3 credits. Prerequisite: Classics 112 or placement by departmental examination. G. Holst-Warhaft.
This course, designed for students who have completed introductory modern Greek or have a reading knowledge of the language, will give attention to developing facility in conversational and written expression, usually in connection with assigned readings reflecting Greek history and culture.

CLASS 310 Greek Undergraduate Seminar #
Fall and spring. 4 credits. Prerequisite: two 200-level courses in Greek or permission of instructor. Fall topic: Aristophanes. P. Pucci. Spring topic: Aeschylus. F. Ahl.

CLASS 311 Greek Philosophical Texts: (also Philosophy 411) #
Fall and spring—up to 4 credits. Prerequisites: Knowledge of Greek and permission of instructor. Fall, C. Shields; spring, C. Brittain.
Readings of Greek philosophical texts in the original.

CLASS 313 Greek Epic #
Fall. 4 credits. Prerequisite: Classics 206 or equivalent. Not offered 1997-98.

CLASS 401-402 Independent Study in Greek, Undergraduate Level
401, fall; 402, spring. Up to 4 credits.

CLASS 417 Advanced Readings in Greek: Hellenistic Poetry #
Spring. 4 credits. J. Reed.

CLASS 419 Advanced Greek Composition
Spring. 3 credits. Prerequisite: Classics 209 or equivalent. K. Clinton.

CLASS 433 Greek Mystery Cults (also Classics 633 and Religious Studies 433) #
4 credits. Prerequisite: one term of 300-level Greek or permission of instructor. Not offered 1997-98. K. Clinton.
Discussion of the major Greek mystery cults—the Mysteria at Eleusis, the cult of the Great Gods at Samothrace, and Dionysiac mysteries—with the aim of elucidating the structure and religious purpose of these cults and the nature of the initiates’ experience. The evidence includes: the Hymn to Demeter; Plato’s Symposium; works of Christian Fathers, inscriptions, artistic representations, and archaeological data.

CLASS 501 Introduction to Greek Epigraphy

CLASS 555 Graduate Proseminar
Graduate students will be introduced to the tools, techniques, and methods of Classical scholarship.

CLASS 633 Greek Mystery Cults (also Classics 433) #
For description, see Classics 433.

CLASS 671 Graduate Seminar in Greek: Religion
Fall. 4 credits. K. Clinton.

CLASS 672 Graduate Seminar in Greek: Hesiod
Spring. 4 credits. P. Pucci.

CLASS 701-702 Independent Study for Graduate Students in Greek
701, fall; 702, spring. Up to 4 credits.

CLASSICS 383
CLASS 220 Introduction to Art History: The Classical World (also History of Art 220) #
Fall. 4 credits. A. Ramage.
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 late empire.

CLASS 221 Minoan-Mycenaean Art and Archaeology (also Archaeology 221 and History of Art 221) #
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 232 Archaeology in Action I (also Archaeology 232 and History of Art 224) #
Fall. 3 credits. Prerequisite: permission of instructor. Not offered fall 1997. P. I. Kuniholm.

CLASS 233 Archaeology in Action II (also Archaeology 233 and History of Art 225) #
Spring. 3 credits. Prerequisite: permission of instructor. Not offered spring 1998. P. I. Kuniholm.

CLASS 309 Dendrochronology of the Aegean (also Archaeology 309 and History of Art 309)
Fall and spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students. P. I. Kuniholm.
For description, see ART H 309.

CLASS 320 The Archaeology of Classical Greece (also History of Art 320) #

CLASS 322 Greeks and Their Neighbors (also History of Art 328) #
4 credits. Prerequisite: Classics 220 or 221, or permission of instructor. Not offered 1997-98; next offered 1999-2000. 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 will focus on Greek relationships with Egypt, Phoenicia, Cyprus, Anatolia, and Italy in the post-Greek and Roman period.

CLASS 323 Painting in the Greek and Roman World (also History of Art 323) #

CLASS 325 Greek Vase Painting (also History of Art 325) #
Spring. 4 credits. A. Ramage.
For description, see ART H 325.

CLASS 326 Greek Cities and Towns (also History of Art 326) #
Ancient Greek cities and towns from an archaeological perspective. Topics include the city in its geographical setting, the development of the fortified city, town planning, the Classical house and household, official and religious life versus private life, the territorial and boundaries of cities and towns, regional states and leagues, warfare between cities and regions, and roads and sea routes. Examples will mostly be drawn from Athens/Attica and central Greece. Two short oral presentations, presented after consultation in written form, and a final examination.

CLASS 327 Greek and Roman Coins (also History of Art 327) #
Fall. 4 credits. A. Ramage.
For description, see ART H 327.

CLASS 328 Greek Sculpture (also History of Art 328) #
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 The Art of the Roman Empire (also History of Art 330) #
For description, see ART H 330.

CLASS 350 The City of Rome (also Archaeology 351 and History of Art 321) #
Fall. 3 credits. M. Landon.
A detailed survey of the architectural development of the Roman capital from the early Iron Age to the fourth century A.D. Students will be introduced to the principal ancient monuments through slide lectures and selected readings from ancient and modern written sources. Special attention will be given to recent archaeological discoveries and to the social and historical currents that helped to shape the appearance of the largest city in the ancient world.

CLASS 360 Field Archaeology in Greece (also Archaeology 360) #
Summer 1998. 6 credits.
A six-week archaeological field training program in conjunction with the Cornell Halai and Earth Lokis Project. For information and application forms, contact Professor John E. Coleman, Department of Classics, 120 Goldwin Smith Hall.

CLASS 423 Ceramics (also Archaeology 423 and History of Art 423) #
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. Staff.

CLASS 430 Seminar on the Bronze Age Architecture of Asia Minor (also Archaeology 425 and History of Art 425) #
For description, see ART H 425.

CLASS 432 Sardis and the Cities of Asia Minor (also Archaeology 432 and History of Art 424) #
4 credits. Prerequisite: permission of instructor. Not offered 1997-98. A. Ramage.

CLASS 434 The Rise of Classical Greece (also Archaeology 434 and History of Art 434) #
Spring. 4 credits. Recommended: Classics 220 or 221, History of Art 220 or 221, or permission of instructor. P. I. Kuniholm.
For description, see ART H 434.

CLASS 435 Seminar on Roman Art and Archaeology (also Archaeology 435 and History of Art 427) #
Spring. 4 credits. Prerequisite: permission of instructor. A. Ramage.
For description, see ART H 427.

CLASS 475-476 Independent Study in Classical Archaeology, Undergraduate Level #
475, fall; 476, spring. Up to 4 credits.

CLASS 529 The Prehistoric Aegean (also Archaeology 529) #
Seminar with focus on the Aegean and neighboring regions in the Neolithic and Early Bronze Ages.

CLASS 630 Seminar in Classical Archaeology (also Archaeology 520 and History of Art 520)
Fall. 4 credits. P. I. Kuniholm.
For description, see ART H 520.

CLASS 721-722 Independent Study for Graduate Students in Classical Archaeology,
721, fall; 722, spring. Up to 4 credits.

Greek and Latin Linguistics

CLASS 421 Greek Comparative Grammar (also Linguistics 609) #
4 credits. Prerequisite: thorough familiarity with the morphology of classical Greek. 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 Linguistics 610) #
The prehistory and evolution of the sounds and forms of Classical Latin as reconstructed by comparison with the other Indo-European languages.

CLASS 424 Italic Dialects (also Linguistics 612) #

CLASS 425 Greek Dialects (also Linguistics 611) #
The language of the Homeric epics: dialect and morphological aspects of epic compositional technique.

An introduction to the essentials of Sanskrit grammar. Designed to enable the student to read classical and epic Sanskrit as quickly as possible.

A program of reading and conferences centered on an author or topic chosen in accordance with the special interests of the student and instructor.

A continuation of Classics 370, with change of author or topic.

Spring. 4 credits. For students who have successfully completed Classics 471. Topics must be approved by the student's honors committee at the end of the first term of the senior year.

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

COMPARATIVE LITERATURE

E.S. Apter, chair (141 Goldwin Smith, 255–759A); directors of undergraduate studies: fall: Calum Carmichael (139 Goldwin Smith, 255–8265); spring: W. J. Kennedy, director of graduate studies (163 Goldwin Smith, 255–339B); C. M. Arroyo, A. Caput (Emeritus), D. Castillo, W. Cohen, J. Culler, B. deBary, D. Grossvogel, P. Holum, W. Holdheim (Emeritus), N. Melas, J. Monroe, J. Porter, I. W. Wetherbee Also cooperating: A. Adams, D. Bathrick, J. Bishop, R. Brann, S. Buck-Morss, P. Carden, E. Hanson, C. Kaske, D. Mankin, B. Maxwell, M. Migiel, A. R. Parker, R. Schneider, R. Sellars, M. Steinberg, A. Vidler, G. Wate The Department of Comparative Literature provides a broad range of courses in European as well as non-European literatures. Courses variously 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, 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 1997–98 Comparative Literature 411 [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 or higher level, to be taken in one or more foreign literature departments. Texts must be read in the original language. A student may offer one language course (conversation, composition, etc.) towards fulfilling the language requirement.

4) An honor's essay (Comparative Literature 495) of roughly fifty pages, 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.

The department also encourages:

1) a program that includes broad historical coverage (e.g., Comparative Literature 201–202: Great Books); intensive study of a single genre (e.g., Comparative Literature 363–364: The European Novel, Comparative Literature 365: Contemporary Fiction); analysis of problems in literary theory (e.g., Comparative Literature 302: Literature and Theory, Comparative Literature 448: Subject to Translation). Beginning in 1998–99, the department will offer a number of strongly recommended 200-level courses designed to acquaint undergraduates with the discipline: Comparative Literature 203: "Introduction to Comparative Literature," as well as broadening introductory courses in World Fiction (Comparative Literature 204) and World Poetry (Comparative Literature 205), with emphasis on the nineteenth and twentieth centuries.

2) a second foreign language, especially for students interested in graduate work in literature.

Honors

A student who completes the requirements for the major is eligible for the degree of Bachelor of Arts with honors in comparative literature. The department bases its decision on the student's achievements of at least B+ in the senior essay and in course work for the major, and on overall academic performance at Cornell.

Freshman Writing Seminars

Most 100-level courses may be used toward satisfying the freshman writing seminar requirements. See "John S. Knight Writing Program" for a full description of the freshman seminar program.

Courses

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

COM L 201#-202 Great Books

201, fall; 202, spring. 4 credits. Comparative Literature 201 and 202 may be taken independently of each other.

A reading each semester of seminal texts that represent and have shaped Western culture and hence form an essential part of the student's intellectual development. By analyzing, interpreting, and evaluating, students will develop critical reading abilities.

201: Selections from the Bible, Homer, Dante, Rabelais, Shakespeare, and others.

202: World literature of the last 300 years, emphasizing the response to European worldwide expansion first in the colonizing countries, then in the colonized. The persistence of certain themes (such as slavery, monstrosity, overreaching, coercion, and vengeance) will be a central concern in many of the texts studied. A certain amount of attention will be given to an examination of differing ideological perspectives on the notion of "Great Books." Readings chosen from texts by Shakespeare, Defoe, Swift, Voltaire, Goethe, Mary Shelley, Balzac, Poe, Melville, Marx, Flaubert, Conrad, Kipling, Brecht, Woolf, Céline, Toculla, Brathwaite, Naipaul, and Armah.

COM L 203 Introduction to Comparative Literature
4 credits. To be offered in 1998-99. Staff. 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 prospective majors, or interested undergraduates generally, with the range and variety of the field by having the members of the department take turns in presenting those aspects with respect to which differences of their expertise and methods of teaching. Each faculty member will give a manageable reading assignment; of the two meetings each week, the first will generally take the form of a lecture, the second will be a discussion of the assigned text.

COM L 204 Global Fictions
4 credits. To be offered in 1998-99. Staff. An introduction to the enormously rich field of the novel, from the astonishingly modern fiction to emerge from the medieval and post-medieval Far East to both Eurocentric and Third World literary movements of the twentieth century. Translated into names, our roster would implicate people from Lady Murasaki to Vladimir Nabokov—and beyond. We shall be reading some shorter and longer fictions which have been generally considered milestones in the history of the novel and the novella, including works by Cervantes, Defoe, Austen, Flaubert, Henry James, Joyce, Kafka, and Borges and/or "essential" writers not covered in the more advanced novel courses.

COM L 205 Introduction to Poetry, Chiefly Modern
4 credits. To be offered in 1998-99. Staff. Unlike Comparative Literature 207, 205 is intended to be a survey that concentrates largely (but of course not exclusively) on foreign poetry. The course will cut across historical periods and poetic genres, from conventional "strict" genres of the sonnet-variety to forms more nearly associated with our own times: free verse, "the prose poem," etc. Difficult as it may be to avoid poets on the order of Milton, Goethe, and Keats, we propose to focus on the practitioners of the craft from Baudelaire, Whitman, Hopkins, Mallarmé, and Rilke on down.

COM L 206 Introduction to Literary Criticism
Spring. 4 credits. T R 2:55-4:10. R. Sellers. More advanced undergraduate seminars normally tend to focus on contemporary literary theory; after all, it is essential for students of literature to be well-informed about contemporary theoretical debates, methodologies, and problems. But literary theory and criticism did not begin with the structuralist revolution of the 1960s, and it is also essential for students to understand earlier developments—many of which still have the power to provoke and inspire. Critical historicization should begin at home, with an awareness of how different the forms, practices, institutions and politics of literary criticism have been, and this course will thus introduce students to the vast field of pre-1960 debates. We will examine the historical evolution of key terms now more or less taken for granted as part of critical vocabulary, and we will pay particular attention to the (relatively recent) emergence of literature itself as a category of study. Critics and theorists will be chosen from among Plato, Aristotle, Cicero, Horace, and Augustine; Renaissance and neo-classical critics such as Spenser, Dryden, and Dr. Johnson; Enlightenment, Romantic and post-Romantic theorists such as Kant, Hegel, Swift, Wilde, and Pater; and such major twentieth-century figures as Heidegger, Bataille, Sartre, Benjamin, Adorno, and I. A. Richards. No prior knowledge of the subject will be assumed, and all texts will be read in English.

COM L 206 Shakespeare and the 20th Century (also ENGL 208)
Fall. 4 credits. M W F 10:10-11. W. Cohen. What is the relationship between the plays of Shakespeare in their own time and the various ways they have functioned in modern culture? We will compare restored works of Shakespeare with their adaptations in fiction, theater, film, the educational system, government, and popular culture. The discussion of each play will be organized around one or more critical approaches. The course as a whole will attempt to provide a systematic introduction to the contemporary study of literature and culture.

COM L 223 The Comic Theater (also CLASS 223 and THETR 223) #

COM L 236 Greek Mythology (also CLASS 236) #
Fall. 3 credits. T R 11:40-12:55. Limited to 200. (Also offered summer '98). D. Malkin. For description, please see Classics 236.

COM L 239 Cultural History of the Jews of Spain (also NSES 239, JWST 239, REL. ST. 239 and SPAN L 239)
Fall. 3 credits. M W F 10:10-11:00. R. Brann. For description, please see Near Eastern Studies 239.

COM L 302 Literature and Theory (also COM L 622 and ENGL 302/602)
Fall. 4 credits. M W F 9:05-9:55. J. Culler. Study of issues in contemporary theoretical debates, with particular attention to structuralism, deconstruction, psychoanalysis, and feminism. Readings from Barthes, Derrida, Foucault, J. Butler, B. Johnson, and others. No previous knowledge of literary theory is assumed.

COM L 305 Irony: An Introduction
Fall. 4 credits. M W F 1:25-2:15. R. Sellers. Oscar Wilde suggested that all bad poetry is sincere. Was he being ironic? Irony is an aspect of literature (and everyday life) that is very common and of fundamental importance but misunderstood and even distrusted. This course will confront the theory and politics of irony. Our approach will be historical, philosophical, and literary but will never lose sight of practical questions that students necessarily face: must we—or can we—mean what we say? How can we analyze irony in a text? In what sense is the performance of a drag queen ironic? Texts about irony—or ironic texts—to be studied will include Plato, Kierkegaard, Swift, Flaubert, and German idealists. We will also investigate nonverbal irony in twentieth-century music from Mahler to Madonna.

COM L 322 Encounters with the Dead (also ITAL L 322/623)

COM L 328 Literature of the Old Testament (also REL. ST. 328) @ #
Fall. 4 credits. T R 2:55-4:10. C. M. Camicmichael. Analysis of small sections of well-known material for in-depth discussion.

COM L 330 Political Theory and Cinema (also GERST 330, GOVT 370 and THETR 329)
Fall. 4 credits. T R 1:25-2:40. G. Waite. For description, please see Theatre Arts 329.

COM L 334 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also NSES 339/639, JWST 339, REL ST. 334 and SPAN L 339/699) @ #

COM L 336 European Drama 1680-1900: Mollière to Ibsen (also ENGL 335 and THETR 333) #
Spring. 4 credits. T R 10:10-11:25. A. R. Parker. Major works by such writers as Mollière, Congreve, Goethe, Schiller, Kleist, Shelley, Byron, Büchner, Ibsen, and Chekhov. Attention to influential theater traditions (commedia dell'arte, melodrama, pantomime); theories and styles of acting (Diderot, Garrick, Kran); the role of theater in the cultural politics of Enlightenment and Revolutionary Europe (Rousseau, Burke).

COM L 343 Contemporary Mass Culture in Japan and in the U.S. (also Asian St 363)

COM L 352 European Cultural History, 1750-1870 (also HIST 362) #
Spring. 4 credits. TBA. M. Steinberg. For description, please see History 362.
COM L 355 Decadence (also ENGL 355 and WOMNS 355) Fall. 4 credits. M W F 10:10-11. E. Hanson.

For description, please see English 355.

COM L 362 The Culture of the Renaissance II (also ENGL 325, HIST 354, MUS 390, ART H 351 and REL. ST. 362) Fall. 4 credits. T R 11:40-12:55 plus discussion section to be announced. C. Kaske, W. J. Kennedy.

Members of various departments will lecture on Luther, Michelangelo, Edmund Spenser, Cervantes, Copernicus, Galileo, and Monteverdi. Guest lectures will include Peter Dear, History; Esther Dotson, History of Art; and Rebecca Harris-Warrick, Music. Lectures and discussion will introduce different methods of interpretation and of historical analysis. Written requirements: two short papers and a final take-home examination.


363: From Boccaccio to Goethe. Survey of the novel up to its participation in the romances of chivalry. Ambiguities derived from the lack of the word "novel." Different epochs in the development of the novel and intellectual history in different epochs: character and structure in the novels of contemporary philosophical views on man, cosmetics, gender, and social classes. Readings include Boccaccio's Flonne, Gómez de la Serna's Lazarillo de Tormes, Cervantes's Don Quixote, Mme de Lafayette's The Princess of Cleves, Defoe's Robinson Crusoe, Horace Walpole's The Castle of Otranto, and Goethe's The Sorrows of Young Werther, as well as a short paper comparing critical statements about the genre from Giraldi Cinthio to Goethe. All texts read in English.

364: From Stendhal to the present (in translation). Close reading of novels from the 19th and 20th centuries: Stendhal's The Red and the Black, Flaubert's Madame Bovary, Dostojevsky's Crime and Punishment, Joyce's Portrait of the Artist as a Young Man, Kafka's The Metamorphosis; and Kundera's The Unbearable Lightness of Being. Study of the changing ways of representing recurring themes: the role of the creative imagination; the city and country; rebellion and revolution; communities and solidarity; dominant groups and minorities (social, ethnic, religious, psychological); interplay of politics, sex, and humanity. Artistic and structural developments: coherence, connectedness, fragmentation; from realism to modernism.

COM L 365 Contemporary Fiction Fall. 4 credits. T R 1:25-2:40. B. Maxwell.

A study of European fiction and drama largely drawing on texts from the first half of the twentieth century. In 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 'surrender (transformation) chosen from the following: Robert Walser, Strawinsky and The Walk, Franz Kafka, The Trial, Thomas Mann, Death in Venice, Bertolt Brecht, The Rise and Fall of the City of Mabagonny, Joseph Roth, Hotel Savoy: Alfred Doblin, Berlin Alexanderplatz; Christa Wolf, The Quest for Christa T, Louis Aragon, Paris Peasant, Louis-Ferdinand Celine, Death on the Installment Plan; Elia Vail, Natalia Ginzburg, stories; and Isaac Babel, stories. Collateral theoretical readings by Georg Lukács, Ernst Bloch, Bertolt Brecht, Walter Benjamin, Siegfried Kracauer, Gershon Scholem, Elias Canetti, and Chiswala.


For description, please see Russian Literature 367.

COM L 368 Visual Culture and Social Theory (also GOVT 375 and ART H 370) Fall. 4 credits. M W F 1:25-2:15. S. Buck-Mors, A. Vidler.

For description, please see Government 375.

COM L 369 Interpretation and/as Violence Spring. 4 credits. T R 11:40-12:55. R. Sellars.

This course is a response to the approach of the millennium and the increase of violence that seems destined to accompany it. The working hypothesis of the course is that reading should be a process of radical patience which resists the millenarian drive towards apocalypse, and that 'reading' should be distinguished from 'interpretation.' The course will introduce students to the history and theory of interpretation and will show how it has implied a certain kind of violence at least since the beginnings of Christianity. We will begin by exploring how the New Testament comes into being as a more or less violent interpretation of Jewish scriptures, and how Christianity sets up a strong interpretative regime that continues to exert its power today. Given that the ethics of interpretation is becoming increasingly urgent, we will focus on how literary interpretation becomes institutionalized in order to rethink what happens when a reader meets a text. Particular attention will be given to developments in nineteenth-century Germany, where theological categories gradually became secularized as part of the founding process of the modern university.

COM L 395 Fin de Siécle or Belle Époque?: Parisian Culture Around 1900 (also FRLIT 383) Spring. 4 credits. T R 1:25-2:40. E. Apter. Focusing on Parisian culture between 1880 and 1914, a period in which artists and intellectuals confronted a startling new world wrought by industrial production, urban concentration, and political reorganization, this course will consider the relationship between decadence and modernity, with special attention to sexuality and the subject of modernity in the Belle Époque. Themes to be considered will include: 1) theories of pathology, decadence, and difference; 2) city spectacle and mass entertainment; 3) the retreat to the interior as a site of psycho­logical exploration and artistic innovation; 4) feminine culture and the New Woman; 5) spaces of the demimonde (the culture of courtesans, saphism 1900); 6) identity and technological innovation. Short critical texts will be read in relation to well-known authors of the period such as Max Nordau, Zola, Huysmans, Rachilde, Colette, and Proust.

Requirements will include short oral presentations and a term paper.

COM L 396 German Film (also GERST 396 and THETR 396) Spring. 4 credits. Requirements: participation in class discussion, one paper, midterm, and final. TBA.

For description, please see Theatre Arts 396.

COM L 404 History into Fiction: Nazi and the Literary Imagination (also ENGL 404 and GERST 414) Fall. 4 credits. M W F 11:15-12:05. E. Rosenberg.

For description, please see ENGL 404.

COM L 410 Semiotics and Language (also LING 400 and Fr Rom St 400) Spring. 4 credits. Prerequisite: some background in an area relevant to semiotics: e.g., linguistics, philosophy, psychology, anthropology, or literature; or permission of instructor. TBA. L. Waugh.

For description, please see Linguistics 400.


Discussion of some ten authors who excelled in the form of the novel and whose names are thus up to a point "given," in addition to James and Flaubert, writers like Conrad, Tolstoy, Mann, Kafka, Joyce, Faulkner, Marquez, Morrison. One novella each week or week and a half, but not in canonical order, e.g., Conrad's Heart of Darkness, Kafka's Penal Colony, and Ozick's The Shawl as versions of modern politics (or atrocities); the question of "status" as this is reflected in the relations between employer and domestic in things like Flaubert's Simpleton, Tolstoy's Master and Man, and Gertrude Stein's The Good Anna; versions of the récit—specifically on the conditions of marriage—in Tolstoy's Kreutzer Sonata and (to stick with Beethoven) Andre Gide's Pastoral Symphony; same-sex relations in James's Martin's Death in Venice, then also varieties of the fantastic in, say, Jekyll and Hyde, Turn of the Screw, Dostoevsky's Double.

COM L 413 Death, Culture and the Literary Monument Fall. 4 credits. T R 1:25-2:40. N. Melas. Beginning with Homer's Iliad, this course will inquire into the monumental transformation of death into immortality in the literary composition. How do death's negations become fiction's triumphs? We will 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 will 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 will be 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 will include Homer, Derek Walcott, Simone Schwartz-Bart, Virginia Woolf, Krista Wolf, Tayeb Salih, Maurice Blanchot, Hegel, Orlando Patterson, Walter Benjamin.
COM L 419–420 Independent Study
419, fall; 420, spring. Variable credit. Comparative Literature 419 and 420 may be taken independently of each other. Applications available in 145 G.S.

COM L 429 Readings in the New Testament (also NES 429, Rel. St. 425 and ENGL 429) Fall. 4 credits. Limited to 40 students. M W F 10:10–11. J. P. Bishop. Close readings of representative texts from the New Testament in modern scholarly editions, with the help of an introductory and specialized commentary. The focus for 1997 will be on Acts and the letters of Paul. All readings will be in English, but repeated reference to the Greek original will be made. Graduate students and undergraduates from other colleges who are interested in the material should not feel inhibited from enrolling. The approach will be primarily exegetical, that is, we will try to find out what the texts say and what they mean by what they say. Thus we can hope to stay open to scholarly and religious issues alike.

COM L 455 Caribbean Literature (also Africana St. 455) Fall. 4 credits. Enrollment limited to 15. M 2:00–4:25. A. Adams. For description, please see Africana Studies 455.


COM L 493 Senior Essay Fall and spring. 8 credits. Hours to be arranged individually in consultation with the director of the Senior Essay Colloquium. Approximately fifty 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 will be assigned on the basis of research and a seminar will investigate the global politics they say. Thus we can hope to stay open to the texts say and what they mean by what they say. Thus we can hope to stay open to the meaning, to what extent and in what circumstance can comparison produce cultural difference, consolidate it, dissolve it, erect borders, inhabit borderlands, propose a global euclidean? With particular attention to colonialism and globalization, we will inquire into the relation between various modes of comparison and broader contexts and ideologies. Though focused on the humanities and on theoretical texts, readings will include incursions into the social sciences and selected poetry and film. Authors may include Lyotard, Foucault, Fanon, Tilley, Gilroy, Clifford, Appadurai, Bhabha, Lancer, Kincaid, Walcott.

COM L 619–620 Independent Study 619, fall; 620, spring. Variable credit. Comparative Literature 619 and 620 may be taken independently of each other. Applications available in 145 G.S.

COM L 622 Literature and Theory (also Com L 302 and ENGL 302/602) Fall. 4 credits. M W F 9:05–9:55. J. Cullen. For description, please see Comparative Literature 302.

COM L 626 Baroque (also GER ST 627) Fall. 4 credits. T 4:30–6:30. G. Waite. For description, please see German Studies 627.

COM L 641 Bakhtin as Reader (also RUSS L 641) Spring. 4 credits. Also open to undergraduates with permission of instructor. W 3:35–5:30. P. Carden. For description, please see Russian Literature 641.

COM L 657 Seminar in Dramatic Theory (also THETR 637) Spring. 4 credits. Prerequisite: permission of instructor. TBA. R. Schneider. For description, please see Theatre Arts 637.

COM L 674 Contemporary Poetry and Culture: 1968–1998 (also ENGL 679, and GERST 674) Spring. 4 credits. W 1:25–3:20. J. Monroe. The redrawing of cultural and political boundaries underway since the late 1980's 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 will focus on the second half of the post-1945 period—the thirty years extending from 1968 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 will consider contemporary cultural production 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 675 After the Divide: German Critical Theory of the Seventies and Eighties (also GERST 675 and HIST 675) Fall. 4 credits. W 2:30–4:25. P. Hohenadl. For description, please see German Studies 675.

COM L 699 German Film Theory (also GERST 699 and THETR 699) Fall. 4 credits. M 2:30–4:25. D. Batchik. For description, please see Theatre Arts 699.

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 major in computer science. For details, visit our World Wide Web site at http://www.cs.cornell.edu/Info/Ugrad.

The Major
CS majors take courses in algorithms, data structures, logic, programming languages, scientific computing, systems, and theory. Electives in artificial intelligence, computer graphics, computer vision, databases, multimedia, and networks are also possible. Requirements include:

- four semesters of calculus (MATH 111–122, 211–222 or 191–192, 293–294)
- two semesters of introductory computer programming (COM S 100 and 211 or 212)
- a seven-course computer science core (COM S 222, 280, 314, 381, 410, 414, and 482)
- two 400+ computer science electives, totaling at least 6 credits
- a computer science project course (COM S 413, 415, 418, 433, or 473)
- a 3+ credit mathematical elective course (ORIE 270, MATH 300+, TRAM 300+, etc.)
- two 300+ courses that are technical in nature and total at least six credits
- three courses which are related to one another from a discipline other than computer science. These courses must be numbered 300-level or greater and total at least eleven credits.

The program is broad and rigorous, but it is structured in a way that supports in-depth study of outside areas. Intelligent course selection can set the stage for graduate study and employment in any technical area and any professional area such as business, law, or medicine. With the advisor, the computer science major is expected to put together a coherent program of study that supports career objectives and is true to the aims of liberal education.
Admission
The prerequisites for admission to the major are:

1) Completion of Computer Science 100–211 (or 212–280) (or equivalent)
2) Completion of Mathematics 111–122–221 or Mathematics 191–192–293
3) A 2.75 grade-point average in all computer science and mathematics courses
4) Acceptance by the department's admissions committee

After admission, students are expected to maintain at least a 2.75 grade-point average in their major courses. Any grade below C- in a core course or related elective is not acceptable.

Honors. To qualify for departmental honors a student must have:
- maintained a cumulative GPA ≥ 3.5
- completed 8 credit hours of COM S course work at or above the 500 level
- completed 6 credit hours of CS 490 research with a COM S faculty member, spread over at least two semesters and obtaining grades of A- or better.

Note: Honors courses may not be used to satisfy the COM S 400+ elective requirement or the COM S project requirement.

Courses
For complete course descriptions, see the computer science listing in the College of Engineering section.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM S 099</td>
<td>Fundamental Programming Concepts</td>
<td>Fall, summer. 2 credits. S-U grades only. No prerequisites.</td>
</tr>
<tr>
<td>COM S 100</td>
<td>Introduction to Computer Programming</td>
<td>Fall, spring, or summer. 4 credits. During the fall semester, two versions of COM S 100 (COM S 100a and COM S 100b) are available as described in the computer science listing in the College of Engineering.</td>
</tr>
<tr>
<td>COM S 101</td>
<td>Introduction to Cognitive Science (also COGST 101, LING 170, and PSYCH 102)</td>
<td>Fall. 3 credits.</td>
</tr>
<tr>
<td>COM S 113</td>
<td>Introduction to C</td>
<td>Fall, spring. 1 credit. Weeks 5–8. Prerequisite: COM S 100 or equivalent programming experience. Credit is granted for both COMS 113 and 213 only if 113 is taken first. S-U grades only.</td>
</tr>
<tr>
<td>COM S 114</td>
<td>Unix Tools</td>
<td>Fall, spring. 1 credit. Weeks 1–4. Prerequisite: COM S 100 or equivalent programming experience. S-U grades only.</td>
</tr>
<tr>
<td>COM S 130</td>
<td>Creating Web Documents</td>
<td>Fall. 3 credits.</td>
</tr>
<tr>
<td>COM S 211</td>
<td>Computers and Programming (also ENGRD 211)</td>
<td>Fall, spring, or summer. 3 credits. Prerequisite: COM S 100 or equivalent programming experience. Credit will not be granted for both COM S 211 and 212.</td>
</tr>
<tr>
<td>COM S 212</td>
<td>Structure and Interpretation of Computer Programs (also ENGRD 212)</td>
<td>Fall, spring. 4 credits. Prerequisite: COM S 100 or equivalent programming experience. Credit will not be granted for both COM S 211 and 212.</td>
</tr>
<tr>
<td>COM S 213</td>
<td>C++ Programming</td>
<td>Fall, spring. 2 credits. Prerequisite: COM S 211 or 212 or equivalent programming experience. Students who plan to take COMS 113 and 213 must take 113 first. S-U grades only.</td>
</tr>
<tr>
<td>COM S 222</td>
<td>Introduction to Scientific Computation (also ENGRD 222)</td>
<td>Spring, summer. 3 credits. Prerequisites: COM S 100 and (MATH 222 or MATH 294).</td>
</tr>
<tr>
<td>COM S 280</td>
<td>Discrete Structures</td>
<td>Fall or spring. 4 credits. Prerequisite: COM S 211 or 212 or permission of instructor.</td>
</tr>
<tr>
<td>COM S 314</td>
<td>Introduction to Digital Systems and Computer Organization</td>
<td>Fall, spring. 4 credits. Prerequisite: COM S 211 or 212, or equivalent.</td>
</tr>
<tr>
<td>COM S 381</td>
<td>Introduction to Theory of Computing</td>
<td>Fall, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.</td>
</tr>
<tr>
<td>COM S 400</td>
<td>The Science of Programming</td>
<td>Spring. 4 credits. Prerequisite: COM S 280 or equivalent. Not offered every year; next offered spring 1998.</td>
</tr>
<tr>
<td>COM S 410</td>
<td>Data Structures</td>
<td>Fall, spring, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.</td>
</tr>
<tr>
<td>[COM S 411]</td>
<td>Programming Languages and Logics</td>
<td>Fall. 4 credits. Prerequisites: COM S 410 or permission of instructor. Not offered every year; semester to be announced.</td>
</tr>
<tr>
<td>COM S 412</td>
<td>Introduction to Compilers and Translators</td>
<td>Spring. 3 credits. Prerequisites: COM S 314, 381, and 410. Corequisite: COM S 413.</td>
</tr>
<tr>
<td>COM S 414</td>
<td>Systems Programming and Operating Systems</td>
<td>Fall, summer. 3 credits. Prerequisite: COM S 314 or permission of instructor.</td>
</tr>
<tr>
<td>COM S 415</td>
<td>Practicum in Operating Systems</td>
<td>Fall. 2 credits. Prerequisite: COM S 410. Corequisite: COM S 414.</td>
</tr>
<tr>
<td>COM S 417</td>
<td>Computer Graphics and Visualization (also ARCH 374)</td>
<td>Spring. 3 credits. Prerequisite: COM S 211 or 212. Corequisite: COM S 414.</td>
</tr>
<tr>
<td>COM S 421</td>
<td>Numerical Analysis</td>
<td>Fall. 4 credits. Prerequisites: MATH 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming.</td>
</tr>
<tr>
<td>COM S 432</td>
<td>Introduction to Database Systems</td>
<td>Fall. 3 credits. Prerequisites: COM S 211 or 212 and COM S 410. Recommended: COM S 213.</td>
</tr>
<tr>
<td>COM S 433</td>
<td>Practicum in Database Systems</td>
<td>Fall. 2 credits. Corequisite: COM S 432.</td>
</tr>
<tr>
<td>COM S 444</td>
<td>Distributed Systems and Algorithms</td>
<td>Fall. 4 credits. Prerequisite/co-requisite: COM S 414 or permission of instructor. Not offered every year; next offered fall 1998.</td>
</tr>
<tr>
<td>COM S 472</td>
<td>Foundations of Artificial Intelligence</td>
<td>Fall. 3 credits. Prerequisites: COM S 211 or 212, and COM S 280 or equivalent.</td>
</tr>
<tr>
<td>COM S 473</td>
<td>Practicum in Artificial Intelligence</td>
<td>Fall. 2 credits. Prerequisites: COM S 211 or 212, and COM S 280 or equivalent. Corequisite: COM S 472.</td>
</tr>
<tr>
<td>COM S 481</td>
<td>Introduction to Theory of Computing</td>
<td>Fall. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and 481. A faster-moving and deeper version of COM S 381. Corrective transfers between COM S 481 and 381 (in either direction) are encouraged during the first few weeks of instruction.</td>
</tr>
<tr>
<td>COM S 482</td>
<td>Introduction to Analysis of Algorithms</td>
<td>Spring, summer. 4 credits. Prerequisites: COM S 410 or 481, or permission of instructor.</td>
</tr>
<tr>
<td>COM S 486</td>
<td>Applied Logic (also MATH 486)</td>
<td>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.</td>
</tr>
<tr>
<td>COM S 490</td>
<td>Independent Reading and Research</td>
<td>Fall or spring. 1–4 credits.</td>
</tr>
<tr>
<td>COM S 501</td>
<td>Software Engineering: Technology and Techniques</td>
<td>Fall. 4 credits. Prerequisite: COM S 410 and knowledge of the C programming language.</td>
</tr>
<tr>
<td>COM S 514</td>
<td>Practical Distributed Computing</td>
<td>Fall or spring. 4 credits. Prerequisites: COM S 414 or permission of instructor.</td>
</tr>
<tr>
<td>COM S 515</td>
<td>Practicum in Distributed Systems</td>
<td>Fall or spring. 1–2 credits. Co-requisite: COM S 514.</td>
</tr>
<tr>
<td>COM S 516</td>
<td>High-Performance Computer Architecture</td>
<td>Spring. 4 credits. Prerequisite: COM S 314 required; COM S 412 or 414 highly recommended.</td>
</tr>
</tbody>
</table>
COM S 519 Engineering Computer Networks  
Fall. 4 credits. Prerequisites: COM S 214, 314, and 410, or permission of instructor.

COM S 522 Software Tools for Computational Science  
Spring. 4 credits. Prerequisites: a numerical analysis course such as (COM S 222 or 421) or PHYS 480; willingness to work in Matlab and C or Fortran; interest in mathematics and the natural sciences. Not offered every year; semester to be announced.

COM S 572 Introduction to Automated Reasoning  
Spring. 3 credits.

COM S 601 System Concepts  
Fall. 3 credits. Prerequisite: open to students enrolled in the COM S Ph.D. program. Not offered every year; next offered spring 1997.

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; semester to be announced.

COM S 614 Advanced Systems  
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor.

COM S 618 Principles of Distributed Computing-MESSAGE Passing  
Fall. 4 credits. Prerequisites: COM S 444 or permission of instructor.

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, mathematical analysis including Fourier methods, and differential equations. Offered in even-numbered years.

COM S 631 Multimedia Systems  
Fall. 4 credits. Prerequisite: COM S 414 or permission of instructor.

COM S 632 Advanced Database Systems  
Spring. 4 credits. Prerequisite: COM S 432 or permission of instructor.

COM S 664 Machine Vision  
Spring. 4 credits. Prerequisites: under-graduate-level understanding of algorithms and Mathematics 221 or equivalent.

COM S 671 Introduction to Automated Reasoning  
Fall. 4 credits. Prerequisites: graduate standing and COM S 611 or permission of instructor.

COM S 674 Natural Language Processing  
Spring. 4 credits. Prerequisites: COM S 472 or permission of instructor. Not offered every year; semester to be announced.

COM S 676 Reasoning About Knowledge  
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Not offered every year; next offered fall 1998.

COM S 677 Reasoning About Uncertainty  
Fall. 4 credits. Prerequisites: mathematical maturity and an acquaintance with propositional logic. Not offered every year; next offered fall 1997.

COM S 681 Analysis of Algorithms  
Fall. 4 credits. Prerequisite: COM S 381 or 481, or permission of instructor.

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 709 Computer Science Colloquium  
Fall, spring. 1 credit. S-U grades only. For staff, visitors, and graduate students interested in computer science.

COM S 713 Seminar in Systems and Methodology  
Fall, spring. 4 credits. Prerequisites: a graduate course employing formal reasoning, such as COM S 660, 611, 613, 615, 671; a logic course, or permission of instructor. Not offered every year; semester to be announced.

COM S 719 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 to be announced.

COM S 721 Seminar in Programming Languages  
Fall, spring. 4 credits. Prerequisite: COM S 611 or permission of instructor. S-U grades only.

COM S 722 Topics in Numerical Analysis  
Fall, spring. 4 credits. Prerequisite: COM S 621 or 622 or permission of instructor. Not offered every year; semester to be announced.

COM S 729 Seminar in Numerical Analysis/ACRI  
Fall, spring. 1-4 credits (to be arranged). Prerequisite: permission of instructor. S-U grades only.

COM S 754 Seminar in Work in Progress-Distributed Systems  
Fall. 1 credit.

COM S 773/774 Proseminar in Cognitive Studies I & II (also COGST, PHIL, LING, and PSYCH 773/774)  
Fall and spring. 2 credits.

COM S 775 Seminar in Natural Language Understanding  
Fall, spring. 2 credits.

COM S 789 Seminar in Theory of Algorithms and Computing  
Fall, spring. 2-4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 890 Special Investigations in Computer Science  
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only. Master of Science degree research.

COM S 990 Special Investigations in Computer Science  
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only. Doctoral research.

CZECH  
See Language Courses under Languages and Linguistics.

DANCE  
See listings under Department of Theatre, Film and Dance.

DANISH  
See Language Courses under Languages and Linguistics.

DUTCH  
See Language Courses under Languages and Linguistics.

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:
- Economics 101, Economics 301, or Economics 313.
- The macroeconomics distribution requirement can be satisfied with any of the following:
- Economics 102, Economics 302, or Economics 314.

The Major

Prerequisites

Economics 101 and 102 and Math 111 (or equivalents, with approval of the director of undergraduate studies), all with grades of C or better.

Economics 301 with a grade of C or better substitutes for 101; Economics 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.

These eight courses must include:
1. Economics 313 and 314.
2. Economics 321 or Economics 319 and 320.
3. at least 3 courses from the following: 318, 320, 322-62, 364-98, 404, 406.

Economics 301 with a grade of B or better substitutes for both 101 and 313; Economics 302 with a grade of B or better substitutes for both 102 and 314.

If Economics 321 is applied toward the major, neither 319 nor 320 can be applied.


Courses

ECON 101 Introductory Microeconomics
Fall, spring, winter, and summer. 3 credits. Economics 101 is not a prerequisite for 102. Explanation and evaluation of how the price system operates in determining what goods are produced, how goods are produced, and who receives income. And how the price system is modified and influenced by private organizations and government policy.

ECON 102 Introductory Macroeconomics
Fall, spring, winter, and summer. 3 credits. Economics 101 is not a prerequisite for 102. Analysis of aggregate economic activity in relation to the level, stability, and growth of national income. Topics discussed may include the determination and effects of unemployment, inflation, balance of payments, deficits, and economic development, and how these may be influenced by monetary, fiscal, and other policies.

ECON 301 Microeconomics
Fall. 4 credits. Prerequisite: calculus. Intended for students with strong analytical skills who have not taken Economics 101, 102. Can be used to replace both Economics 101 and 313. (Can replace 313 only with grade of B or better). This course covers the topics taught in Economics 101 and 313. An introduction to the theory of consumer and producer behavior and to the functioning of the price system.

ECON 302 Macroeconomics
Spring. 4 credits. Prerequisite: Economics 301. Intended for students with strong analytical skills who have not taken Economics 101, 102. Can be used to replace both Economics 102 and 314. This course covers the topics taught in Economics 102 and 314. (Can replace 314 only with grade of B or better). An introduction to the theory of national income determination, unemployment, growth, and inflation.

ECON 307 Introduction to Peace Science (also CRP 495.18 and Introduction to Peace Science)
Winter session. 4 credits. Prerequisites: Economics 101-102 or permission of instructor. Introduction to the theories of and research on conflict resolution. Topics include conflict, its role and impact on society; theories of aggression and altruism; causes of war; game theory; conflict management procedures and other analytical tools and methods of peace science; alternatives to war.

ECON 313 Intermediate Microeconomic Theory
Fall, spring, and summer. 4 credits. Prerequisites: Economics 101-102 and calculus. The pricing process in a private enterprise economy are analyzed under varying competitive conditions, and their role in the allocation of resources and the functional distribution of national income is considered.

ECON 314 Intermediate Macroeconomic Theory
Fall, spring, and summer. 4 credits. Prerequisites: Economics 101-102 and calculus. The theory of national income and determination and economic growth in alternative models of the national economy is introduced. The interaction and relation of these models to empirical aggregate economic data is examined.

ECON 317 Intermediate Mathematical Economics I
Fall. 4 credits. Prerequisites: Economics 101-102 and Math 111-112. Not offered 1997-98. Introduction of calculus and matrix algebra; problems of maximization of a function of several variables. Economic examples are used to illustrate and teach the mathematical concepts.

ECON 318 Intermediate Mathematical Economics II
Spring. 4 credits. Prerequisites: Economics 101-102 and Math 111-112. Advanced techniques of optimization and application to economic theory.

ECON 319 Introduction to Statistics and Probability
Fall. 4 credits. Prerequisites: Economics 101-102, 319, or equivalent. This course provides an introduction to statistical inference and to principles of probability. It includes descriptive statistics, principles of probability, discrete and continuous distributions, and hypothesis testing (of sample means, proportions, variance). Regression analysis and correlation are introduced.

ECON 320 Introduction to Econometrics
Spring. 4 credits. Prerequisites: Economics 101-102, 319, or equivalent. Introduction to the theory and application of econometric techniques. How econometric models are formulated, estimated, used to test hypotheses, and used to forecast; understanding economists' results in studies using regression model, multiple regression model, and introduction to simultaneous equation models.

ECON 321 Applied Econometrics
Fall, spring, and summer. 4 credits. Prerequisites: Economics 101-102 and calculus. This course provides an introduction to statistical methods and principles of probability. Topics to be covered include analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, correlation and time series analysis. Applications from economics are used to illustrate the methods covered in the course.

ECON 322 American Economic History
Fall. 4 credits. Prerequisites: Economics 101-102 or equivalent. Problems in American economic history from the first settlements to early industrialization are surveyed.

ECON 324 American Economic History I
Spring. 4 credits. Prerequisites: Economics 101-102 or equivalent. A survey of problems in American economic history from the Civil War to World War I.

ECON 324A American Economic History II
Spring. 4 credits. Prerequisites: Economics 101-102 or equivalent. Same material as Economics 324, seminar limited to 12 students.

ECON 331 Money and Credit
Spring. 4 credits. Prerequisites: Economics 101-102 and 319. 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
Fall. 4 credits. Prerequisites: Economics 313 and 314. The theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets are examined.

ECON 335 Public Finance: The Microeconomics of Government
Fall. 4 credits. Prerequisites: Economics 101-102 and 313, or their equivalent, and one semester of calculus. The role of government in a free market economy is 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 will vary from term to term.

**ECON 336 Public Finance: Resource Allocation and Fiscal Policy**

Spring. 4 credits. Prerequisites: Economics 101-102, 313 or their equivalent and one semester of calculus.

This course covers the revenue side of public finance and government transfers. 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 341 Labor Economics**

For description, see IRLE 240.

**ECON 351 Industrial Organization**

Fall. 4 credits. Prerequisite: Economics 313 or its equivalent.

A study of markets that differ from the ideal of perfect competition (e.g., monopoly and oligopoly) and the efforts of our legal system through the antitrust laws to deal with the kinds of problems that arise in such markets. Specific topics covered include mergers, price fixing, price discrimination, predatory pricing, and vertical restraints such as resale price maintenance.

**ECON 352 Advanced Topics in Industrial Organization**

Spring. 4 credits. Prerequisites: Economics 311 and 313.

This course is an extension of 351 and will emphasize (a) more-advanced topics in the theory of industrial organization with special attention to recent developments in the literature; and (b) empirical analysis of numerous issues relating to the structure of markets and their performance.

**ECON 361 International Trade Theory and Policy**

Fall. 4 credits. Prerequisites: Economics 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 aspects of the world trading system.

**ECON 362 International Monetary Theory and Policy**

Spring and summer. 4 credits. Prerequisites: Economics 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 363 International Economics**

Spring and summer. 4 credits. Prerequisites: Economics 101-102 or equivalent.

This course surveys international economics in one semester. First, it surveys the sources of comparative advantage, and it analyzes commercial policy and the institutional aspects of the world trading system. Second, it discusses exchange rates, and it studies theories of balance of payments adjustments. This course is intended primarily for government majors who are comfortable with a less technical approach to international economics. (Cannot be applied to the economics major.)

**ECON 371 Economic Development**

Spring. 4 credits. Prerequisites: Economics 313 or equivalent.

Study of the problem of sustaining accelerated economic growth in less-developed countries. Trade-offs between growth, welfare, and equity; the legacy of colonialism; relevance of history and economic theory; problems of capital formation, economic planning and international specialization; and the interaction of industrialization, agricultural development, and population change are emphasized.

**ECON 372 Applied Economic Development**

Fall or spring. 4 credits. Prerequisites: Economics 101-102. Not offered 1997-98.

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 399 Readings in Economics**

Fall or spring. Variable credit.

Independent study.

**ECON 404 Economics and the Law**

Fall. 4 credits. Prerequisite: Economics 101.

An examination, through the lens of economic theories, 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**

For description, see ARME 608.

**ECON 409 Environmental Economics**

For description, see ARME 451.

**ECON 413 Economics of Consumer Demand**

For description, see CEH 613.

**ECON 415 Price Analysis**

For description, see ARME 415.

**ECON 416 Intertemporal Economics**

Spring. 4 credits. Prerequisites: Economics 313. Not offered 1997-98.

This course is intended for advanced economics majors who are especially interested in economic theory. Topics to be covered: (a) review of the one good Ramsey model of optimal savings and accumulation; conditions for intertemporal efficiency in production; competitive dynamics and sensitivity analysis; (b) some earlier models of capital accumulation; the roles of present value and internal rate of return in guiding investment decisions; (c) growth, exhaustible resources, pollution and conservation discussion of the trade-offs facing a society.

**ECON 417 History of Economic Analysis**

Fall and spring. 4 credits. Prerequisites: Economics 101-102 or permission of instructor.

Early writings in economics and their relationship to current economic analysis and policy issues, for example, ancient and medieval philosophers on justice in exchange; mercantilist arguments for trade protection; early theories about the effect of monetary expansion (D. Hume); the role of the entrepreneur (Cantillon); and general competitive equilibrium (the Physiocrats). The most recent reading assignment in this course is Adam Smith's Wealth of Nations but the emphasis is on the relationship between the precursors of Adam Smith and his Wealth of Nations to modern economics analysis and current efforts to answer some of the questions raised in the early writing on economics.

**ECON 419 Economic Decisions under Uncertainty**

Fall. 4 credits. Prerequisites: Economics 313 and 319. Not offered 1997-98.

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**

Economics 420 and 421 together, count as one course for the Economics major.

For description, see CEH 320.

**ECON 421 Economics of Family Policy—Children**

Economics 420 and 421 together, count as one course for the Economics major.

For description, see CEH 321.

**ECON 422 The Economics of Infrastructure and a Sustainable Environment**

For description, see CEE 422.

**ECON 424 Economics of Household Behavior**

For description, see CEH 624.

**ECON 425 History of Latin America**

Spring. 4 credits.

A survey of changing economic institutions and policies from pre-Columbian to modern times.

**ECON 426 History of American Enterprise**

Spring. 4 credits. Prerequisites: Economics 101-102 or equivalent.

History of the changing structure of American business from 1800 to the present, with major emphasis upon developments after the Civil War. The focus of the course will be the changing structure of challenges (for example, the rise of unions, development of a national capital market, changing role of government) and the various responses of business organizations and entrepreneurs to those challenges.

**ECON 428 Technology: Management and Economic Issues**

For description, see ARME 428.

**ECON 430 Policy Analysis: Welfare Theory, Agriculture, and Trade**

For description, see ARME 630.

**ECON 435 Information and Regulation**

For description, see CEH 635.

**ECON 436 Projects in Environmental Management**

For description, see NBA 573.

**ECON 440 Analysis of Agriculture Markets**

Economics 440 and 441 together, count as one course for the Economics major.

For description, see ARME 640.
ECON 441 Commodity Futures Markets  
Economics 440 and 441 together, count as one course for the Economics major. For description, see ARME 441.

ECON 444 Modern European Economic History  
For description, see ILRLE 444.

[ECON 445 Topics in Microeconomic Analysis—Markets and Planning  
Fall. 4 credits. Prerequisites: Economics 313. Not offered 1997–98.  
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: (1) How can economic activities be efficiently organized through the market mechanism? Why is the presence of many traders essential to efficiency? (2) What can be done if the indivisibility in production processes becomes an important hindrance to competitive pricing? (3) How can economic planning be decentralized efficiently? This course serves two purposes: (1) to introduce concepts that are novel to undergraduates and relevant to public policy but require only a modicum of analytic tooling up, and (2) to illustrate the deductive approach of modern economic analysis. (3) To define concepts unambiguously, how to  form propositions in clean-cut fashion, and how to follow up logical implications sequentially to the conclusion.]

[ECON 446 Topics in Macroeconomic Analysis—Is Keynesianism Dead?  
Fall or spring. 4 credits. Prerequisites: Economics 314. Not offered 1997–98.  
The coverage of this course may vary from term to term. Presently the content of the course deals with the range of criticisms against Keynesian theory by the New Classical Economists, alias the Equilibrium School, alias the Rational Expectations School. Despite the fact that almost all intermediate macroeconomic textbooks are Keynesian in perspective, clearly Keynesian economics is currently at bay. We shall review critically, critiques to Keynesian theory.]

ECON 448 Housing Economics  
For description, see CEH 648.

ECON 451 Economic Security  
For description, see ILRLE 340.

ECON 452 Corporate Finance  
For description, see ILRLE 345.

ECON 453 The Economics of Unemployment  
For description, see ILRLE 348.

ECON 454 The Economics of Health Care  
For description, see ARME 440.

ECON 455 Income Distribution  
For description, see ILRLE 441.

ECON 456 The Economics of Employee Benefits  
For description, see ILRLE 442.

ECON 457 Women In the Economy  
For description, see ILRLE 445.

ECON 458 Topics in Twentieth Century Economic History  
For description, see ILRLE 448.

ECON 459 Economic History of British Labor 1750–1940  
For description, see ILRLE 640.

ECON 460 Economic Analysis of the Welfare State  
For description, see ILRLE 642.

ECON 461 The Economics of Occupational Safety and Health  
For description, see ILRLE 644.

ECON 462 Labor in Developing Economies  
For description, see ILRLE 332.

ECON 464 Economics of Agricultural Development  
For description, see ARME 464.

ECON 465 Food and Nutrition Policy  
For description, see ARME 665.

ECON 466 Economics of Development  
For description, see ARME 666.

ECON 467 Game Theory  
Spring. 4 credits. Prerequisites: Economics 313 and 319.  
This course studies mathematical models of conflict and cooperation in situations of uncertainty (about nature and about decision makers).

ECON 468 Economic Problems of Latin America  
Spring. 4 credits. Prerequisites: Economics 310–104.  
Current topics include, international debt, capital flight, economic integration, stabilization programs, etc.

ECON 469 The Economy of China  
Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.  
Examines the development of the Chinese economy and the evolution of China’s economic system since 1949.

[ECON 471 The Economics of the Former Soviet Union and of Central Europe: From Central Planning to Markets  
Fall. 4 credits. Prerequisites: Economics 313 and 314. Not offered 1997–98.  
The course will introduce first the basic features of a centrally planned economy and proceed to consider the most important example: the rise and fall of the Soviet Union. Secondly, the analysis will be extended to what used to be known as "Eastern Europe" (e.g., Czechoslovakia, Hungary, Poland). From this necessary historical background, the course will proceed 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  
Fall. 4 credits. Prerequisites: Economics 101–102. Not offered 1997–98.  
The course will develop first a framework for studying economic systems and national economies and present three simple stylized systemic models: capitalist market, socialist market, and central planning. Secondly, the course will consider economic goals to be achieved (such as growth, stability, and productivity) and introduce quantitative measures used in the evaluation of the performance. Thirdly, comparative studies of selected national economies representing the models will be carried out.]

ECON 473 Economics of Export-led Development  
Spring. 4 credits. Prerequisites: Economics 313, 314, or their equivalent.  
This course will examine the phenomenon of export-led development from both the theoretical and empirical points of view. Concentration will be on experiences within the West Pacific Rim.

ECON 474 National and International Food Economics  
For description, see NS 457.

ECON 475 Economic Problems of India  
Fall. 4 credits. Prerequisite: Economics 101–102 or equivalent background.  
This course will present the major economics and development problems of contemporary India and to examine the country’s future economic prospects. It will, however, be our aim to discuss these problems in their proper historical perspectives. Hence, the course will start with a brief outline of the social and political history of India. It will then turn to a more detailed account of the economic history of India in two stages.

ECON 499 Honors Program  
Fall and spring. 8 credits. 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 613 Macroeconomic Theory I  

ECON 614 Macroeconomic Theory II  

ECON 616 Applied Price Theory  
Spring. 4 credits. The course emphasizes the applications of the principles of price theory to a variety of problems taken from concrete, practical settings.
ECON 617 Intermediate Mathematical Economics I
Fall. 4 credits. Prerequisites: Calculus II and intermediate linear algebra.
The course will cover 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 Economics 617, the course develops additional mathematical techniques for applications in economics. Topics covered could include study of dynamic systems (linear and nonlinear difference equations, differential equation, chaotic behavior), dynamic optimization methods (optimal control theory, nonstochastic and stochastic dynamic programming), game theory (repeated dynamic and evolutionary games).

ECON 619 Econometrics I
Fall. 4 credits. Prerequisites: Economics 315–320 or permission of instructor.
This course gives the probabilistic and statistical background for meaningful application of econometric techniques. Topics to be covered are (1) probability theory: probability spaces, random variables, distributions, moments, transformations, conditional distribution; (2) calculus: differentiation, and expected values of distributions. Further topics in statistics will be considered in Economics 620.

ECON 620 Econometrics II
Spring. 4 credits. Prerequisite: Economics 619.
This course is a continuation of Economics 619 (Econometrics I) covering (1) statistics: estimation theory, least squares method, method of maximum likelihood, generalized method of moments, theory of hypothesis testing, asymptotic test theory, and nonnested hypothesis testing and (2) econometrics: the general linear model, general linear equation, specification test, instrumental variables, dynamic regression models, linear simultaneous equation models, nonlinear models, and applications.

ECON 639 Public Political Economy (also CEE 528)
Spring. 4 credits. Prerequisite: Economics 531 or permission of instructor.
Designed as part of the core curriculum for MPA students in Cornell's Institute for Public Affairs, this course emphasizes the application of economic concepts and methods in the identification, formulation, administration and evaluation of public policy. It is open to all students with a policy interest who have met the prerequisite.
Topics covered include the intrinsic nature of goods and services, decreasing cost of production, externalities and congestion, amenities and environmental regulation essential for an effective market, the efficient role of government in non-market resource allocation methods, methods for inferring the demand for public goods, efficient public decision-making, the supply of public services and raising revenue through taxes and user-fees. Particular emphasis will be placed on the intersection of government and economy in resolving conflicts over public good provision, including defining jurisdictions for the provision of particular services. Examples will emphasize the proper provision of infrastructure services: physical (transportation, utilities, tele-information); human-capital (education and R&D) and biological (renewable resources, species diversity and the environment).

ECON 699 Readings in Economics
Fall or spring. Variable credit. Independent study.

ECON 703 Seminar in Peace Science
Fall. 4 credits.
Among topics to be covered at an advanced level are game theory, coalition theory, bargaining and negotiation processes, cooperative procedures, microbehavior models, macrosocial processes, and general systems analysis.

ECON 710 Stochastic Economics: Concepts and Techniques
Spring. 4 credits. Prerequisites: Economics 609, 610, 614, 615, 619, and 620.
This course will review a number of techniques that have been useful in developing stochastic models of economic behavior. Among these are (a) discrete-time Markov processes, (b) dynamic programming under uncertainty, and (c) continuous-time diffusion processes. Examples of economic models will be drawn from recent literature on optimal capital accumulation and optimal savings and portfolio selection problems; permanent income hypothesis of the consumer, models of price adjustment, etc. Advanced graduate students contemplating work in economic theory and econometric theory will be able to get some exposure to current research.

ECON 711 Advanced Microeconomic Theory: "The Mathematics of Institutions"
4 credits.
The objectives of this class are to provide the tools to study institutions and to analyze some particular institutions. We will borrow from many literatures: game theory, social choice, political science, microeconomics, microeconomics. The structure of the class will be rather informal. The syllabus will only be an indicator of the material that will be covered during the class. In particular, depending upon the number of students that attend and their interests, we can decide to shorten some parts of this syllabus and to spend more time on other parts.

ECON 712 Advanced Macroeconomics
4 credits.
The purpose of this course is to introduce the student to some of the topics and analytic techniques of current macroeconomic research. The course will fall into three parts: dynamic programming, new Keynesian economics, and recent theories of economic growth. The dynamic programming section will include models of consumption, investment, and real business cycles. The new Keynesian section will cover models of wage and price rigidity, coordination failure and credit markets. The section on endogenous growth will look at recent efforts to add non-convexities to models of optimal growth. These topics are intended to complement the material on overlapping generations covered elsewhere.

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 microeconomics. 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 718 Topics in Mathematical Economics
4 credits.

ECON 719 Advanced Topics in Econometrics I
Fall. 4 credits. Prerequisites: Economics 619–620 or permission of instructor.
Advanced topics in econometrics, such as asymptotic estimation and test theory, robust estimation, Bayesian inference, advanced topics in time-series analysis, errors in variable and latent variable models, qualitative and limited dependent variables, aggregation, panel data, and duration models.

ECON 720 Advanced Topics in Econometrics II
Spring. 4 credits. Prerequisites: Economics 619–620 or permission of instructor.
For description see Economics 719.

ECON 721 Time Series Econometrics
Spring. 4 credits. Prerequisites: Economics 619–620 or permission of instructor.
This course covers traditional and current time series techniques that are widely used in econometrics. Topics include the theory of stationary stochastic processes including univariate ARMA(p, q) models, spectral density analysis, and vector autoregressive models; parametric and semi-parametric estimation, current developments in distributional theory, estimation and testing in models with integrated regressors including, unit root tests, cointegration, and permanent vs. transitory components.

ECON 731 Monetary Theory and Policy
Fall. 4 credits. Prerequisites: Economics 614 or permission of the instructor.
Advanced topics in monetary economics, macroeconomics, and economic growth—such as overlapping generations, taxes and transfers denominated in money, transactions demand for money, multi-asset accumulation, exchange rates, and financial intermediation.

ECON 732 Monetary Theory and Policy
Spring. 4 credits. Prerequisites: Economics 731 or permission of the instructor.
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
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 upon 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 737 Location Theory and Regional Analysis**

Fall. 4 credits. Prerequisites: Economics 609, 617, and Econometrics. Not offered 1997–98.

Economic principles influencing the location of economic activity, its spatial equilibrium structure, and dynamic forces. Topics include spatial pricing policies, price competition, and relocation by firms, residential location patterns, patterns of regional growth and decline; and patterns of urbanization.

**ECON 741 Seminar in Labor Economics**

For description see ILRLE 744.

**ECON 742 Seminar in Industrial Economics**

For description see ILRLE 745.

**ECON 747 Economics of Evaluation (also Industrial and Labor Relations 647)**

For description see ILRLE 647.

**ECON 748 Issues in Latin American Development**

Fall. 4 credits.

The topics include: “informal sector” (or multi-part labor markets), evolving capital markets (particularly the market for short-term, domestic currency denominated public sector debt, privatization, etc.). The emphasis will be placed on the impact of these institutional (or structural) changes on economic growth.

**ECON 751 Industrial Organization and Regulation**

Fall. 4 credits.

This course focuses primarily on recent theoretical advances in the study of industrial organization. Topics covered include market structure, non-linear pricing, quality, durability, location selection, advertising, repeated games, collusion, entry deterrence, managerial incentives, switching costs and government intervention. These topics are discussed in a game-theoretic context.

**ECON 752 Industrial Organization and Regulation**

Spring. 4 credits. Prerequisites: Economics 609 and 651.

This course focuses on some topics in the Theory of Industrial Organization with the specific intent of addressing the empirical implications of the theory. The course reviews empirical literature in the SCP paradigm and in the NEIO paradigm.

**ECON 753 Public Policy Issues for Industrial Organizations**

Spring. 4 credits. Prerequisites: Economics 609, 610, and 751. Not offered 1997–98.

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 755 Rivalry and Cooperation**

Fall. 4 credits. Prerequisites: Economics Graduate Coordinator’s permission. Not offered 1997–98.

In standard models, economic interaction is impersonal. Agents respond to price signals and measure their own welfare not in relative but in absolute terms, and cooperative behavior emerges only when it coincides with narrow self-interest. This course will explore the details of rivalry and cooperation in an effort to synthesize broader views of economic interaction. Topics will include the effect of concerns about relative income on wage rates, consumption, savings, and regulation; the effect of concerns about fairness on prices and wages; the conditions that foster trust and cooperation, and the role of positional competition in the distribution of economic rewards.

**ECON 756 Noncooperative Game Theory**

Fall. 4 credits. Prerequisites: Economics 609–610 and 619.

This course surveys equilibrium concepts for non-cooperative games. We will cover Nash equilibrium and subgame-perfect equilibrium refinements, including perfect equilibrium, proper equilibrium, sequential equilibrium and more! We will pay attention to important special classes of games, including bargaining games, signalling games, and games of incomplete information. Most of our analysis will be from the strict decision-theoretic point of view, but we will also survey some models of bounded rationality in games, including games played by automata.

**ECON 757 Economics of Imperfect Information**

Spring. 4 credits. Prerequisites: Economics 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 will vary from year to year, subjects such as markets with asymmetric information, signalling theory, sequential choice theory, and record theory will be discussed.

**ECON 760 Topics in Political Economy**

Fall. 4 credits. Prerequisite: Economics 313 or equivalent.

This course will develop critiques and extensions of economic theory, taking into account the political and social moorings of economic activity and equilibria. The formation and persistence of social norms; the meaning and emergence of property rights; the role of policy advice in influencing economic outcomes; and the effect of political power and ideology on economic variables will be studied. While these topics were popular in the classic works of political economy, recent advances in game theory and, more generally, game-theoretic thinking allow us to approach these topics from a new perspective. Hence, the course will begin by devoting some lectures to elementary ideas in game-theory and strategic analysis.

**ECON 761 International Economics: Trade Theory and Policy**

Fall. 4 credits.

This course surveys the sources of comparative advantage. It analyzes simple general equilibrium models to illustrate the direction, volume, and welfare effects of trade. Topics in game theory and econometrics as applied to international economics may be covered.

**ECON 762 International Economics: International Finance and Open Economy Macroeconomics**

Spring. 4 credits.

This course surveys the determination of exchange rates and theories of balance of payment adjustments. It explores open economy macroeconomics by analyzing models of monetary economies. Topics in monetary economics and econometrics as applied to international economics will be covered.

**ECON 771 Economic Development and Development Planning**

Spring. 4 credits.

Reviews the existing literature on the determinants of economic growth and the interrelationship between growth and income distribution through the process of economic development. A general equilibrium approach to development is taken. Computable general equilibrium models, based on social accounting matrices, are used to explore the performance of a variety of developing countries. Among the topics explored are: impact of structural adjustment and stabilization policies on growth, equity and internal and external equilibrium; sectoral interrelationships and interdependence through the growth process. Critical review and evaluation of national, sectoral and regional development models built for such developing countries as India, Brazil, Indonesia and Ecuador.

**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.
ECON 773 Economic Development
Fall. 4 credits. Prerequisites: Economics 609 and 620.
The course is concerned with theoretical and applied works that seek to explain economic development, or economic growth at low-income levels. Specific topics vary each semester.

ECON 774 Economic Systems
Spring. 4 credits.
The course deals with economic systems, with the formerly centrally planned economies, and with the economies in transition.

ECON 784 Seminars in Advanced Economics
Fall and spring. 4 credits.

ENGLISH
J. Culler, chair; B. B. Adams, director of undergraduate studies (255–3492); D. Mermin, director of graduate studies (255–7989).

The Department of English offers a wide range of courses in English, American, and Anglophone literature as well as in creative writing, expository writing, and film. Literature courses focus variously on the close reading of texts, the study of particular authors and genres, questions of critical theory and method, and the relationship of literary works to their historical periods and to other disciplines. The department seeks not only to foster analytical reading and lucid writing but also, through the study of literary texts, to teach students to think about the nature of language, and to be alert to the rigor and pleasures of that ordinary and peculiar activity, reading.

Students who major in English develop their own programs of study in consultation with their advisers. Some focus on a particular historical period or literary genre; others combine sustained work in creative writing with the study of literature. Others pursue special interests in such areas as women's literature, African-American literature, literature and the visual arts, or critical theory. There are also many ways for students informally to supplement their course work in English, by attending lectures and poetry readings sponsored by the department, or by writing for campus literary magazines.

The Major
The Department of English recommends that its students prepare themselves for the English major by taking at least one introductory course. Freshmen interested in majoring in English are encouraged to take one of the following freshman seminars: The Reading of Fiction (English 270), The Reading of Poetry (English 271), Introduction to Drama (English 272). These courses concentrate on the skills basic to the English major and to much other academic work: responsive, sensitive reading and lucid, effective writing. English 270, 271, and 272, which may be used to satisfy the freshman writing seminar requirement, are open to all second-term freshmen. First-term freshmen with a score of 750 or above on the CEEB Advanced Placement Examination in English, may enroll in English 270, 271, 272 as space permits (all students who have taken at least one high school English course, and for whom English is not a foreign language, must complete this requirement by the end of their sophomore year). Students who elect English 270, 271, and 272 but fail to complete all three courses satisfactorily must complete an additional 36 credit hours in courses approved in the major. Students are also urged to complete this requirement by the end of the sophomore year, and those who enter Cornell without sufficient preparation should begin their language study at once.

Course Requirements
English majors are required to complete, with passing letter grades, 36 credits of foreign language study in courses for which qualification is a prerequisite. These should be in the literature of the foreign language. Majors are urged to complete this requirement by the end of their sophomore year, and those who enter Cornell without sufficient preparation should begin their language study at once.

Besides fulfilling the English Department language requirement, each major must complete with passing letter grades at least 36 credit hours in courses approved for the major. Courses approved for the major include English 201 and 202, and all English courses numbered 300 or above. In addition to English 201 and 202, students may count up to two additional 200-level courses for the major (except those courses which specify they do not count). English majors may use the same courses to satisfy both College of Arts and Sciences distribution requirements and English major requirements.

Of the 36 credits required for the major, 12 credits (three courses) must be taken in literature written before 1800. Students may count toward the English major a maximum of 12 credits in courses in literature and creative writing, at the 300 level or above, given by such departments as Comparative Literature, Theatre Arts, foreign languages, the Africana Studies and Research Center, and the Society for the Humanities. Double majors may count courses at the 300 level or above taken in their other major toward these 12 credits if such courses are approved by their English Department adviser as relevant to the study of literature.

The Major in English with Honors
Prospective candidates for the degree of Bachelor of Arts with honors in English should read the brochure "Honors in English," available in the English office. These students should discuss their qualifications with the chair of the Honors Committee during the spring term of their sophomore year, when they will be admitted provisionally to the program. During their junior year, honors candidates must take one honors seminar (English 491 or 492), which will reflect a dominant area of interest, address methods of scholarly research, and require the composition of a long end-of-term essay. Honors students are strongly encouraged to take an honors 400-level course in which they plan to concentrate. On the basis of their performance, students will be officially admitted to the program at the end of the junior year. Seniors in honors enroll in a year-long tutorial (English 493 and 494) in which they work closely with a faculty member especially qualified to supervise the topic of the candidate's choosing; the year's work culminates in the writing of a scholarly honors thesis. (All seniors in the program are expected to attend informal meetings in which they discuss their work-in-progress.) More information about the program may be found in the department's brochure for honors candidates.

Courses for Nonmajors
For students not majoring in English, the department makes available a variety of courses at all levels. Some courses at the 200 level are open to qualified freshmen, and all of them are open to sophomores. Courses at the 300 level are open to juniors and seniors and to underclass students with permission of the instructor. The suitability of courses at the 400 level for nonmajors will vary from topic to topic, and permission of the instructor is required. Students may elect any two of these courses during their first year to satisfy the Freshman Writing Seminar requirement. Descriptions of Freshman Writing Program offerings may be found in the Freshman Writing Program listings, available from college registrars in August for the fall term and in November for the spring term.

Freshman Writing Seminars
As part of the Freshman Writing Program, the Department of English offers many one-semester courses concerned with various forms of writing (narrative, biographical, expository), with the study of specific areas in English and American literature, and with the relation of literature to culture. Students may elect any two of these courses during their first year to satisfy the Freshman Writing Seminar requirement. Descriptions of Freshman Writing Program offerings may be found in the Freshman Writing Program listings, available from college registrars in August for the fall term and in November for the spring term.

Freshman Writing Seminars Recommended for Prospective Majors

ENGLISH 270 The Reading of Fiction
Fall, spring, each summer. 3 credits. Each section limited to 17 students. Freshman Writing Seminar. Recommended for prospective majors in English. English 270 examines modern fiction, with an emphasis on the short story and novella. Students will write critical essays on English, American, and continental authors who flourished between 1870 and the present, such as Joyce, Woolf, James, Lawrence, Tolstoy, Kafka, Fitzgerald, Faulkner, Rhys, Welty, etc.
Salinger, and Morrison. Instructors may include the reading of a novel. This course does not satisfy requirements for the English major.

ENGL 271 The Reading of Poetry
Fall, spring. 3 credits. Each section limited to 17 students. Freshman Writing Seminar. Recommended for prospective majors in English. This course does not satisfy requirements for the English major. Designed to sharpen the student’s ability to understand and respond to poetry, through readings in the major periods, modes, and genres of poetry written in English. This course does not satisfy requirements for the English major.

ENGL 272 Introduction to Drama
Fall, spring. 3 credits. Each section limited to 17 students. Freshman Writing Seminar. Students in this seminar study plays, older and newer, in a variety of dramatic idioms and cultural traditions. A typical reading list might include works by Sophocles, Shakespeare, Molière, Chekhov, Brecht, Miller, Williams, Beckett, and O’Casey. Course work consists of writing and discussion and the occasional viewing of live or filmed performances. This course does not satisfy requirements for the English major.

Expository Writing

ENGL 288-289 Expository Writing
Fall and spring. 3 credits. Each section limited to 16 students. Students must have completed ENGL 280 or 281 and English majors and non-majors who have done distinguished work in freshman writing seminars and in such courses as ENGL 280–281, 288–289, and who desire intensive practice in writing personal essays. 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 creative nonfiction that is conceptually rich and stylistically polished.

Creative Writing

Students usually begin their work in Creative Writing with English 280 or 281, and only after completion of the Freshman Writing Seminar requirement. Please note that either English 280 or English 281 is the prerequisite for 300-level creative writing courses. English 280 and 281 may satisfy a distribution requirement in your college (please check with your college adviser). English 282–283, 284–285, and 286-281 are approved for the English major.

ENGL 280-281 Creative Writing
Fall, spring, summer, winter session. 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, English 280–281 cannot be counted towards the 36 credits required for completion of the English major. It is a prerequisite for 300-level courses in writing, which count towards the major. English 280 is not a prerequisite for English 281.

An introductory course in theory, practice, and reading of prose, poetry, and allied forms. Students are given the opportunity to try both prose and verse writing and may specialize in one or the other. Many of the class meetings are conducted as workshops.

ENGL 382-383 Narrative Writing
Fall, spring. 3 credits. Each section limited to 15 students. Each section limited to 15 students. Previous enrollment in English 280 or 281 recommended. Prerequisite: permission of instructor, normally on the basis of a submission of written work are required. In the case of a well-written sample, the instructor may recommend the student for advanced work. The course is designed to develop the student’s understanding of how to write fiction and/or nonfiction. Students are given the opportunity to try both prose and verse writing and may specialize in one or the other. Many of the class meetings are conducted as workshops.
ENGL 480-481 Seminar in Writing  
Fall: 480; spring 481. 4 credits each term. Each section limited to 15 students. Students are encouraged to take English 280 or 281 and at least one 300-level writing course. Prerequisites: permission of instructor, normally on the basis of a manuscript. Fall: Sec. 1, L. Herrin; sec. 2, S. Vaughn. Spring: M. McCoy, S. Vaughn. Intended for those writers who have already gained a basic mastery of technique. Although English 480 is not a prerequisite for 481, students normally enroll for both terms and should be capable of a major project—a collection of stories or poems, a group of personal essays, or perhaps a novel—to be completed by the end of the second semester. Seminars are used for discussion of the students' manuscripts and published works that individual members have found of exceptional value.

200-Level Courses Approved for the Major

Students may take up to four 200-level courses for credit toward the English major.

Introductions to Literary Studies

These courses have no prerequisites and are open to freshmen and non-majors as well as majors and prospective majors.

ENGL 201-202 The English Literary Tradition 

201: Fall. 4 credits. Open to undergraduates who have completed the freshman writing requirement. English 201 is not a prerequisite for 202. This course may be used as one of the three pre-1800 courses required of English majors. G. Teskey. An introduction to the study of English literature examining its historical development and many of its highest achievements. Works to be read include Sir Gawain and the Green Knight, selections from Chaucer’s Canterbury Tales and Spenser’s Faerie Queene, Shakespeare’s A Midsummer Night’s Dream, poems by Jonson, Donne, and Herbert, and Milton’s Paradise Lost.

202: Spring. 4 credits. F. Bogel. A survey of English literature from the late seventeenth century to the early twentieth century, including poetry and some prose works from the Restoration and eighteenth century, the Romantic period, the Victorian period, and Modernism. Lectures and discussion sections.

ENGL 204 Mostly Poems and Stories  

Spring. 4 credits. R. Parker. Introduction to the pleasures of close reading, with special emphasis on analyzing the forms, structures, and rhetorical dynamics that characterize poems, prose narratives, and drama and contribute to their appeal. Some attention also to the ways that ideologies of power, whether those of gender, race, and cultural difference, impinge on how readers interpret literary works. The syllabus will include works from older as well as more recent periods; among them this semester will be works by Whitman, Elizabeth Bishop, and Seamus Heaney, stories by Nathaniel Hawthorne, Flannery O’Connor, and Julian Barnes; and such novels as George Eliot’s Adam Bede and Toni Morrison’s Jazz.

ENGL 208 Shakespeare and the Twentieth Century (also Comparative Literature 208)  

Fall. 4 credits. W. Cohen. What is the relationship between Shakespeare’s plays in their own time and the various ways they have functioned in modern culture? We will compare selected works of Shakespeare with their adaptations in fiction, theater, film, the educational system, government, and popular culture. The discussion of each play will be organized around one or more critical approaches. The course as a whole will attempt to provide a systematic introduction to the contemporary study of literature and culture.

ENGL 227 Shakespeare  

Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. B. Correll. The course will survey formal, historical and thematic aspects of representative Shakespearean drama: comedies, tragedies and history plays. (Majors and non-majors, see also Engl 327 Shakespeare.)

Major Genres and Areas

These courses are designed for freshmen and sophomores but are open to all students.

ENGL 235 Major Poets  

Spring. 4 credits. J. Culler. Intensive reading in the work of eight to ten poets chosen to represent important periods and modes of poetry. Poets to be studied may include William Shakespeare, John Milton, John Keats, Emily Dickinson, Walt Whitman, Gerard Manley Hopkins, Robert Frost, and A. R. Ammons.

ENGL 238 Readings in English Literature Spring. 3 credits. This course does not satisfy requirements for the English major. R. Farrell. English literature to 1800: This course is intended for non-majors, and is open to any student interested in literature and culture. Authors covered include Chaucer, Shakespeare, Jonson, Swift, and Pope. There will be a take-home mid-term and final, both open book. Students will be strongly encouraged to follow their own interests in two brief papers.

ENGL 274 Scottish Literature and Culture  

Fall. 4 credits. B. Correll. An introduction to the kinds of cultural forms we encounter in our studies and in our lives and to some of the literature that has been written about them. Examples will be selected from a range of texts, both “high” and “low”—literature, cinema, advertisements, music—chosen from historical and contemporary sources. The course will follow a lecture-discussion format.

ENGL 255 African Literature  

Spring. 4 credits. B. Jeyifo. An introduction to major African writers and literary traditions. Authors to be studied may include Wole Soyinka, Chinua Achebe, Bessie Head, Ayi Kwei Armah, Ama Ata Aidoo, Tayeb Salih and Ousmane Sembene.

ENGL 265 Introduction to American Indian Literatures (also American Studies 265)  

Fall. 4 credits. D. Moore. An introduction to Native American literatures. We will read a variety of genres—novels, short fiction, autobiography, poetry, oral traditions—spanning American publications through the last two centuries. Issues arising from the texts include aesthetics of orality and literacy; cultural change and survival; colonial identity politics; mythic histories; world views and ideologies; and contemporary political sovereignty. A goal of the course is to read historical American contexts through the eyes of Native American texts.

ENGL 266 Ethnic Literature: Bridges and Boundaries  

Spring. 4 credits. K. Shanley and S. Wong. The American literature that, William Carlos Williams noted, came from the mouths of Polish mothers” has also been shaped by the oral and written traditions of Native Americans, African Americans, U.S. Latinos, and Asian Americans whose literary production will be examined in this course. Works by writers in these traditions will be studied as sites marking the emergence of a contemporary American language and literature capable of representing the social realities of a multicultural nation. This course will focus especially on how each ethnic tradition uses the contested territories of geography, language, and gender in texts that both refer to and imaginatively construct communities and traditions based on collective experience.

ENGL 265 Contemporary African American Literature  

4 credits. To be offered 1998-99.

ENGL 274 Scottish Literature and Culture  

Fall. 3 or 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. The course may be taken for 3 or 4 credits; those taking it for 4 credits will complete an additional writing project. This course only counts towards the English major when taken for 4 credits. Non-majors are welcome. Enrollment limited to 20. 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 its 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 century.
and nineteenth 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 will include Henryson, Dunbar, Anonymous (the Scottish Ballads), Hume, Burns, Scott, Hogg, Stevenson, and Grasick Gibbon.

ENGL 275 The American Literary Tradition (also American Studies 275)
Fall and spring. 4 credits. Fall, B. Maxwell; spring, D. Moore.
The problem of an American national literature is explored through the reading, discussion, and close analysis of texts across the range of American literary history. Not a survey, this course focuses on the relations of the texts to each other, the shaping of national identities in those relationships, and the assumptions about history, language, and the self that underlie them.

ENGL 295 The Essay in English #
Spring. 4 credits. Prerequisite: completion of freshman seminar requirement. This course may be counted as one of the three pre-1800 literature courses required of English majors. L. Fakundiny.

ENGL 299 The Essay in English #
Spring. 4 credits. Prerequisite: completion of freshman seminar requirement. This course may be counted as one of the three pre-1800 literature courses required of English majors. L. Fakundiny.

Special Topics

ENGL 263 Studies in Film Analysis
Fall and spring. 4 credits. Enrollment limited to 20 students. Preference given to English majors. L. Bogel.
Fall: Special topic: Interpreting Hitchcock. Through detailed analysis of at least twelve of Hitchcock's major films—from British silents such as The Lodger and the British talkies of the 30's (The Thirty-Nine Steps) to the early 40's work in Hollywood (Shadow of a Doubt, Notorious), and major American films of his late period (Rear Window, The Birds)—we will consider Hitchcock as a major technical and stylistic innovator in the history of cinema. As texts for psychoanalytic and feminist approaches to study, his films invite questions about film language, the ethics of spectatorship, and the nature of desire and sexuality. Frequent short essays and viewing exercises encourage students to engage through their writing the course’s critical concerns. Students must be free to attend regular evening screenings and video showings of the films once or twice a week. Lab fee.

ENGL 268 The Culture of the 1960s
Spring. 4 credits. P. Sawyer.
The 1960s survive today as a quasi-mythical period and a constant reference-point for contemporary events. But what are the most useful ways to remember that turbulent decade? Was it a time of dangerous experimentation with drugs, sex, and alternative lifestyles, or the start of a pampered generation that gradually learned to straighten up and join the mainstream? Or was it a time of revolutionary hopefulness, when the civil rights movement and the Vietnam War stimulated a principled and impassioned critique of American society? How can the experiences of young "boomers" contribute to our understanding of the relation of these films to American culture, about the relation of these films to American culture, about Hollywood's changing constructions of "woman," the "maternal," and the "feminine," and questions about desire, pleasure, fantasy, and ideology in relation to the melodramatic heroine. Required weekly, evening screenings of such films as: Picnic, Now, Voyager, Rebecca, Mildred Pierce; The Women, Imitation of Life; Gilda; Leave Her to Heaven; Gaslight. Regular critical readings, frequent viewing questions, two longer essays, no exam. Students must be free to attend regular evening screenings and video showings of the films once or twice a week. Lab fee.

ENGL 280 Icelandic Family Sagas
Spring. 4 credits. T. Hill.
An introduction to the Icelandic family saga—the "native" heroic literary genre of Icelandic tradition. Texts will vary but will normally include the Prose Edda, the Poetic Edda, Hrafnkleis Saga, Njals Saga, Laxdaela Saga, and Grettis Saga. All readings will be in translation.

ENGL 311 Old English (also English 611)
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 provide a grounding in the Old English language, and precede the reading of some major texts in poetry, such as The Wanderer and The Battle of Maldon. No previous knowledge of Old or Middle English is required or expected. There will be both a mid term and a final, plus oral reports. Students will be encouraged to follow their own interests. Graduate students will be expected to do a substantial paper, or other research exercise.

ENGL 312 Beowulf (also English 612)
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. T. Hill.
A close reading of Beowulf. Attention will be given to relevant literary, cultural, and linguistic issues. One semester's study, or the equivalent, of Old English is a prerequisite.

ENGL 319 Chaucer
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. 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. Lectures will cover Chaucer's life, society, literary and linguistic context. There will be take home mid- and end-of-term exams, and student presentations.

ENGL 320 Literature of the English Renaissance (1500-1660)
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. R. Adams.
This course will focus on major works of English literature from the Renaissance period. Students will examine the works of Shakespeare, Marlowe, Webster, Jonson, Donne, Herbert, Bacon, Marvell, Suckling, Love, Burton and Browne, and others. Students will be encouraged to follow their own interests. Graduate students will be expected to do a substantial paper, or other research exercise.
ENGL 321 Spenser and Malory
4 credits. Limited to 45 students. This course may be used as one of the three pre-1800 courses related to English majors. To be offered 1998-99.

ENGL 325 The Culture of the Renaissance II (also Comparative Literature, History, E. Artis 364). Fall. 4 credits. C. Kaske and W. Kennedy. For complete description, see Comparative Literature 362.

ENGL 327 Shakespeare
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. Limited to 25 students. C. G. O. Petrie.

For both non-majors and majors in English who wish to encompass the reading and small-class discussion of some ten representative plays in the work of a single semester.

ENGL 328 The Bible
Spring. 4 credits. G. Teskey.
The purpose of the course is to provide students of English literature with a basic knowledge of that literature's most important, underlying text. Students will learn not only the significance of the division of the Bible into "old" and "new" testaments but of the important divisions within those two parts. The Old Testament will be examined with an eye to generic differences between, for example, the early narrative books (Genesis and Exodus), the books of the law (e.g., Leviticus), the prophetic books (e.g., Ezekiel), and the epic, historical books (e.g., first and second Kings). The New Testament will likewise be examined with an eye to differences: between the four gospel accounts of Jesus, between the various episodes of Paul on the meaning of Jesus for the institution of the church, and between the relatively straightforward history of the early church (in Acts) and the final, apocalyptic vision of the end of history (Revelation). Some account will be given of the historical contexts for the various parts of the Bible, in particular the fate of the Hebrew nation from about the sixth century B.C. and of the early Christian church under the Roman empire. But the main purpose of this course will be to elucidate the literary, indeed symbolic, historiography of the Bible, that is, of the poetic idea of human experience in time as having a total form. This form lay behind the organization of a vast array of separate writings in Hebrew, Aramaic, and Greek into one surprisingly coherent design. It is not the writings from which the Bible was made but rather this inner design that William Blake was referring to when he called the Bible "the great code of art." The King James Version (1611) will be used.

ENGL 329 Milton
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. G. Teskey.

An introduction to the life, poetry, and thought of John Milton, one of the most important English poet after Shakespeare.

ENGL 330 Restoration and Eighteenth-Century Literature
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. N. Sacchamano.

Close reading of 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 authority and fallibility of human knowledge; connections among melancholy, madness, and imagination. Works by such writers as Rochester, Dryden, Swift, Gay, Defoe, Johnson, Boswell, Sterne, and Cowper.

ENGL 333 The Eighteenth-Century English Novel
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. R. Bogel.

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-heroic modes; sentiment, sensibility, and sexuality; race and gender; and the forms and uses of narrative. Readings may include Behn's Oroonoko, Defoe's A Journal of the Plague Year, Richardson's Clarissa, Fielding's Joseph Andrews, Geddes's Memoir of a Woman of Pleasure, Johnson's Rasselas, Walpole's The Castle of Otranto, Sterne's Tristram Shandy, Moraes's The Man of Feeling and Auent's Pride and Prejudice.

ENGL 335 European Drama 1660-1900: Molière to Ibsen (also Comparative Literature 336)
Spring. 4 credits. R. Parker.

For complete description, see Comparative Literature 336.

ENGL 336 American Drama and Theatre (also Theatre Arts 336)
Spring. 4 credits. J. E. Gainor.

For complete description, see Theatre Arts 336.

ENGL 340 The English Romantic Period
Fall. 4 credits. C. Chase.

Readings in various writers from the late 1780s through the 1820s—among them Blake, Burke, Wordsworth, Coleridge, Byron, Mary Shelley, Percy Shelley, and Keats—with major emphasis on poetry but substantial collateral attention also to prose fiction, drama, letters, and criticism. The course will be centered both with formal experiments in narrative, lyric, and dramatic representation and with political and cultural contexts in an age of national reform and international revolution.

ENGL 345 The Victorian Period
Spring. 4 credits. S. Siegel.

How did the Victorians view themselves? This course will explore the controversies that divided literary culture: Should universities award higher degrees to women? Is "manliness" revealed through "character" or "behavior"? What kind of behavior is "masculine"? Does the study of "primitive men" reveal truths about the present? Should the "Colonies" be allowed to rule themselves? Should women be allowed to vote? Should some artworks be censored? Do machines degrade the works? Can "esthetic" experience replace "religious" experience? Is our time marked by progress or decline? Readings will include the poetry of the Brownings, the Rossettis, Swinburne, Tennyson and Yeats, plus Arnold, Carlyle, Morris, Pater, and Ruskin; paintings by Burne-Jones, Hunt, Shaw, and Whistler; and three novels: Great Expectations, The Mill on the Floss and The Picture of Dorian Gray.

ENGL 350 The Modern Tradition I: 1890-1930
Fall. 4 credits. D. Schwartz.

Critical study of major works by Hardy, Conrad, Lawrence, Joyce, Woolf, Eliot, Yeats, Hopkins, Wilde, W. H. Davies, and T. S. Eliot. While the emphasis will be on close reading of individual works we shall place the authors and works within the context of literary and intellectual history. The course will seek to define the development of literary modernism (formal but not exclusively) and to relate literary modernism in England to that in Europe and America as well as to other intellectual developments. We shall be especially interested in the relationship between modern literature and modern painting and sculpture; on occasion, we shall look at slides.

ENGL 351 The Modern Tradition II: Modernism and the Two World Wars
Spring. 4 credits. English 350 is not a prerequisite. M. Hite.

This class will examine the relation of important English, Irish and U.S. modernist poetry, fiction and essays to the violence and ideological upheavals of the first half of the century. We will pay special attention to working and personal correspondences between some (but not all) of the following writers: W. B. Yeats, Ezra Pound, H. D., T. S. Eliot, James Joyce, Mina Loy, Virginia Woolf, W. H. Auden, Marianne Moore, Ford Madox Ford and Jean Rhys. Requirements include online coursework discussion assignments, two critical papers, a take-home midterm and a take-home final.

ENGL 353 Postcolonial Literature
Spring. 4 credits. S. Mohanty.

Topic: Modern Indian Literature and Culture. A survey of twentieth-century literature, film, and other cultural productions from the Indian subcontinent. Our approach will be thematic and historical, and the course will include some works by historians, anthropologists, and social theorists (e.g., Karl Marx, Bipan Chandra, M. N. Srinivas, Romila Thapar). Literary works by Anglophone writers as well as those from various regional traditions such as Hindi, Oriya, Marathi, Bengali, and Tamil (to be read in translation). Texts will be selected in part to represent the variety and diversity of styles, attitudes, and voices that constitute modern "Indian" writing—from R. K. Narayan and Rabindranath Tagore to Nissim Ezekiel and Jayanta Mohapatra, and from Salman Rushdie and Anita Desai to Gopinath Mohanty, Mahasweta Devi, and Agha Shahid Ali. Films and videos will be used to deepen our understanding of emerging cultural trends and social movements.

ENGL 355 Decadence (also Comparative Literature 355 and Women's Studies 355)
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, unnatural, or morbid, the so-called "decadent" writers of the late-nineteenth century sought to free the pleasures of beauty and sexual desire from their more conventional ethical moorings. We will focus primarily on the various ways that decadence
became a powerful trope for the articulation of proscribed sexual pleasures. We will focus in particular on five writers, Charles Baudelaire, Leopold von Sacher-Masoch, J. K. Huysmans, Walter Pater, and Oscar Wilde. Topics for discussion will include homophobia and sexual encoding, androgyny and sexual inversion, sodomy and Satanism, lesbianism and vampirism, cultural and linguistic difference, paranoia, masochism and mysticism, chastity and sublimation, Catholicism and Hellenism, and the dandy.

ENGL 356 Postmodernist Fiction
Fall. 4 credits. M. Hite.
This class will explore experimental (i.e., weird, counterrealist, "difficult") fiction written in the post-World War II period by some (but not all) of the following writers: Kathy Acker, Margaret Atwood, John Barth, Jorge Luis Borges, Christine Brooke-Rose, Angela Carter, Theresa Hak Kyung Cha, Robert Coover, Don DeLillo, Nathaniel Hawthorne, Vladimir Nabokov, Thomas Pynchon, Ishmuel Reed, Salman Rushdie, Joanna Russ, Meredith Steinbach, Kurt Vonnegut, Fay Weldon. We will also read some criticism and theory dealing with writing and conditions, or movement described as "postmodern." Requirements include online newsgroup participation, two critical papers, a take-home midterm and a take-home final.

ENGL 361 Early American Literature
(also American Studies 361)
Fall. 4 credits. This course may be used as one of the three-1800 Courses required of English majors. S. Samuels.
An exploration of national identities in the formative British colonial period, including the relation of sexualities, religions, narrative practices, and encounters with other cultures to the contested formulations of destiny and free will in determining and explaining an American national character. Moving from early contact narratives through the conflicts that led to revolution and beyond, this course will consider American writing from the 1630s to the 1830s; among other sources, we will read sermons, diaries, journals and poetry of the Puritans, captivity narratives, autobiographies and how-to manuals; in the 1830s, we will approach the literature of the last fifty years mindful of this double perspective of closeness and distance, familiarity and strangeness. Topics will include the particular difficulties of judging contemporary writing, the establishment, maintenance, and decay of literary reputations within the context of cultural institutions; the literary disruption of Cold War consensus models, the redefinitions of American literature in the wake of the social movements of the period; and the importance of poetry and poetics; and problematic populist revivifications of poetry via rap and performance poetry. The reading list will be chosen from the following: fiction by Saul Bellow, Paul Bowles, Carson McCullers, Jack Kerouac, Vladimir Nabokov, Tllie Olsen, Alexander Trocchi, N. Scott Momaday, Walter Abish, Don DeLillo, and Carolivia Herron; poetry by James Baldwin, Norman Mailer, and Joan Didion. Time permitting, we will look at a recent collection of illustrated stories, Ben Katchor's Julius Knipl, Real Estate Photographer.

ENGL 362 The American Renaissance
(also American Studies 362)
Spring. 4 credits. J. Porte.
American writing from the 1830s through the 1850s, with emphasis on the major literary achievements of Emerson, Poe, Hawthorne, Thoreau, Melville, Whitman and Dickinson. We shall also study Douglass's 1845 Narrative and Stowe's Uncle Tom's Cabin.

ENGL 363 The Age of Realism and Naturalism (also American Studies 363)
Spring. 4 credits. J. Goldsby.
Literary history tells us that realism was an aesthetic movement that emerged in American fiction at the turn of the 19th century. Cultural histories of the era tell us that realism emerged as a social ideal debated by Americans as they coped with the revolutionary changes that turned their worlds upside down between the Civil and First World Wars. This course moves between these two accounts in order to appreciate the varied styles and issues that comprised the literature of American realism at the turn of the 19th century. Possible authors include Charles Chesnutt, Stephen Crane, Rebecca Harding Davis, Theodore Dreiser, Charlotte Perkins Gilman, William Dean Howells, Henry James, Mark Twain, and Edith Wharton.

ENGL 364 American Literature Between the Wars (also American Studies 365)
Spring. 4 credits. L. Herrin.
This course will concern itself with American writers between the two World Wars. Fiction writers may include Faulkner, Hemingway, Porter, Fitzgerald, Richard Wright, and others. Poets will include William Carlos Williams and T. S. Eliot and other poets. We will also read non-fiction prose writers, and, perhaps, dramatists (O'Neill). Interpretive papers and a final.

ENGL 365 American Literature Since 1945
(also American Studies 369)
Spring. 4 credits. B. Maxwell.
At one moment the literature of the last half of the twentieth century may appear wholly contemporary, and at the next sunken or embedded in a world that is historically and aesthetically remote. We will approach the literature of the last fifty years mindful of this double perspective of closeness and distance, familiarity and strangeness. Topics will include the particular difficulties of judging contemporary writing, the establishment, maintenance, and decay of literary reputations within the context of cultural institutions; the literary disruption of Cold War consensus models, the redefinitions of American literature in the wake of the social movements of the period; historicity and referentiality in the period; the redefinitions of American literature in the wake of the social movements of the period; the redefinitions of American literature in the wake of the social movements of the period; and the importance of poetry and poetics; and problematic populist revivifications of poetry via rap and performance poetry. The reading list will be chosen from the following: fiction by Saul Bellow, Paul Bowles, Carson McCullers, Jack Kerouac, Vladimir Nabokov, Tllie Olsen, Alexander Trocchi, N. Scott Momaday, Walter Abish, Don DeLillo, and Carolivia Herron; poetry by James Baldwin, Norman Mailer, and Joan Didion. Time permitting, we will look at a recent collection of illustrated stories, Ben Katchor's Julius Knipl, Real Estate Photographer.

ENGL 366 The Nineteenth-Century American Novel (also American Studies 366)
# To be offered 1998-99.

ENGL 370 Nineteenth-Century English Novel (also American Studies 370)
# 4 credits. To be offered 1998-99.

ENGL 371 American Poetry to 1950
(also American Studies 371)
# 4 credits. To be offered 1998-99.

ENGL 372 English Drama to 1700 (also Theatre Arts 372)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. S. McMillin. Major plays and other events in the English theatre, from the medieval craft cycles through the age of Shakespeare and into the Restoration period. Writers include Marlowe, Kyd, Shakespeare, Dekker, Jonson, Middleton, Beaumont and Fletcher, Webster, Wycherley and Congreve.

ENGL 373 English Drama from 1700 to the Present (also THETR 373)
# 4 credits. To be offered 1998-99.

ENGL 374 Nineteenth-Century American Women Writers (also Women's Studies 374 and American Studies 374)
Spring. 4 credits. L. Brown.
In this cross-cultural examination of nineteenth-century American women writers, we will contrast a variety of nineteenth-century works of fiction, poetry, and non-fiction produced by black American writers from the period of the Harlem Renaissance, to the present. Readings will include works by authors such as Louisa May Alcott, Lydia Marie Child, Kate Chopin, Sui Sin Far, Margaret Fuller, Pauline Hopkins, Sarah Winnemucca Hopkins, Frances Harper, Harriet Beecher Stowe, and Harriet Wilson.

ENGL 375 Survey in African American Literature to 1917 (formerly English 369) (also American Studies 375)
Fall. 4 credits. J. Porte.
This course surveys the first half-century of African American novel production (1850-1912), with these as our founding propositions: what prompts African American authors to embrace the novel as a specific mode of expression in these years? How do they incorporate the major traditions of American novel writing (e.g., romance, sentimentalism, realism, naturalism, and modernism) into their writing? What are the social fictions of race that not only require but inspire these writers to invent narrative strategies that challenge the conventions of the novel as such? Authors will include Frederick Douglass, William Wells Brown, Harriet Jacobs, Charles Chesnutt, Pauline Hopkins, Paul Laurence Dunbar, and James Weldon Johnson.

ENGL 376 Survey in African American Literature: 1918 to present
Spring. 4 credits. H. Spillers.
This course will select its readings from the genres of poetry, drama, 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 poems 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's 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. (Cane, The Autobiography of an Ex-Colored Man, Passing, The Autobiography of Malcolm X, Letter from an Birmingham Jail, Black Boy, Invisible Man, Flight to Canada, Ombreding Tales, Middle Passage, Jazz, and The Bedouin Hornbook will be among the selected texts for the spring term.) The course is designed for majors, but will be open to all interested students.

ENGL 377 Gay Fiction (also Women's 376)
# 4 credits. To be offered 1998-99.
ENGL 381 Reading as Writing
See complete course description in section headed Expository Writing.

ENGL 382-383 Narrative Writing
See complete course description in section headed Creative Writing.

ENGL 384-385 Verse Writing
See complete course description in section headed Creative Writing.

ENGL 386 Philosophic Fictions
See complete course description in section headed Expository Writing.

ENGL 388-389 The Art of the Essay
See complete course description in section headed Expository Writing.

ENGL 390 Autobiography: Memoir, Memory, and History
Fall. 4 credits. L. Falundo.
Central to this course is the question: how does the life constructed in memoir, through the personal activity of “remembering,” assimilate and position the “public,” or cultural, contexts? How, in other words, does history inhabit memory and how does memory personalize history? How aware is the constructed self (the life that is being remembered) of his or her historical moment, and to what ends is the self historicized in a given memoiristic text? A core list of readings might be chosen from the following modern works in English: Nabokov’s Speak Memory, Wright’s American Hunger (the restored 1991 edition of Black Boy), Hurston’s Dust Tracks on a Road, Hemingway’s A Moveable Feast, Welty’s One Writer’s Beginnings, Crews’s Childhood. The Autobiography of a Place, Soyinka’s Ake. The Years of Childhood, Nir’s The Lost Childhood, Hoffman’s Lost in Translation, Man’s Red Azalea, Suleri’s Meatless Days, Gates’s Colored People, Wolf’s In Pharaoh’s Army, Conway’s Road from Coorain, Lessing’s Under My Skin, Santiago’s When I was Puerto Rican, Kari’s The Liars Club. Additional texts—considered (in excerpt) for their self-conscious and/or fictive enactments of memoiristic conventions—might include Kaplan’s French Lessons, Stein’s The Autobiography of Alice B. Toklas, Naipaul’s A Way in the World. Also required: a critical reading of two substantial critical papers or a critical paper and an essay-length memoir.

[ENGL 391 Irish Studies: Since the Eighteenth Century
4 credits. To be offered 1998-99]  

ENGL 392 Asian American Literature (also Asian American Studies 392 and American Studies 392)
Fall. 4 credits. S. Wong.
This course will introduce students to a range of writing by Asian Americans and to some critical issues concerning the production and the reception of Asian American texts. In reading through selected works of prose, poetry and drama, we will be asking questions about the relation between literary forms and the sociohistorical context within which they take on their meanings, and about the historical formation of Asian American identities.

ENGL 393 Survey of U.S. Latino/a Literature (also LSP 393)
Spring. 4 credits. H. M. Vira Montes.
This course seeks to introduce students to the growing body of literature across time, space and genre (poetry, fiction, theater, performance art, testimonial narrative) that is being produced by the various Latina/o communities that have maintained or recently established a strong presence in the “United States of America.” Concurrent with our study of literature as belles lettres the course will examine how Latina/o authors of various heritages—Chicano (Mexican American), Puerto Rican, Cuban American, Dominican American, Salvadoran American and “Mixed-Blood”—converge and diverge as they explore issues of race and class, gender and sexuality, as well as ideology, identity and culture in general. For example, what is the relation of a given text to the history of the Latino group to which the author belongs? How do the various literary forms and formats deployed by Latina/o authors interact with particular historical exigencies such as the various Black, Native American and Latino Civil Rights Movements? What, for instance, is the significance of Spanish, Caló, Nahua, English and various forms of bilingualism and multiculturalism to the “Huysmon” verse in the 1960s? Furthermore, how are various paradigms of cultural nationalism revisited in subsequent eras by Latinas and Latinos? How is popular culture manifested in these texts, and what are the various ideological statements being made by these representations? What do these authors reveal about the limits of various sociological models of analysis such as notions of acculturation, assimilation, accommodation? What does post-modernism mean for U.S. Latinos, or should this question be inverted? And, in general, how are various power relations-articulated along gender, race, class and culture—negotiated? Authors examined include Julia Alvarez, Lorna Dee Cervantes, Junot Diaz, Cristina García, Oscar Hijuelos, Cherrie Moraga, Willie Perdomo, Miguel Piñero, Tomás Rivera, Esmeralda Santiago, Helena María Viramontes, and others.

ENGL 394 Topics in American Indian Literature (also American Indian Studies 394 and American Studies 394)
Spring. 4 credits. D. Moore.
Native Cultural Studies. The course is an interdisciplinary exploration of the literature, history, and politics of various American cultures and their conceptual universes. Questions range from comparative studies of land-based versus transcendent religious to issues of cultural appropriation, economic development, tribal sovereignty, and other contemporary contexts of Native American literature.

[ENGL 395 Video: Art, Theory, Politics (also Theatre Arts 395)
4 credits. Not offered 1998-99]

Courses for Advanced Undergraduates

Enrollment in courses at the 400 level is generally limited by prerequisite or permission of the instructor.

ENGL 401 The Sexual Child (also English 401 American Society for the Humanities 418)
Fall. 4 credits. E. Hanson.
For complete course description, see Society for the Humanities 418.

ENGL 402 Literature as Moral Inquiry
Fall. 4 credits. To be offered 1998-99.

[ENGL 403 Studies in American Poetry
4 credits. Not offered 1998-99]

ENGL 404 History into Fiction: Nazis and the Literary Imagination (also Comparative Literature 404 and German Studies 414)
Fall. 4 credits. E. Rosenberg.
The twelve years of Hitler’s rule remain the most critical, “longest” years of the 20th century. We shall read some seven or eight texts by Anglophone and Continental novelists (and a few playwrights and poets) that explore the salient features of the regime: Weimar, Hitler’s scenario and his rise to power (e.g., Mann’s “Mario and the Magician,” Isherwood’s Goodbye to Berlin, Faulkner’s “Percy Grimm”); civilian life in Nazi Germany and the rise of anti-Semitism (Brecht’s “The Jewish Wife” and other one-acters, Sartre’s “Childhood of a Leader,” Grass’s Tin Drum); World War II and the occupation of Europe (Camus’s The Plague, Heinrich Böll’s short fiction, Anne Frank’s Diary); genocide and a glimpse at post-War Germany (e.g., Weiss’ The Investigation, Borowski’s This Way for the Gas, Spiegelman’s Maus, Celan’s “Lyrics by Yvonne Sachs, Anthony Hecht”). Brief ancillary selections by historians and memoirists (Arcndt, Primo Levi, Bruno Bettelheim). Two papers; no exam.

ENGL 405 The Politics of Contemporary Criticism
Fall. 4 credits. S. Moody.
An introduction to some of the major issues in contemporary criticism and theory, with primary focus on such questions as: What is a literary or cultural text? What is interpretation and what are its limits? 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, and feminism), we will examine the competing claims of the various positions and focus on the implications of answers to the above questions in actual critical analysis. Readings from Clanchy Brooks, Paul de Man, Jacques Derrida, Shoshana Felman, Michel Foucault, Hans-Georg Gadamer, Fredric Jameson, Toni Morrison, Barbara Herrnstein Smith, Charles Taylor, and Richard Rorty, among others. Two papers and a weekly journal.

ENGL 407 The Geography of Race (also Asian American Studies 407)
Fall. 4 credits. S. Wong.
The frontier, the Mariboran Man, the open road, riding the rails—just a few of the defining topos of an American understanding of space and its role in the making of Americans. In recent decades, the longstanding—and highly cherished—American romance with mobility has been retooled by its encounter with a postmodern celebration of liminality, border crossing and ephemerality. This course looks at how this encounter holds both promises and perils for minority subject formation, and for the production and the reception of Asian American and African American literature. Other topos to be visited along the way may include nationalism, transnationalism, diaspora, and travelling. Readings will include works by some of the following writers: Gwendolyn Brooks, Carlos Bulosan, Joy Kogawa, Toni Morrison, Li-Young Lee, Bharati Mukherjee, Ann Petry, Frank Chin, Jessica Hagedorn, James Weldon Johnson,
James Baldwin, Carolivia Herron, Theresa Cha, and Shawn Wong.

413 Middle English (also English 613)
Fall. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. T. Hill.
This course surveys the literature of late medieval England, beginning with the cultural, literary, and linguistic collapse of standard Old English and proceeding to the age of Chaucer and perhaps a bit beyond. Readings will move through chronicles, homilies, lyrics, and acknowledged literary masterpieces such as The Owl and the Nightingale, the works of the Pearl poet, selections from Piers Plowman, and other poems from the "alliterative revival."

[ENGL 416 Chaucer and the Politics of Love #]
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 1998-99.]

[ENGL 417 Early Medieval Archaeology and Literature (also English 817, Archeo 417, & 617)
Spring. 4 credits. Permission of the professor is required, and the number of students will be limited to fifteen. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 1998-99.]

420 Objects Lost and Found: Psychoanalysis and the Scene of Reading (also English 620 and Society for the Humanities 420)
Spring. 4 credits. Jacobus.
For complete course description, see Society for the Humanities 420.

[ENGL 423 Seventeenth-Century Lyric #]
4 credits. To be offered 1998-99.]

ENGL 424 Freud and Sex: Trauma and the Object (also English 624 and Society for the Humanities 405)
Fall. 4 credits. M. Jacobus.
For complete course description, see Society for the Humanities 405.

[ENGL 425 Elizabethan and Jacobean Drama #]
4 credits. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 1998-99.]

ENGL 427 Shakespeare #
Fall and Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors.
Fall: Romance and Courtesy C. Levy.
A study of themes and patterns in Shakespeare's later history plays (Richard II, Parts I and II, Henry IV, and Henry V) in the perspective afforded particularly by Castiglione's Book of the Courtier, Machiavelli's Prince, A Mirror for Magistrates, and Sidney's The Countess of Pembroke Arcadia. Among topics to be explored are growth, responsibility, play, order, and community. Two short papers and a term-paper of about ten pages. Each student will conduct class-discussion on topics he or she has explored for two of those papers and on at least one other topic. No final examination.
Spring: Later Shakespeare S. McMillin.
A reading of major plays from the second half of Shakespeare's career, with particular emphasis on Othello and Winter's Tale. Particular attention to the theory of theatre

and acting implied by these texts. Prerequisite: English 327, or a comparable survey of Shakespeare.

ENGL 429 Readings in the New Testament (also Near Eastern Studies 429, Comparative Literature 429 and Religious Studies 429) #
Fall. 4 credits. J. Bishop.
For complete description, see Comparative Literature 429.

[ENGL 431 Studies in Enlightenment (also Women's Studies 431) #]
4 credits. This course may be used as one of the three pre-1800 courses required of English majors. To be offered 1998-99.

ENGL 433 The Invention of Humanity: Passion and Experience in the 17th and 18th Century
Spring. 4 credits. This course may be used as one of the three pre-1800 courses required of English majors. N. Saccomano.
This course will investigate the role played by the passions in "inventing" the notion of a "common humanity" that has been dominant in our culture for over two centuries. We will examine the ways in which the stress on the body, individual experience, and sexuality in writings of the seventeenth and eighteenth centuries challenges or reinforces definitions of human nature and gave rise to new forms of discourse (auto/biographical essay, genealogical history, novel). Concentrating primarily on literary works of various genres, we will also read some moral and political philosophy. Topics will include the social and political significance of passion from "possessive individualism" to the gender politics of sentimentalism; the "savage" in histories of human nature; and the relationship between the "common humanity" and modernity. We will also examine Rousseau's notion of "common humanity" as a concept for the education of the indigent poor.

ENGL 434 Electronic Art, Cultural Memory, Baroque Theory (also English 634 and Society for the Humanities 421)
Spring. 4 credits. T. Murray.
For complete course description, please see Society for the Humanities 421.

ENGL 437 Fictions of Apartheid and Modes of Liberalism #
Fall. 4 credits. B. Jeyifo.
This course involves a study of selected works of four major contemporary writers from South Africa, Athol Fugard, Nadine Gordimer, Andre Brink, and J. M. Coetzee. The iconography includes drama, fiction, and the essay. Issues to be examined include apartheid and the deformations of a refined modernity, interpellations of racialized and gendered identity by the juridical and cultural texts and practices of apartheid, multiculturalism in the South African context, the place of the aesthetic artifact in the dismantling of apartheid and the transition to a post-Apartheid South Africa.

[ENGL 442 Austen and the Eighteenth Century #]
4 credits. To be offered 1998-99.]

[ENGL 443 The Dandy in London and Dublin: 1790-1890 #]
4 credits. To be offered 1998-99.]

[ENGL 446 Victorian Poetry #]
4 credits. To be offered 1998-99.]

[ENGL 448 The American Short Story #]
4 credits. To be offered 1998-99.]

ENGL 450 The History of the Book
Spring. 4 credits. Limited to 20 students. Prerequisite: permission of the instructor. D. Edely.
A study of the physical object of books printed during the last six centuries. Included are papermaking, typography and printing, bookbinding, and the anatomy of book illustrations; the transmission of texts and bibliographical descriptions of hand-printed and modern trade books. Above all, this is the study of the book as a work of art.

ENGL 454 American Musical Theatre (also Music 490 and Theatre Arts 46)
Spring. 4 credits. Prerequisite: English 272 or Theatre Arts 240-41 plus ability to read music at the level of Music 105 S. McMillin.
A close reading of some seven or eight leading examples of the American musical, together with their sources, from Showboat to Sweeney Todd. A chronological approach will give a historical basis to the course, but the prime concern will be with 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 Rogers and Hammerstein's Carousel and its source, Molnar's Liliom; the Gershwin's Porgy and Bess and its source, Dubose Heyward's novel Porgy; Loesser and Burrows's Guys and Dolls, and its source, stories by Damon Runyon; Bernstein's West Side Story and its source, Romeo and Juliet.

ENGL 457 The Pathological Public Sphere (also English 657 and Society for the Humanities 409)
Fall. 4 credits. M. Selzer.
For complete course description, see Society for the Humanities 409.

[ENGL 459 Contemporary British Drama #]
4 credits. To be offered 1998-99.]

ENGL 463 Problems in the Novel: Murder and Crimewriting
Spring. 4 credits. M. Selzer.
An investigation of the representation of murder across a range of novels, non-fictional accounts, and film. Focus on turn of the century and recent materials.

ENGL 465 Proseminar in American Studies (also AmSt 465)
Spring. 4 credits. J. Porte.
For complete description, see American Studies 465.

ENGL 466 Studies in American Fiction: 1870-1915 (also American Studies 467)
Fall. 4 credits. Prerequisite: a lower-level course in American literature. Limited to 15. J. Porte.
A study of novels and stories by such writers as Mark Twain, Henry James, William Dean Howells, Sarah Orne Jewett, Stephen Crane, Kate Chopin, Theodore Dreiser, Gertrude Stein, Edith Wharton, James Weldon Johnson, and Willa Cather.

[ENGL 468 Studies in American Fiction: 1870-1915 (also American Studies 467)
Fall. 4 credits. To be offered 1998.]

ENGL 469 William Faulkner
Fall. 4 credits. H. Spillers.
This course will examine selected writings of William Faulkner, beginning with some of the early novels (Sartoris, The Birds of the-Past, 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 letters. As a socially written writer, Faulkner is traditionally confined to the character study of exotic types, but his systematic functional exploration of “violence and the sacred” provides a powerful clue to the larger issue of 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
Spring. 4 credits. D. Schwarz.
A thorough episodic-by-episodic study of the art and meaning of Joyce’s Ulysses. We shall place Ulysses in the context of Joyce’s canon, Irish culture, and literary modernism. We shall explore the relationship between Ulysses and other experiments in modernism—especially painting and sculpture—and show how Ulysses redefines the concepts of epic, hero, and reader. We shall discuss how Ulysses raises major issues in literary study and tests various critical and scholarly approaches. Such a self-conscious inquiry into theories and methods should prepare students to confront other complex texts. No previous experience with Joyce is required.

ENGL 471 American Indian Women’s Literature (also Women’s Studies 471 and American Indian Studies 471)
Fall. 4 credits. K. Shanley.
Through a variety of genres—fiction, poetry, the non-fictional essay, and autobiography—as well as media other than writing, we will explore what it means and has meant to be an indigenous woman in North America. Although our focus will be on American Indian women in the United States, we will touch on the experiences of Canadian Native women. Beginning with early tribal histories as expressed in the autobiographies, we will look at the way Indian women fit in their respective cultures, their roles in their families and communities, and the geographical and inter-cultural circumstances of their lives. The most famous Indian women such as Pocahontas and Sacagawea—have earned their places in American mainstream culture based on heroism enacted primarily to benefit non-Indians. How historically accurate are such portrayals and how representative are such women of other Native women? These and many other questions will guide us throughout the term. In addition to works about/ by historical figures, we will read works by well-known contemporary writers such as Leslie Silko, Louise Erdrich, Beth Brant, Joy Harjo, and others. The student’s grade will be based on two formal papers and a number of informal writing assignments and reports. Background in American Indian history is not required.

ENGL 480-481 Seminar in Writing
Fall, spring. 4 credits. See complete description in section headed Creative Writing.

ENGL 482 Forms of Poetry
Fall. 4 credits. R. Morgan.
Part survey of the evolution of forms in poetry in modern English. In a 3-hour workshop, the course will focus on the formal aspects of poetry from the time of Sir Thomas Wyatt to the early 20th century. Students will write examples of the forms studied and give short presentations in class. Particular attention will be paid to the word forms from other languages and earlier cultures have been introduced and adapted, reinvigorating poetry in English, for example, the Italian sonnet, the French villanelle, the classical ode, and the Chinese Tang lyric.

ENGL 481 Honors Seminar I
Fall. 4 credits. Open to students in the Honors Program in English or related fields, or by permission of instructor.

ENGL 482 Honors Seminar II
Spring. 4 credits. Open to students in the Honors Program in English or related fields, or by permission of instructor.

Section I: Writing the Civil War (also American Studies 402) S. Samuels.
This course will consider 19th-century male and female American writers who take on the story of the war. We will pay attention to accounts of wounding, healing, violence, slavery, romance, and nation-building enterprises and will read authors such as Melville, Whitman, Stowe, Alcott, Southworth, and Child. Course requirements will include in-class presentations, short research projects, and a longer research paper.

Section II: Narrators and Readers: Austen, Eliot, Forster, H. Shaw
A close look at representative works by three authors central to the classic realist novel. We will be particularly interested in how novelists use their narrators to share complex visions of life in society. Students should emerge from the course with a richer sense of how to read these three novelists and others, an acquaintance with a variety of critical approaches, and a notion of how one goes about doing extended writing on narrative fiction. Short papers and a longer writing project.

ENGL 483 Honors Essay Tutorial I
Fall or spring. 4 credits. Prerequisites: senior standing and permission of Director of the Honors Program.

ENGL 484 Honors Essay Tutorial II
Fall or spring. 4 credits. Prerequisites: English 493 and permission of Director of the Honors Program.

ENGL 495 Independent Study
Fall or spring. 2-4 credits. Prerequisites: Permission of departmental adviser and director of undergraduate studies.

Courses Primarily for Graduate Students

Permission of the instructor is a prerequisite for admission to courses numbered in the 600s. These are intended primarily for graduate students, although qualified undergraduates are sometimes admitted. Undergraduates seeking admission to a 600-level course should consult the instructor. The list of courses given below is illustrative only; a definitive list, together with course descriptions and class meeting times, is published in a separate department brochure before course enrollment each term.

Graduate English Courses for 1997-98

ENGL 600 Colloquium for Entering Graduate Students
Fall

ENGL 602 Literature and Theory (also English 502, Comparative Literature 302, and Comparative Literature 322)

ENGL 604 Paleography, Bibliography, and Reception History for 14th-17th Century Literature

ENGL 611 Old English (also English 311)

ENGL 613 Middle English (also English 413)

ENGL 615 Piers Plowman

ENGL 624 Freud and since: Trauma and the Object (also English 424 and Society for the Humanities 405)

ENGL 627 Studies in Shakespeare: Shakespearean Tragedy

ENGL 636 Richardson and Fielding

ENGL 641 Studies in Romantic Writing: Byron, Shelley, Keats, and the Issue(s) of Romanticism

ENGL 649 Victorian Fiction and the Sphere (also English 457 and French Literature 703 and Theatre 703)

ENGL 657 The Pathological Public Sphere (also English 457 and Society for the Humanities 409)

ENGL 665 Studies in Early American Literature

ENGL 685 Reconstructing the Era: Nineteenth Century African American Women’s Literature and Society (also Women’s Studies 685)

ENGL 695 Race, Colonialism, and Contemporary Theory

ENGL 703 Theorizing Film: Race, Nation, Psychoanalysis (also French Literature 703 and Theatre 703)

ENGL 780.1 MFA Seminar: Poetry

ENGL 780.2 MFA Seminar: Fiction
GEOLOGICAL SCIENCES


As an intercollege unit, the Department of Geological Sciences offers degree programs in both the College of Arts and Sciences (B.A. degree) and the College of Engineering (B.S. degree).

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 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 policy makers and ordinary citizens. Because the human need to understand the earth is so pervasive, we provide our students with a broad and solid minimal set of required courses plus room to explore more specialized topics with well-chosen electives within and outside the department. The Geological Sciences Major prepares students for advanced study in geology, geophysics, geochemistry and geobiology, and careers in mineral and petroleum exploitation or in environmental geology. 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 field work and involvement in research projects. Facilities include equipment for processing seismic signals and digital images of the earth's surface, instruments for highly precise isotopic 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.

The Department of Geological Sciences is taking part in a new intercollege program in the Science of Earth Systems (SES). In the College of Arts and Sciences, this program can be taken as a separate major administered by the Department of Geological Sciences (described in more detail in the section at the front of this catalog, "Interdisciplinary Centers, Programs, and Studies"). The Geological Sciences major emphasizes the structure, composition, and evolution of our planet, while the SES major is more concerned with currently active processes on and near the earth's surface where the interactions of water, life, rock and air produce our planetary environment. The SES major is for students interested in careers in atmospheric, hydrological and ocean sciences, environmental chemistry (biogeochemistry), and environmental geophysics.

The prerequisites for admission to a major in geological sciences in the College of Arts and Sciences are two two-semester sequences in mathematics and physics, MATH 111-112 or MATH 191-192 and PHYS 207-208 or PHYS 112-213, or their equivalents, and a semester course in chemistry, such as CHEM 207 or 211. GEOL 101 or GEOL 201 followed by GEOL 102 or GEOL 104 are strongly recommended, but a student with a strong foundation in mathematics and science may be accepted as a major without completion of an introductory sequence.

Majors take GEOL 210 and GEOL 214, the five 300-level core courses listed below, 6 credits of additional course work from geological 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 4 credit options: (a) GEOL 491-492 (Undergraduate Research, 2 credits each) with a significant component of field work; (b) GEOL 491 or 492 based on field observations obtained in GEOL 212 (Special January Field Trip, 2 credits) or GEOL 417 (Field Mapping in Argentina, 3 credits) for a combined 4-credit minimum; (c) GEOL 437 (Geophysical Field Methods, 3 credits) plus at least 1 credit of GEOL 491 or 492 using geophysical techniques from GEOL 434; or (d) An approved outdoor field course taught by another college or university (4 credit minimum).

Core Courses

GEOL 326 Structural Geology
GEOL 355 Mineralogy
GEOL 356 Petrology and Geochemistry
GEOL 375 Sedimentology and Stratigraphy

GEOL 388 Geophysics and Geotectonics

Prospective majors should consult R. W. Kay, director of undergraduate studies, or another faculty member 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 Geological Sciences.

Courses offered at the 100 and 200 level are open to all students. Certain 300- and 400-level courses in geology also may be of particular interest to students of chemistry, biology, ecology, and physics. Students are encouraged to inquire about courses that interest them at the department office in Snee Hall.

Honors. An honors program is offered by the Department of Geological 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 (geological Sciences 491 or 492). Students interested in applying should contact the director of undergraduate studies during the second semester of the junior year.

GEOLOGICAL SCIENCES 405

FRENCH LANGUAGE AND LINGUISTICS

See Languages and Linguistics.

FRENCH LITERATURE

See Department of Romance Studies.

FRESHMAN WRITING SEMINARS

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, see "Special Programs and Interdisciplinary Studies" at the end of the Arts and Sciences section of this catalog and consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in November for the spring term.
COURSES

Freshman and Sophomore Courses

GEOL 101 Introductory Geological Sciences
Fall, spring, or summer. 3 credits. Fall: W. B. Travers; spring: J. M. Bird; summer: W. Brice.

Designed to enhance an appreciation of the physical world. Natural environments, surface features, 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). Water, mineral, and fuel resources; environmental concerns. Field trips in the Ithaca region.

GEOL 102 Evolution of the Earth and Life (also Bio G 170)
Spring, summer. 3 credits. Spring: J. L. Cisne.


GEOL 104 The Sea: An Introduction to Oceanography (also BIO ES 154)
Spring, summer. 3-4 (4 credits with lab section) credits. Spring: C. H. Greene, W. M. White; summer: L. Godfrey.

A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include: sea-floor spreading and plate tectonics, marine sedimentation, chemistry of seawater, ocean currents and circulation, the oceans and climate change, ocean ecology, coastal processes, marine pollution, and marine resources.

GEOL 105 Writing on Rocks (Freshman Seminar)
Fall. 3 credits. J. Chiment.

See Freshman Seminar Handbook for description.

GEOL 106 Vertebrate Fossil Preparation
Spring. 1 credit. Prerequisites: one introductory geology course or concurrent enrollment, class size is limited. J. Chiment.

A laboratory-oriented course that will expose students to techniques of vertebrate fossil preparation. Roughing-out and fine preparation of large specimens in solid matrix will be covered, as well as screen washing and microscope techniques for the recovery of micro-vertebrate remains. Specialized scanning techniques will be discussed.

The class will meet for one hour each week for the first six weeks of the semester. Students will be assigned to an individual or group project requiring two hours of participation each week for the remainder of the semester.

GEOL 107 How the Earth Works
Fall. 1 credit. J. L. Cisne.

A S/U/IR friendly introduction to the workings and interactions of solid earth, ocean, atmosphere, and life as they relate to understanding ongoing global change.

GEOL 108 Geology and Society
Spring. 1 credit. May be taken concurrently with or after GEOL 101, 102, 104, 111, or 201. Not offered 1997-98. T. E. Jordan.

Intended for students who are curious about the impact of geological materials and processes on society, what geologists actually do, what the big questions are in current research, and what geology might hold in store. A different speaker each week takes a look at topics ranging from environmental law to natural resources to agriculture.

GEOL 109 Dinosaurs
Fall. 1 credit. J. L. Cisne.

An entry-level survey course for those who are interested in dinosaurs and may lack a science background. Lectures examine the fossil evidence and illustrate how various geological and biological disciplines contribute to understanding dinosaurs and their world.

GEOL 111 To Know the Earth and Build a Habitable Planet
Fall. 3 credits. J. M. Bird.


GEOL 122 Earthquakes! (also ENGR 122)
Fall. 3 credits. L. D. Brown.

The science of natural hazards and strategic resource use in the 21st century and an environment­ally sound fuel-minerals cycle.

GEOL 123-124 Science of Earth Systems (also SCAS 123-124, ENGR 123-124)
SCAS 101-102 and SES 101-102)
For description, see the Science of Earth Systems section in "Interdisciplinary Centers, Programs, and Studies," in the front part of the catalog.

GEOL 125 Global Environment (also ENGR 125)
Fall. 2 credits. Prerequisites: GEOL 101 or 201 or equivalent, and permission of instructor. Staff.

Appropriate for students who have completed GEOL 101 or 201 and have passed GEOL 123-124, or have equivalent course work. An introductory course in the Earth sciences. Topics include: global climate, the greenhouse effect, ozone depletion, water resources, coastal and ocean resources. Credit for only one of GEOL 125 or ENGR 125.

GEOL 126 Global Environmental Science (also ENGR 126)
Spring. 2 credits. Prerequisites: ENGR 123-124.

An introductory course in the Earth sciences. Topics include: global climate, the greenhouse effect, ozone depletion, water resources, coastal and ocean resources. Credit for only one of GEOL 125 or ENGR 125.

GEOL 210 Introduction to Field Methods in Geologic Sciences
Fall. 3 credits. Prerequisite: GEOL 101, 102, or permission of instructor. Weekly field sessions. A weekend field trip.

GEOL 211 Marine Geology
Fall. 3 credits. J. Chiment.
The science of marine geology, oceanography, and the study of the Earth's oceans. Emphasis on the physics, chemistry, and biology of the oceans for both science and non-science majors. Topics include: sea-floor spreading and plate tectonics, marine sedimentation, chemistry of seawater, ocean currents and circulation, the oceans and climate change, ocean ecology, coastal processes, marine pollution, and marine resources.

GEOL 212 Marine and Coastal Geology
Summer. 2 credits. Prerequisites: GEOL 101 or 201 or equivalent, and permission of instructor. Staff.

A special one-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, G14 Stimson Hall. Estimated cost for 1998 (including tuition, room, board, and ferry transportation) is $895.

For description, see the Science of Earth Systems section in "Interdisciplinary Centers, Programs, and Studies," in the front part of the catalog.

GEOL 214 Western Adirondack Field Course
Spring, one week at the end of the semester. 1 credit. Prerequisite: GEOL 210 or equivalent, or permission of instructor. Students should be prepared for overnight camping and share in the cost of camp meals. Independent project. W. A. Bassett.

Field mapping methods, mineral and rock identification, examination of Precambrian metamorphic rocks and lower Paleozoic sediments, talc and zinc mines.

Junior, Senior, and Graduate Courses

Of the following, the core courses GEOL 326, 355, 356, 375, and 380 may be taken by B.S. candidates who have successfully completed GEOL 201 or the equivalent, and by B.A. candidates who have completed GEOL 101 or the equivalent, or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

Weathering cycle: chemical cycles, CO2 (weathering), rock cycle, controls on global temperature (CO2 or ocean currents), oil and mineral resources.

GEOL 203 Natural Hazards and the Science of Complexity
Fall. 3 credits. Prerequisites: 1 calculus course. D. L. Turcotte.

Studies of natural hazards: earthquakes, volcanic eruptions, floods, hurricanes, tornadoes, severe storms, wildfires, meteor impacts. Applications of the science of complexity to natural hazards: fractals, chaos, and self-organized criticality.

GEOL 210 Introduction to Field Methods in Geologic Sciences
Fall. 3 credits. Prerequisite: GEOL 101, 102, or permission of instructor. Weekly field sessions. A weekend field trip.

S. Mhulburg Kay.

The methods by which rocks are used as a geological database. Field methods used in the construction of geologic maps and cross sections; systematic description of stratigraphic sections. Field and laboratory sections on Saturday mornings until Thanksgiving. One additional lecture during most of these weeks. One weekend field trip to eastern New York.

GEOL 212 Special January Field Trip
Fall. 2 credits. Prerequisites: GEOL 101 or 201 or equivalent, and permission of instructor. Staff.

A trip of one week to ten days during January intersession in an area of interesting geology in the lower latitudes. Interested students should contact the instructor during the early part of the fall semester.

GEOL 213 Marine and Coastal Geology
Summer. 2 credits. Prerequisites: GEOL 211 or equivalent, or permission of instructor. Staff.

A special one-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, G14 Stimson Hall. Estimated cost for 1998 (including tuition, room, board, and ferry transportation) is $895.
GEOL 302 Evolution of the Earth System
(also SES 332 and SCAS 302)
For description, see the Science of Earth Systems section in “Interdisciplinary Centers, Programs, and Studies,” in the front part of the catalog.

GEOL 321 Introduction to Biochemistry
(also SES 321, 201) C"D 201
Fall. 4 credits. Prerequisites: college level chemistry, plus a course in biology and/or geology. L. A. Derry, J. Yavit.
Control and function of the Earth’s global biochemical cycles. The course begins with a review of the basic inorganic and organic chemistry of biologically significant elements, and then considers the biochemical 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 mathematical models. Interactions between global biochemical cycles and other components of the Earth system are discussed.

GEOL 326 Structural Geology
Spring. 4 credits. Prerequisite: GEOL 101 or 201, or permission of instructor. Visiting Professor Alexandra Moore.
Nature and origin of deformed rocks at microscopic and macroscopic scales, with emphasis on structural geometry and kinematics. Topics include stress, strain, rheology, deformation mechanisms, minor structures, faulting, folding, and structural families.

GEOL 335 Mineralogy
Fall. 4 credits. Prerequisite: GEOL 101 or 201 and Chem 207 or permission of instructor. W. A. Bassett.
Examination of minerals by hand-specimen properties and optical microscopy. Geological setting, classification, crystal structures, phase relations, chemical properties, and physical properties of minerals. X-ray diffraction is introduced. Independent research project.

GEOL 355 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: GEOL 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.

GEOL 375 Sedimentology and Stratigraphy
Fall. 4 credits. Prerequisite: GEOL 101 or 201. J. L. Cisne.

GEOL 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 208, 213, or equivalent. B. L. Jacks.
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.

GEOL 411 Satellite Remote Sensing of Geology, Earthquakes, Erosion
Fall. 3 credits. Prerequisite: Permission of instructor. B. L. Jacks.
Instruction in satellite remote sensing, image processing, geographic information systems (GIS) and analysis of digital elevation models, using advanced computer workstations, via participation in current research on earthquake, mountain glaciers, and erosion processes.

GEOL 417 Field Mapping in Argentina
Summer. 3 credits. Prerequisites: GEOL 210 and 326; Spanish desirable, but not required. S. M. 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 Pampach Ranges (Pie de Palo), and shallow-level intrusive silicic intrusions (Cerro Blanco-Ullan).

GEOL 423 Petroleum Geology
Fall. 3 credits. Recommended. GEOL 426. Offered alternate years. W. B. Travers.
Introduction to hydrocarbon exploration and development. Exploration techniques, including well logs, fluid pressures, seismic reflection methods, gravity, and magnetic measurements to map subsurface structures and stratigraphy. Petroleum origin and migration. Dispersal systems and depositional patterns of petroleum reservoirs. Economics of exploration, leasing, drilling and production. Estimates of petroleum reserves, including tar sands and oil shales.

GEOL 434 Reflection Seismology
Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 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, processing and interpretation in both 2D and 3D. 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.

GEOL 437 Geophysical Field Methods
Fall. 3 credits. Prerequisites PHYS 213 and MATH 192 or equivalents, or permission of instructor. L. D. Brown.
Introduction to field methods of geophysical exploration, especially as applied to environmental issues. Emphasis on seismic, gravity, and magnetic techniques. Field surveys carried out at the beginning of the semester are analyzed under the guidance of the instructor. Field trips are planned on a weekly follow-up basis. The results are analyzed and interpreted. A field companion to GEOL 436, which is recommended but not required prior to this course.

GEOL 445 Geohydrology (also ABEN 471 and CAEE 431)
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.

GEOL 452 X-Ray Diffraction Techniques
Spring. 3 credits. Prerequisites: GEOL 355 or permission of instructor. Offered alternate years. W. A. Bassett and staff.
Automated X-ray diffractometers, Debye-Scherrer, real-time Laue, high-temperature diffraction, high-pressure diffraction, and plo­­figure analysis. Applications in materials science and geological sciences. Labs will be held in the new Materials Science X-Ray Facility.

GEOL 453 Advanced Petrology
Fall. 3 credits. Prerequisite: GEOL 356. Offered alternate years. Not offered 1997–98. R. W. Kay.
Magma formation and metamorphism in the context of plate tectonics. Major and trace element chemistry and phase relations 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.

GEOL 461 Introduction to Meteorology
Spring. 4 credits. Prerequisites: GEOL 101 or 201, or permission of instructor. W. M. White.
The Earth from a chemical perspective. Formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and Solar System. Application of the heat engine concept to the Earth. Processes occurring in the oceans, atmosphere, and hydrosphere including the carbon and water cycles. Examination of the atmosphere, crust, mantle, and core. Weathering and the chemistry of natural waters. Chemical evidence regarding the formation of the Earth and Solar System. Trace-element geochemistry, isotope geochemistry, geochronology, and geothermometry.

GEOL 465 Geochimistry
Fall. 4 credits. Prerequisites: Chemistry 207 and Mathematics 192 or equivalent. Recommended: GEOL 356. Offered alternate years. W. M. White.
The Earth from a chemical perspective. Formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and Solar System. Application of the heat engine concept to the Earth. Processes occurring in the oceans, atmosphere, and hydrosphere including the carbon and water cycles. Examination of the atmosphere, crust, mantle, and core. Weathering and the chemistry of natural waters. Chemical evidence regarding the formation of the Earth and Solar System. Trace-element geochemistry, isotope geochemistry, geochronology, and geothermometry.

GEOL 470 Volcanology
GEOL 475 Special Topics in Oceanography
Spring, 2-5 var. credits. Prerequisites: GEOL 104 or BIO ES 154, and permission of instructor. C. H. Greene Undergraduate instruction and participation in advanced areas of oceanographic research. Topics will change from term to term. Contact instructor for further information.

GEOL 478 Sedimentary Basins: Tectonics and Mechanics
Spring. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years. Not offered 1997-98. T. E. Jordan. Subdivision of sedimentary basins from the point of view of plate tectonics and geomechanics. Interactions of subdivision, sediment supply, and environmental characteristics in development of stratigraphic sequences. Stratigraphic characteristics of active-margin, passive-margin, and cratonic sequences. Stratigraphic characteristics of sediment supply, and environmental characteristics. Numerical modeling. Sequence stratigraphy. Modern and ancient examples.

GEOL 497 Paleobiology (also BIOES 479)
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and either BIOES 274, 373, GEOL 375, or permission of instructor. Offered alternate years. W. Allmon. A survey of the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of geology students and the geological backgrounds of biology students concerned with the nature and significance of the fossil record for their respective studies.

GEOL 481 Senior Survey of Earth Systems
Fall. 3 credits. Limited to seniors majoring in geological sciences. 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). Guest lecturers; synthesis and review literature; scientific literature readings; discussions; student presentations.

GEOL 491-492 Undergraduate Research
Fall, spring. 1 or 2 credits. Staff. (M. A. K. Kay, coordinators). 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 the instructor, and guided by a staff member. A short written report is required, and outstanding projects are prepared for publication.

GEOL 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 two or more semesters. L. M. Cathles. The project may address one of many aspects of groundwater flow and contamination, and must involve a significant geological component and lead to concrete recommendations or conclusions of an engineering nature. Results are presented orally and in a professional report.

GEOL 502 Case Histories in Groundwater Analysis
Spring. 4 credits. L. M. Cathles. Groundwater flow in a specific area, such as a proposed nuclear-waste disposal site, analyzed in depth. Geological and resource data on the area are presented early in the course. Then the material is analyzed by students working as an engineering analysis team. Each student makes a weekly progress report and writes part of a final report. Results are presented in a half-day seminar at end of term.

GEOL 522 Advanced Structural Geology I
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. Not offered 1997-98. R. W. Allmendinger. Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental strain measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and chemical 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.

GEOL 524 Advanced Structural Geology II

GEOL 622 Advanced Structural Geology
Fall. 3 credits. Prerequisite: GEOL 455 or permission of instructor. Offered alternate years. L. A. Kerry. Dynamics of biogeochemical systems. Kinetic treatment of biogeochemical cycles. Box models, residence time, response time. Analytical and numerical solutions of model systems. Eigen-analysis of linear systems. Feedback and nonlinear cases, problems of uncertainties in natural systems. Modeling software such as Stella II and Matlab, applications to current research of participants or from recent literature.

GEOL 651 Analysis of Biogeochemical Systems
Spring. 3 credits. Open to undergraduates. Prerequisite: GEOL 455 or permission of instructor. Offered alternate years. W. M. White. Nucleosynthetic processes and the isotopic abundances of the elements. Geochronology and cosmochronology using radioactive decay schemes, including U-Pb, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmogenic isotopes such as 14C and 230Th. 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, paleotemperature, paleontology, and the global climate system.

GEOL 681 Geotectonics
Fall. 3 credits. Prerequisite: permission of instructor. J. M. Bird. Theories of orogeny; ocean and continental evolution. Kinematics of lithosphere plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms—corollaries and evidence from crustal features.

GEOL 695 Computer Methods in Geological Sciences
Fall, spring. 3 credits. L. Brown, B. L. Isacks. Independent research projects using state-of-the-art computational resources in the Department of Geological Sciences. Possibilities include: image and seismic processing, seismic and geomechanical modeling, GIS, use of interpretational workstations for 3D seismic and satellite imagery; modeling fluid flow through complex media.

GEOL 700-799 Seminars and Special Work
Fall, spring. 1-3 credits. Prerequisite: permission of instructor. Staff. Advanced work on original investigations in geological sciences. Topics change from term to term. Contact appropriate professor for more information.
GEOL 722 Advanced Topics in Structural Geology

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

GEOL 733 Fractals and Chaos—Independent Studies
D. L. Turcotte.

GEOL 751 Petrology and Geochemistry
S. Mahlburg Kay, R. W. Kay.

GEOL 753 Advanced Topics in Mineral Physics
W. A. Bassett.

GEOL 755 Advanced Topics in Petrology and Tectonics
J. M. Bird, W. A. Bassett.

GEOL 757 Current Research in Petrology
S. Mahlburg Kay, R. W. Kay.

GEOL 762 Advanced Topics in Petroleum Exploration
Fall. W. B. Travers.

[GEOL 771 Advanced Topics in Sedimentology and Stratigraphy]

GEOL 773 Paleobotany
J. L. Cusne.

GEOL 775 Advanced Topics in Oceanography
Spring. C. H. Green.

GEOL 780 Earthquake Record Reading
Fall. M. Barazangi.

GEOL 781 Geophysics, Exploration Seismology
L. D. Brown.

GEOL 783 Advanced Topics in Geophysics
B. L. Isacks.

GEOL 789 Lithospheric Seismology (COCORP Seminar)
L. D. Brown.

GEOL 793 Andes-Himalaya Seminar

GEOL 795 Low Temperature Geochemistry
L. A. Derry.

GEOL 796 Geochemistry of the Solid Earth
W. M. White.

GEOL 797 Fluid-Rock Interactions
L. M. Cathles.

GEOL 799 Soil, Water, and Geology Seminar
L. M. Cathles, T. S. Steenhuis.

GERMAN STUDIES

L. Adelson, acting chair, fall; A. Groos, chair, spring; D. Ezerigailis, director of undergraduate studies; P. T. Hohendahl, director of graduate studies; D. Bathrick, D. Brenner, B. Buettner, H. Deinert, P. Gilgen, B. Martin, A. Schwarz, G. Waite.

The Department of German Studies offers students a wide variety of opportunities to discover the literature and culture of German-speaking countries, whether as part of their general education, a major in German Studies or a double major involving another discipline, preparation for graduate school or an international professional career. Courses are offered in English as well as German, and range from medieval to contemporary literature as well as from film and visual culture to intellectual history, music, history of psychology, and women's studies.

The department's offerings in German begin with a series of Freshman Writing Seminars introducing various aspects of German literature (the fairy-tale and romantic narratives, twelfth-century writers such as Kafka, Hesse, Mann, Brecht), issues in mass culture and modernity, problems of German national identity, and cinema and society. A variety of courses in English translation is also offered on the 300- and 400-level, exploring 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.

Students wishing to begin German at Cornell enroll in GERLA 121-122 in the Department of Modern Languages. Those successfully completing this sequence, or those who place into the 200-level, may pursue further language study in that department or begin with the literature and cultural studies tracks in German Studies. The beginning sequence of 200-level courses in German Studies, with readings and discussion in German, is designed to provide further grounding in the language as well as introduce German language (GERST 201-202) and cultural studies (GERST 220). Beginning in spring 1998, GERST 201 and GERLA 203 will be replaced by GERST GERLA 200. More advanced courses introduce majors and other qualified students to a broad variety of literary and cultural topics in German-speaking countries.

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 a SAT II score of 660 or higher must take the CASE examination for placement in courses above GERST 201 or GERLA 203. 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/culture and German area studies, the latter 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; Women's Studies).

The department encourages double majors and makes every effort to accommodate prospective majors with a late start in German.

Students interested in a major should consult the director of undergraduate studies, Ina Ezerigailis, 178 Goldwin Smith Hall.

German (Literature/Culture)

Although the emphasis of this track is on literature, majors can 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, GERST 220, or GERLA 204.

To complete the major, a student must:

1. demonstrate competence in the German language by successful completion of GERLA 304 or the equivalent.
2. complete six courses in German Studies at the 300 level or above. One of these must be the Senior Seminar (GERST 410).

German Area Studies

Students select courses from the Department of German Studies as well as courses with a substantial German component from other departments, such as Comparative Literature; Government; History; Music; Theatre, Film, and Dance; Women's Studies; etc.

Admission:

By the end of their sophomore year, prospective majors should have successfully completed GERST 202, GERST 220, or GERLA 204.

To complete the major, a student must:

1. demonstrate competence in the German language by successful completion of GERLA 304 or the equivalent.
2. complete six courses with a substantial German component at the 300 level or above. Three of these must be in German Studies, including the Senior Seminar (GERST 410).
3. select a committee of two 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

The department encourages undergraduate majors to consider studying abroad for 1-2 semesters, normally during the junior year, as regular students at a German-speaking university. Interested students should consult Bonnie Buettner (German Studies) or Gunhild Lischke (Department of Modern Languages) as early as possible.

Honors

Eligibility: A student wishing to receive honors in German Studies must have a GPA of 3.5 in all courses relevant to the major.

Committee: Candidates for honors form an advisory committee consisting of an advisor from German Studies and at least one additional member.

Honors essay: During the first term of their senior year, students determine the focus of their honors essay through an appropriate course or in independent study under the
direction of their advisors. During the second term they complete an honors essay, which will be evaluated by the committee.

**Determination of honors:** An oral examination concludes the process. The level of honors will be determined by the essay, the exam, and grades in the major.

**Freshman Writing Seminar Requirement**
The following courses may be used to satisfy the freshman writing seminar requirement: German 109, 111, 150, 151 and 175. For details, students should consult the instructors.

**Freshman Writing Seminars**
See Freshman Seminar booklet for course times and descriptions.

**GERST 109 From Fairy Tales to the Uncanny: Exploring the Romantic Consciousness**
Fall or spring. 3 credits. B. Buettner, P. Gilgen, and staff.

**GERST 111 Workshop in German Studies**
Fall. 3 credits. H. Deinert.

**GERST 130 Metropolis, Modernity, and Mass Culture: The Roaring Twenties, German-style**
Fall or spring. 3 credits. B. Buettner, P. Gilgen and staff.

**GERST 150 Imagining Germany/s**
Fall or spring. 3 credits. B. Buettner, P. Gilgen and staff.

**GERST 151 Kafka, Hesse, Brecht, and Mann**
Fall or spring. 3 credits. H. Deinert.

**GERST 175 Cinema and Society**
Fall or spring. 3 credits. G. Waite and staff.

**Courses Offered in German**

**GERST 200 Contemporary Germany (also GERLA 200)**
Spring. 3 credits. Prerequisite: qualification in German (LPG score of 56-64 or SAT II score of 580-670 or GERLA 123). Fulfills the Arts and Sciences language proficiency requirement and can be used in partial fulfillment of the Arts and Sciences humanities distribution requirement. Staff.

An intermediate language course designed to provide an introduction to modern German culture and literature while students develop language proficiency. Students examine issues that shape German society, literature, and thought as reflected in short stories, poems, socio-cultural and political texts, video, and audio materials. Selected themes include "Beyond the Wall: German Unification," "Germany: a Multi-cultural Society?", "Speaking and Identity," and "Musikszene." Oral and written work and individual and group presentations emphasize accurate and idiomatic expression. Successful completion of the course enables students to continue with more advanced courses in language, literature and culture. This course replaces GERST 201 and GERLA 203.

**GERST 201 Introduction to German Literature I: Prose**
Fall. 3 credits. Prerequisite: qualification in German or permission of instructor. Taught in German. Fulfills the language proficiency requirement and can be used in partial fulfillment of the humanities distribution requirement. B. Buettner.

An intermediate course designed to introduce major German-speaking authors of the twentieth century and to improve oral and written German language skills. Selected prose works of Bachmann, Brecht, Kafka, Mann, Dürrenmatt, Aichinger, and others explore problems of subjectivity and identity in modern society. Review of selected points of grammar; emphasis on developing reading competency and accurate and idiomatic expression in class discussion and written assignments; expansion of vocabulary. Beginning in spring 1998, GERST 201 and GERLA 203 will be replaced by GERST/GERLA 200.

**GERST 202 Introduction to German Literature II: Drama**
Fall or spring. 3 credits. Prerequisite: GERST 201, GERLA 203, or permission of instructor. Taught in German. Can be used in partial fulfillment of the humanities distribution requirement. B. Buettner and P. Gilgen.

An intermediate course designed to introduce the work and basic drama theories of major Austrian, Swiss and German dramatists. Selected plays by Dürrenmatt, Brecht, Frisch, Borchert, Hein, and others explore major social and political issues of twentieth-century German culture. Emphasis on further improvement in oral and written German, expansion of vocabulary and basic familiarity with modern literature in German. Review of grammar as needed.

**GERST 220 Was Ist Deutsch?**
Spring. 3 credits. Taught in German. Prerequisite: one German course at the 200 level. B. Buettner.

Questions of German identity have always raised difficult issues—both for Germans themselves and for others. These issues are again taking center stage as Germans redefine themselves in a reunified Germany. How has the concept of "Germanness" evolved? How do past perceptions of identity impinge on the present? Through selections from film, literature, art, and music we will explore this peculiarly German question.

**GERST 307 Modern Germany**
Spring. 4 credits. Prerequisite: GERST 201-202 or equivalent. Taught in German. L. Adelson.

Introduction to the history of postwar Germany, the development and unification of the two Germanys, and their societies. The emphasis is on cultural and social institutions as well as political and intellectual debates. Focal topics include responses to the Nazi past, Germany and Europe, protest movements, migration patterns, women, mass media, and youth, and others. We will consider the changes taking place in Germany today in light of the recent past. Some films will also be shown.

**GERST 312 Workshop in German Studies II**
Not offered 1997-98.

**GERST 315 From Dawn Song to Requiem: Introduction to German Poetry**
Fall. 4 credits. Prerequisite: GERST 201-202 or equivalent. Readings in German. I. Ezergailis.

Reading selected German verse, from the Middle Ages through the Baroque to Goethe, Heine, and the Romantics; from Rilke to Gelan, Ingeborg Bachmann, and other twentieth-century authors, we will pay attention to the microcosm of each poem as well as to its contexts—socio-political, cultural, and aesthetic—and consider the formal constraints and the enabling openings of writing in verse.

**GERST 320 Postwar German Novel**
Spring. 4 credits. I. Ezergailis.

A reading, in English translation, of such post-1945 German novelists as Grass, Böll, Johnson, and Christa Wolf. This course is recommended for the concentration in modern European studies.

**GERST 330 Political Theory and Cinema**
(also COM L 330, GOVT 370 and THETR 329)
Fall. 4 credits. G. Waite.

This course provides an introduction to some fundamentals of current film analysis and political theory and their relationship to one another. Our investigation has two main aspects. On the one hand, we will be interested in the work of film-makers who have been particularly concerned to rehash ideas about politics in the cinematic medium. On the other, we will attempt to develop a way of reading political theory using techniques borrowed from cinema and vice versa—thus forging between these two disciplines productive analogies that are not necessarily based on influence. We will study not only mainstream but also experimental and low-budget films; similarly, we will find political theory in obscure places, as well as more obvious ones. While the course has a historical perspective, the main emphasis will be on contemporary work. Our texts/films will be taken from the works of such thinkers/filmmakers as: P. Pasolini, J.-L. Godard, S. Eisenstein, D. Vertov, G. Romero, R. Corman, M. von Trott, D. Cronenberg, T. W. Adorno, W. Wenders, R. Fassbinder, A. Kluge, P. K. Dick, W. Benjamin, G. Deleuze, M. Gorris, K. Tahimik, L. Strauss, K. Marx, J. G. Fichte, L. Althusser, R. Scott, L. Butteluel, A. Gramsci.

**GERST 342 The New Europe**
(also GOVT 342)
Not offered 1997-98.

**GERST 353 Kleist #**
Not offered 1997-98.

**GERST 354 Schiller #**
Not offered 1997-98.

**GERST 357 Major Works of Goethe**
(1749-1832)
Spring. 4 credits. Prerequisite: GERST 201-202 or equivalent. Please consult instructor. Seminar discourse in English and German. H. Deinert.

Poet, statesman, artist, scientist, rebel, conservative, mythmaker and iconoclast, Goethe stands at the center of Germany's beloved Renaissance. Taking his early cues...
from Homer, Shakespeare and the Bible, he created cultural icons at once modern and steeped in tradition. We will examine works from all phases of the man’s incredibly productive life against the background of political turmoil in Europe and the Americas. We will use art, music and theater as additional tools of interpretation.

GERST 385 Austrian Literature
Spring. 4 credits. Prerequisite: GERST 201-202 or permission of instructor. I. Ezergailis.
A careful study of texts by Austrian authors writing between the turn of the century and World War II, a productive and controversial time that includes the demise of the Austro-Hungarian Empire. We will read some drama and poetry, but most of the texts will be medium-length prose pieces and excerpts from longer ones. The diverse list includes figures such as Arthur Schnitzler, Franz Kafka, Marie von Ebner-Eschenbach, Karl Kraus, Rainer Maria Rilke, and Robert Musil.

Courses in English Translation
GERST 320 Postwar German Novel
GERST 330 Political Theory and Cinema (also COM L 330, GOVT 370 and THETR 329)
GERST 374 Opera and Culture (also MUSIC 374 AND ITALL 374) *
For description, see Music 574.

GERST 378 German Aesthetic Theory: From Kant to Hegel *
Fall. 4 credits. Readings and discussion in English. P. Gilgen.
Beginning with Kant’s Critique of Judgment (1790), German philosophy around 1800 is concerned with the philosophical status of the beautiful and of art. Especially in Romantic theory and practice, art is meant to provide a solution to the philosophical dilemmas in the wake of Kant’s critical philosophy. But already in Hegel’s Phenomenology, and more explicitly in the Encyclopedia and the Lectures on Aesthetics, art loses its elevated position vis-à-vis philosophy. Taking this observation as a guiding thread, this course is structured around in-depth readings of Kant’s Critique of Judgment and the “Introduction” to Hegel’s Lectures on Aesthetics. Further readings will include Schiller, Schelling, Schlegel, Novalis, and Hölderlin. The following questions will be addressed: What are the conditions for the move from the subjective judgment of taste (Kant) to objective beauty (Romantics, Hegel)? How is the relation of art and nature reconceived by the Romantics, particularly Schelling? What is the relation of aesthetic theory and the history of art? In the concluding part of the course, we will discuss contemporary philosophers whose work on aesthetics relies explicitly on Kant’s and/or Hegel’s theories, such as Adorno, Danto, and Lyotard.

GERST 383 German Literature of the Twentieth Century
Fall. 4 credits. Taught in German. Prerequisite: GERST 201-202 or permission of instructor. L. Adelson.
This survey course introduces students to twentieth-century German literature in its historical, social, and aesthetic contexts. Discussion of representative literary texts will be emphasized. Readings will include works by Thomas Mann, Georg Kaiser, Marie Luise Fleisser, Bertolt Brecht, Anna Seghers, Heinrich Boll, Christa Wolf, Ingeborg Bachmann, Ulrich Plenzdorf, Botho Strauss, Peter Schneider, and Vera Kamenko.

GERST 396 German Film (also COM L 396 and THETR 396)
Spring. 4 credits. Prerequisites: participation in class discussion, one paper, midterm, and final. D. Bathrick.
This course will explore German film from the Weimar and Nazi periods to the present in relation German and will proceed in a context of which it was a part. Readings and lectures will be devoted to formal and cultural developments historically as well as interpretative analysis of selected individual films.

GERST 398 The Poetic and the Political: A Look at Some German Women Writers
Not offered 1997-98.

GERST 408 Uncanny Communities (also COM L 412 and WOMNS 413)
Not offered 1997-98.

GERST 411 Theory, Pathology, and Treatment (also S HUM 412)
Fall. 4 credits. B. Martin and C. Miller.
For complete description, please see S HUM.

GERST 413 Women around Freud (also COM L 412 and WOMNS 413)
Not offered 1997-98.

GERST 414 History Into Fiction: Nazis and the Literary Imagination (also ENGL 404, COM L 404, and NES 404)
For description, see ENGL 404.

GERST 415 Marx, Freud, Nietzsche (also COM L 425 and GOVT 473)
Not offered 1997-98.

GERST 418 Thomas Mann
Not offered 1997-98.

GERST 442 German Jewish Culture: From the Enlightenment to the Present (also JWST 442 and S HUM 444)
Spring. 3 credits. This introductory course is designed for undergraduates who do not read German. Centered in a cognitively cumulative fashion, starting with past developments in order to elucidate the present. D. Brenner.
We will examine debates surrounding minority identity by discussing fiction, autobiography, essay, and film by “German Jews” from the Enlightenment through the post-Holocaust period. The course will confront the social, cultural, and religious conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch. Authors to be addressed include: Moses Mendelssohn, Solomon Maimon, Heinrich Heine, Karl Marx, Sigmund Freud, Arthur Schnitzler, Martin Buber, Hannah Arendt, Gertrud Kolmar, Nelly Sachs, Else Lasker-Schüler, Franz Kafka, Fritz Lang, Henriek Galeen, Paul Celan, Walter Benjamin, Maxim Biller, Rafael Seligmann, Katja Behrens, Barbara Honigmann, Henryk Broder, Esther Dischereit, Peter Stephan Jungk, Rachel Abraham, Irene Dische, George Mosse, and others.

GERST 450 Representing the Holocaust, Then and Now (also JWST 451 and S HUM 450)
Fall. 3 credits. Limit 20 students.
D. Brenner.
It has been argued that the most brutal crime humans have committed against humankind was the “Final Solution.” The Nazis attempted and nearly successful destruction of European Jewry. Gypsies, the disabled, homosexuals, communists, Jehovah’s Witnesses, Poles, and Russians were also singled out for persecution. Since the end of the Second World War, numerous social scientists and cultural historians have tried to describe how and why such genocides occurred. Writers, poets, memoirists, artists, filmmakers, museum curators and others have also attempted to represent and communicate the experiences of Holocaust survivors, victims and perpetrators. Mediated through cultural forms and practices, a number of Holocaust “discourses” have developed, particularly in the United States—and leading many critics to decry the “Americanization” of the Holocaust.
In this seminar, we will consider the ways in which the events of 1938-1945 have been, might be, and will be remembered. Exactly how these events are represented is contingent upon a number of factors: political, social, psychological, literary, linguistic, etc. We will frequently make comparisons of a cross-cultural and cross-historical nature (i.e., “here and there,” “then and now”) as well as discussing the implications of Holocaust representations for the practice of tolerance and cultural diversity.

GERST 456 Comparative Democritization (also GOVT 456)
Not offered 1997-98.

Course in Latvian and Baltic Literature
GERST 377 Perfection of Exile? Baltic Emigré Literature (also RUSSL 377)
Not offered 1997-98.

Graduate and Advanced Undergraduate Courses
GERST 405 Introduction to Medieval German Literature I *
Not offered 1997-98.
GERST 406 Introduction to Medieval German Literature II *
Not offered 1997-98.

GERST 410 The Brothers Mann: Senior Seminar
Fall. 4 credits. Readings and discussion in German. I. Ezergailis.
The relationship of Thomas and Heinrich Mann has been described as “a brotherhood in which German history was mirrored...in all its agony.” We will read selected texts by the Mann brothers—novels, short stories, essays, publicistic pieces, and letters—to examine the dynamic of a brothers’ strife that illuminates confrontations and tensions of a whole culture at a decisive time in German history. Some background material will provide the social, political, and intellectual context.

GERST 412 German Literature from 1770 to 1848 *
Not offered 1997-98.
GERST 430 Brecht, Artaud, Müller, Wilson (also COM L 430 and THETR 420)
Not offered 1997-98.
GERST 435 Introduction to Literary Theory (also COM L 439)
Not offered 1997-98.

GERST 447 Reading Freud: Gender, Race, and Psychoanalysis (also COM L 447 and WOMENS 447)
Not offered 1997-98.

GERST 451-452 Independent Study
451, fall; 452, spring. 1-4 credits each term. Prerequisite: permission of instructor.

GERST 472 Poetry of the 1990s (also COM L 472, ENGL 408, and SPANL 472)
Not offered 1997-98.

GERST 492 The Advance of Humanism: Aspects of the European Enlightenment #
Not offered 1997-98.

GERST 495 The Aesthetic Theory of the Frankfurt School (also COM L 495)
Not offered 1997-98.

GERST 496 Theorizing the Public Sphere (also COM L 496 and HIST 496)
Not offered 1997-98.

GERST 600 Special Topics in Feminist Theory (also ANTHR 600 and COM L 600)
Not offered 1997-98.

GERST 608 Modern/Postmodern (also COM L 608)
Not offered 1997-98.

GERST 615 Jews in German Culture Since 1945 (also JWST 615)
Fall. 4 credits. Required readings in German. Class discussion in English. L. Adelson.
This seminar will explore Jewish literature written in German since 1945, including works by authors such as Elisabeth Langgasser, Paul Celan, Hans Keilson, Edgar Hilsenrath, Grete Well, Jeannette Lander, Esther Dischereit, Irene Dische, Rafael Seligmann, Maxim Biller, and Barbara Honigmann. This material will be considered against the larger background of postwar German attempts to represent both Jewish identity and the Holocaust. To this end the course will consider pivotal crises of representation such as those reflected in the Fassbinder scandal, the "Historians' Debate," and the more recent competition for a "German national monument to the murdered Jews of Europe." Additionally, we will consider how these literary works and cultural contexts are relevant to international cultural studies in memory, diaspora, "hybridity," and representation.

GERST 621 Issues in Gay and Lesbian Studies (also WOMENS 621)
Not offered 1997-98.

GERST 624 Seminar in Medieval German Literature II
Not offered 1997-98.

GERST 626 Nuremberg
Not offered 1997-98.

GERST 627 Baroque (also COM L 626)
Fall. 4 credits. The course is conducted in English. G. Waite.
This graduate seminar focuses on the "baroque" in two basic ways: (1) as a period of cultural production in seventeenth-century continental Europe (France, Holland, Italy, and Spain in addition to Germany); (2) but more especially as a problem in current theory. Thus we will study concepts such as: "allegory" and Trauerspiel (Walter Benjamin); "action from a distance," "absent and immanent cause" (Spinoza, Louis Althusser); "the fold" (Leibniz, Gilles Deleuze); "savage anomaly" (Antonio Negri); and "guided culture" (José Antonio Maravall). Approximately equal attention will be given to literary and philosophical texts, written and visual practices. Thus, in addition to representative literary texts, we will analyze works by Leibniz and Spinoza, Caravaggio, Poussin, and Velázquez, as well as some contemporary critics and theorists (Christine Buci-Glucksmann, Michel Foucault, Louis Marin, among others).

GERST 629 The Enlightenment
Not offered 1997-98.

GERST 630 Classicism and Idealism
Not offered 1997-98.

GERST 634 German Romanticism
Not offered 1997-98.

GERST 635 The Gates to Modernity: From Karlbad to the 1848 Revolution
Spring. 4 credits. Anchor course. P. U. Hohendahl.
The seminar will focus on Germany's entry into the modern age represented by authors such as Heine, Büchner, Feuerbach, and Marx. The course will deal with the cultural, political, and social consequences of the Enlightenment, among them the democratization of literature and culture, the politicization of philosophy, and the emancipation of underprivileged groups (women and working class). The readings will trace the formation of bourgeois culture and its contradictions as they are articulated by the writers of Young Germany, the Left Hegelians, and radical literati of the 1840s. In addition to the authors mentioned above, texts will be taken from the works of Bettina von Arnim, Börne, Grabbe, Hebbel, and Fanny Lewald.

GERST 637 Novelle Workshop
Not offered 1997-98.

GERST 647 German Literature from 1949 to 1989: Questions about Identity
Spring. 4 credits. L. Adelson.
This seminar/anchor course will focus on German literature during the period between 1949 and 1989. The central point of the course will be to trace major themes and styles in German-speaking literature, East and West, in light of recent events. While individual texts will be examined within their specific historical (temporal, geopolitical, and social) contexts, the course will also be organized comparatively around critical debates concerning such topics as fictional representation of the immediate past, attempts by minority/majority voices to challenge and change the canon; writing and social change; questions concerning a national cultural identity; the politics of postmodernity, etc. Readings will be taken from authors such as Böll, Grass, Bachmann, Koerpern, Andersch, Handke, Dürenmatt, C. Wolf, Weiss, H. Muller, V. Braun, Hein, Morgner, J. Becker, Enzensberger, B. Strauss, Süsskind, and Maron. Secondary materials will include critical writings and visual media from the period.

GERST 650 Culture in the Weimar Period
Not offered 1997-98.

GERST 652 Culture in Germany 1933-1945
Not offered 1997-98.

GERST 653 Opera (also COM L 655 and MUSIC 679)
Not offered 1997-98.

GERST 660 Visual Ideology (also COM L 660 and THETR 660)
Not offered 1997-98.

GERST 661 After the City: From Metropolis to Electropolis (also ARCH 338/636 and COM L 661)
Not offered 1997-98.

GERST 663 Nietzsche and Heidegger (also COM L 663)
Spring. 4 credits. G. Waite.
This graduate seminar investigates the basic thoughts, types of argumentation, and styles of writing of these two philosophers, with particular focus on Heidegger's appropriation of Nietzsche. We will consider both as political thinkers in the tradition of esotericism—as a way of grasping the paradoxical existence of Left-Nietzscheans and Left-Heideggerians, given Nietzsche's and Heidegger's self-understanding of themselves as men of the Right. At issue, too, is a relation of Nietzsche and Heidegger to both Plato and Machiavelli. In this regard, the grasp of Nietzsche not only by Heidegger but also by Straussians will be contrasted with that of the Left. Basic texts include: Nietzsche, "The Greek State," "On Truth and Lie in the Extraporal Sense," Thus Spoke Zarathustra, and Beyond Good and Evil; and Heidegger, "Who Was Nietzsche's Zarathustra?" Nietzsche's Word "God Is Dead," and selections from his Nietzsche. Further: Lawrence Lampert, Leo Strauss and Nietzsche, Stanley Rosen, "Nietzsche's Revolution" and The Mask of Enlightenment: Nietzsche's "Zarathustra" and al. Strauss, "What Is Political Philosophy?" and "Note on the Plan of Nietzsche's Beyond Good and Evil."

GERST 664 Freud and the Fin de Siècle
Not offered 1997-98.

GERST 666 Ingeborg Bachmann
Not offered 1997-98.

GERST 667 "Minor" German Literatures?
Not offered 1997-98.

GERST 671 Postcolonial Theory and German Studies
Not offered 1997-98.

GERST 672 German Opera (also MUSIC 674)
Not offered 1997-98.

GERST 674 Contemporary Poetry and Culture: 1960-1993 (also COM L 674, ENGL 697 and SPAN L 674)
Spring. 4 credits.
For description, please see COM L.
GERST 675 After the Divide: German Critical Theory of the Seventies and Eighties (also COM L 675 and HIST 675)
Fall. 4 credits. P. U. Hohendahl.
The death of Theodor W. Adorno in 1969 marked the end of classical Critical Theory. During the following decade his students and disciples moved in different and conflicting directions. In this country only the project of Jürgen Habermas has received serious and consistent attention. However, the German configuration of the 1980s is considerably more complex. The seminar examines the writings of H. M. Enzensberger, Habermas, O. Negri, A. Kluge, P. Bürger, A. Wellmer, and C. Dahlhaus. Their works range from social and political theory to aesthetic theory and literature and music criticism.

GERST 679 Bertolt Brecht in Context (also COM L 679 and THETR 679)
Not offered 1997-98.

GERST 685 Gramsci and Cultural Politics (also COM L 685 and GOVT 675)
Not offered 1997-98.

GERST 687 The Politics of Culture in the German Democratic Republic
Not offered 1997-98.

GERST 690 Feminist Criticism and Theory (also WOMNS 690)
Not offered 1997-98.

GERST 692 The Politics of Criticism (also COM L 692 and THETR 692)
Not offered 1997-98.

GERST 699 German Film Theory (also COM L 699 and THETR 699)
Fall. 4 credits. D. Batchick.
This course examines critically major German film theories from the Weimar period to the present. Works by Balazs, Arnhem, Kraucau, Benjamin, Adorno, Horkheimer, Kluge, Syberberg, Koch, Elsaesser, and others will be discussed in relation to the context in which they emerge as well as current debates in film theory.

GERST 733-754 Tutorial in German Literature
Fall and spring. 1-4 credits per term. Prerequisite: permission of instructor.

Related Courses in Other Departments

Government

GOVT 465 Visual Culture After Nietzsche
Fall. S. Buck-Morss.

GOVT 655 Gender Politics and Welfare Policies in Europe and the US
Fall. U. Liebert.

GOVT 669 Modern Social Theory I
Fall. S. Buck-Morss.

GOVT 670 Modern Social Theory II
Spring. S. Buck-Morss.

Modern Languages

LANG 501 Teaching Second Languages
Fall. Y. Shrai.

Linguistics

LING 441 Introduction to Germanic Linguistics
Fall. J. H. Jasano.
member nations of the European Community, to discuss issues and resolutions of current concern to the EC. To prepare for this simulation, a 2-credit seminar, Government 431, is offered each spring. Participation in the simulation will be open only to those who register for this seminar. Any student interested in participating or in finding out more information should contact the Western Societies Program at 130 Uris Hall, 255-7592.

International Relations Concentration.

See the description under "Special Programs and Interdisciplinary Studies."

Honors. Each fall a small number of qualified seniors enter the honors program. To apply, junior majors submit applications in April. Along with a fuller description of the honors program, application forms are available in 125 McGraw Hall. The two courses comprising the honors sequence (honors courses) are described below.

Introductory Courses

Students registering for introductory courses should register for the lecture only. Sections will be assigned during the first week of class. Introductory courses are also offered during summer session.

**GOVT 111** Introduction to American Government and Politics

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

Fall and summer. 3 credits. V. Bunce. 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 will analyze institutional variations among liberal democracies, and their political implications. We will 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 will explore the impulses behind the obstacles to democratization in the Third World and the erstwhile Communist Bloc. Throughout this survey, problems of democracy will be related to problems of economic development, efficiency, and equality.

**GOVT 161** Introduction to Political Philosophy #

Spring and summer. 3 credits. I. Kramnick. A survey of the development of Western political theory from Plato to the present. Readings from the works of the major theorists. An examination of the relevance of their ideas to contemporary politics.

**GOVT 181** Introduction to International Relations

Spring and summer. 3 credits. S. Telhami. An introduction to the basic concepts and practice of international politics.

Freshman Writing Seminars

**GOVT 100** Freshman Seminars

Fall, spring, or summer. 3 credits. Seminars will be offered in fall, spring, and summer terms. Consult the listings for the Freshman Seminar Program in the section "Special Programs and Interdisciplinary Studies," the supplement issued by the department, and the Freshman Seminar booklet for course descriptions and instructors.

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 majors over nonmajors and seniors over juniors. Topics and instructors change each semester. To apply, seniors should pick up an application in 125 McGraw 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

Government 111 is recommended.

**GOVT 121** Economic Growth and Democratic Legitimacy

3 credits. Not offered 1997-98.

**GOVT 302** Social Movements in American Politics (also American Studies 302)

Fall. 4 credits. E. Sanders. From populism to environmentalism, social movements directed at reform of national policies and political structures have been an earmark of American politics. This course will begin with an examination of late nineteenth-century agrarian and labor movements and move through progressivism, a variety of 1930s upsurges, civil rights, and more or less contemporary environmental, consumer, feminist, and peace movements. The focus will be on the conditions that gave rise to these movements, their internal resources, and external alliances and their ultimate impact on the national state (as well as vice versa).

**GOVT 303** Introduction to American Political Parties

4 credits. Not offered 1997-98.

**GOVT 305** Atomic Consequences: The Incorporation of Nuclear Weapons in Post-War America

Spring. 4 credits. M. Dennis. This course will explicate the development of atomic weapons from early twentieth-century rumina tions about super bombs in science and fiction through the Manhattan Project, the postwar development of thermonuclear weapons and civil defense, and more recent plans for strategic defense. Our focus will expand to cover the lives of researchers at such institutions as Los Alamos during and after World War II as well as discussions of national policies. Other topics include the Nazi effort to develop an atomic bomb, the role of technical espionage during and after World War II, and the problems posed by the classification of technical knowledge. From our vantage point at the end of the cold war, we will seek to understand how the bomb became part of American culture through the use of literature and film, as well as reading in primary historical documents and secondary analyses.

**GOVT 308** Science in the American Polity 1800-1960

Fall. 3 credits. M. Dennis. For description, see S&TS 390.

**GOVT 309** Science in the American Polity

Spring. 4 credits. S. Jasanoff. For description, see S&TS 391.

**GOVT 310** Power and Poverty in America

4 credits. Not offered 1997-98.

**GOVT 311** Urban Politics

Fall. 4 credits. M. Shefter. The major political actors, institutions, and political styles in large American cities: mayors, city councils, bureaucracies, ethnic and racial minorities, urban machine politics and the municipal reform movement. The implications of these political forces for policies pertaining to urban poverty, homelessness, and criminal justice.

**GOVT 313** The Nature, Functions, and Limits of Law

Fall. 4 credits. Undergraduates only. R. Ogden. A general education course for students at the sophomore and higher levels. Law is presented not as a body of rules but as a set of varied techniques for resolving conflicts and dealing with social problems. The roles of courts, legislatures, and administrative agencies in the legal process is analyzed, considering also the 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 316** The American Presidency (also American Studies 316)

4 credits. Not offered 1997-98.

**GOVT 317** Campaigns and Elections

4 credits. Not offered 1997-98.

**GOVT 318** The American Congress

Spring. 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

4 credits. Prerequisite: Government 111 or permission of the instructor. Not offered 1997-98.

**GOVT 322** Political Economy of Capitalist Development

Fall. 4 credits. A. Rutten. Everyday life in Europe has been radically transformed over the past millennium. This course examines how political, economic, and social institutions shaped that transformation, and the institutional reaction to that transfor-
nation. It gives special attention to the development of limited government in Europe, and to the evolution of the American state. We will also consider what lessons, if any, the history of the West offers for modern developing countries.

GOVT 324 Legal Reasoning and Legal Adaptation: A Comparison of American and Talmudic Law
Spring. 4 credits. J. Rabin.
Legislatures may change old laws to reflect new preferences, but much American law is still adapted to modern challenges by judges invoking old precedents and principles, particularly in fields like family law, the law of contracts, and the law of torts. Talmudic law, which rests on much older principles and precepts and cannot fall back on new legislation to justify change in the modern world, must also be adapted to new circumstances. The rabbinic authorities who seek to apply this law often invoke similar kinds of reasoning as American courts but under peculiar conditions. This course, an unusual venture in comparative law, will focus on characteristic modes of reasoning in each system, rather than attempting any systematic surveys of legal outcomes. Readings will include selections from ancient texts as well as modern decisions and contemporary commentaries. No previous background is required.

GOVT 327 Civil Liberties in the United States
Spring. 4 credits. A. Rutten.
An analysis of contemporary issues in civil liberties and civil rights, with emphasis on Supreme Court cases. Cases are analyzed in terms of democratic theory and the social and political context in which they arose.

GOVT 328 Constitutional Politics: The United States Supreme Court
Fall. 4 credits. J. Rabin.
The course investigates the role of the Supreme Court in American politics and compares it to the historical development of constitutional doctrine and the institutional role the court has played in American politics.

GOVT 352 Feminism Movements and the State (also Women's Studies 353)
4 credits. Not offered 1997-98.

GOVT 401 Introduction to Science and Technology Policy (also S&T 431)
4 credits. Not offered 1997-98.

GOVT 402 Public Opinion and Mass Political Behavior
Fall. 4 credits. J. Cowden.
This survey course examines the processes by which people develop their political attitudes and beliefs, the ways in which these attitudes and beliefs find expression in electoral behavior, and the conditions under which public sentiment is translated in public policy and government action.

GOVT 405 Government and the Economy (also GOVT 705)
4 credits. Not offered 1997-98.

GOVT 406 Politics of Education (also GOVT 706)
Fall. 4 credits. E. W. Kelley.
Education is simultaneously America’s biggest business and the institutional process through which skills and values are passed on to the next generation. This course deals with conflicts about, and the politics of, education as they occur in administrative, state, and local levels. What (including values) will be taught and to whom; who will benefit from formal education as a vehicle for entry into economic opportunity? What are the powers and restrictions on government in this area? How does the American system differ from other systems? How does educational testing affect equal opportunity to obtain meaningful competencies and jobs?

GOVT 407 Law, Science, and Public Values (also S&T 407)
4 credits. Not offered 1997-98.

GOVT 409 Racial Prejudice and Political Intolerance
Fall. 4 credits. J. Cowden.
This course explores the nature, scope, and etiologies of intolerance and its implications for the operation of politics in the United States. Readings will include many of the “classics” in political science, political psychology, psychoanalysis, and social psychology, dating from the 1930s to the present.

GOVT 410 Legislatures, Courts, and Public Policy
Fall. 4 credits. A. Rutten.
Courts play a central role in the formulation and enforcement of policy in the United States. However, courts are not all powerful; politicians and bureaucrats have a variety of ways of changing judicial decisions. This course examines judicial control over policy by examining the relations among politicians, bureaucrats, and judges. To do so, we must examine how courts fit into the political process. Among the topics that we will consider are statutory interpretation, administrative procedures, and constitutional review.

GOVT 413/613 Finance, Federalism, and Politics
4 credits. Not offered 1997-98.

GOVT 427 The Politics of Environmental Protection in America
Fall. 4 credits. S. Jasenoff.
For description, see S&T 427.

GOVT 428 Government and Public Policy: An Introduction to Analysis and Criticism
4 credits. Not offered 1997-98.

Comparative Government
Government 131 is recommended.

GOVT 252 Contemporary Palestinian Society (also NES 296)

GOVT 271 Introduction to African Development (also CRP 271 and ASRC 271)
3 credits. Not offered 1997-98.

GOVT 325 Eastern Europe
4 credits. Not offered 1997-98.

GOVT 333 Modern European Politics
4 credits. Not offered 1997-98.
This course presents an introduction to politics and political change in Western Europe. It starts from the formation of the European nation-state and the growth of democratic regimes after the French Revolution. It continues with the nature of European systems of government and with the political party system; it then turns to the politics of public policy and to the interaction between policy-makers and societal interest groups. The course ends with a consideration of the interaction between politics and economics in the different countries. The main country studies are France, Germany, Britain, Italy, Spain, and the Scandinavian countries, with the United States used as an external reference point.

GOVT 333 Government and Politics of the Former Soviet Union
4 credits. Not offered 1997-98.

GOVT 334 Political Economy of East Asia
Spring. 4 credits. R. Bullock.
This lecture course examines East Asian political economy in historical and comparative perspective. Central questions include: Why have Japan, South Korea, and Taiwan developed so rapidly in the postwar era? Can we identify an East Asian mode of development? What does the region's growth mean for other countries and for the international economy? Are Southeast Asian countries following a similar trajectory today? Particular topics include Japanese colonialism, industrial policy and its critics, domestic political consequences of rapid growth, political corruption, US-Japan economic conflict, and recent attempts at political-economic liberalization.

GOVT 335 America in the World
4 credits. Not offered 1997-98.

GOVT 340 Latin American Politics
Spring. 4 credits.
This is the introductory lecture course to the politics of Latin America. The main purpose is to view the region in a conceptual and comparative perspective. Country cases will be introduced in order to understand the fundamental historical processes as well as to explain the significance of competing theoretical frameworks that have shaped the debate in the field. The course will focus on the political economies of the region in order to analyze the role of groups and classes under different political regimes and contrasting strategies of development.

GOVT 342 The New Europe
4 credits. Not offered 1997-98.

GOVT 344 Government and Politics of Southeast Asia
4 credits. Not offered 1997-98.

GOVT 346 Modern Japanese Politics
Fall. 4 credits. R. Bullock.
This course is an introduction to Japanese domestic politics and political economy. Subject matter begins with post-Meiji Japan but focuses on the postwar era. Questions to be explored include: Who rules Japan? How is policy formulated? How do we account for postwar political stability and rapid economic growth? How are opposition interests accommodated or ignored? How is the political system changing today?

GOVT 347 Government and Politics of China
Fall. 4 credits. V. Shue.
An introduction to fundamental currents in China’s domestic politics over the last sixty years. Topics include the revolutionary rise of communism; Maoism, in theory and in practice; the politics of bitterness during the “Cultural Revolution”; the evolving roles of the party and the military, and of peasants,
workers, and intellectuals in the polity; the prospects for democracy, perceived social inequality, violence, corruption, and other pressing problems that have emerged with the reforms under Deng Xiaoping.

[GOVT 349] Political Role of the Military  
4 credits. Not offered 1997-98.

[GOVT 350] Comparative Revolutions  
4 credits. Not offered 1997-98.

[GOVT 354] America In the World Economy  
4 credits. Not offered 1997-98.

[GOVT 355] International Relations of the Ancient Near East  
4 credits. Not offered 1997-98.

[GOVT 357] Understanding Russia Today  
4 credits. Not offered 1997-98.

For description, see, Russ L 330.1

GOVT 358 Modern History of the Middle East: Changing Politics, Society, and Ideas @  
Fall. 4 credits. M. Litvak.

For description, see NES 294.

[GOVT 433] Democracy, Power, and Economic Reform  
4 credits. Not offered 1997-98.

At a time of major political and economic reforms taking place in much of the Second and Third Worlds, and also in some of the First, fundamental questions about governance have been raised. The task before reformers is not limited to establishing a political system of individual rights and the rule of law, or of designing fair electoral systems and holding regular elections. It is also about establishing new forms of political power, or as Max Weber might put it, establishing new and effective systems of political domination. The reformers' need to carry out massive structural transformations has often implied centralizing authority, at the same time they are supposed to foster democracy. The dual challenge is thus one that much of the political development theory has tended to see as sequential rather than simultaneous: to centralize political power in order to carry out major socio-economic transformations, and to build democratic institutions which, by definition, disperse power. This seminar will examine these questions by focusing on some of the more important debates about the interrelationship between democracy and structural reform, the state and the economy, the crafting of order and the creation of markets.

[GOVT 431] Model European Union  
2 credits. Not offered 1997-98.

This two-credit course is designed to prepare students to participate in the annual Model European Union Simulation held, on an alternating basis, at SUNY Brockport and in Brussels. The simulation provides an opportunity for participants, representing politicians from the member states of the European Union, to discuss issues and resolutions of current concern to the EU. The preparatory course introduces students to the EU, the country that the Cornell will represent, and the issues to be discussed at the simulation. A substantial part of travel costs for the Cornell will be paid by the Institute for European Studies, and course enrollment will be restricted by budgetary considerations. Students enrolled in this course are required to write a research paper.

[GOVT 433] The Politics of Economic Liberalization in the Developing World @  
4 credits. Not offered 1997-98.

[GOVT 434] Politics and Society in Modern Italy  
4 credits. Not offered 1997-98.

[GOVT 436] Environmental Politics and Policy  
4 credits. Not offered 1997-98.

[GOVT 437] Contemporary China: Society and Politics @  
Spring. 4 credits. V. Shue.

Selected reading and in-class discussion of some of the central dilemmas that have been posed by the rapidly escalating processes of social change taking place under conditions of continuing political authoritarianism in China today. Topics include broad changes in demographic and social structure, rising tensions in family and gender relations, the enduring salience of community and workplace, the resurgence of Chinese nationalism, of ethnic nationalism, 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 438] Contemporary China: Political Economy @  
4 credits. Not offered 1997-98.

[GOVT 439] Japan in International Politics @  
4 credits. Not offered 1997-98.

[GOVT 442] Feminist Politics and Policy in the United States and Europe (also GOVT 655)  
Spring. 4 credits. U. Liebert.

In both Western Europe and the United States, feminist organizations as well as public policies that support gender equality are simultaneously under siege and yet still vibrant. Instances of this are the increasing gender gap in political voting behavior, the advancements in feminist political representation and participation in all major spheres of society and politics, the public debates on topics once considered private—including women's, gay and lesbian issues—and ongoing demands for state and federal legislation (in Europe: national and EU-legislation) to act on gender related discrimination. Through cross-national comparisons we hope to assess the strengths and weaknesses of public and private gender politics and policies in Europe and the U.S., and to discuss how differences can be traced to variations in institutional structures of "party government" and the "welfare state," to media framing and patterns of public discourse, to feminist organizational strategies, power resources and alliances, as well as to conflicts of interests and struggles over values and symbolic meanings. The course is addressed to students who have completed undergraduate and graduate students interested in studying gender issues in a comparative perspective.

[GOVT 443] Prosseminar in the Politics of South Asia @  
4 credits. Not offered 1997-98.

[GOVT 444] Afrocentrism  
4 credits. Not offered 1997-98.

[GOVT 454] The Herodotean Moment: The Uses and Abuses of "Western Civilization" (also Comparative Literature 454, History 454) #  
Fall. 4 credits. M. Bernal.

The basic premise of the seminar is that the concept of "Western civilization" is a problematic one in need of critical and historical analysis. The course will examine the evolution and transformation of this concept from antiquity to the twentieth century by focusing on selected moments (and texts in which they are represented) of actual and/or perceptual encounters with other civilizations. It will also inquire into the political uses and abuses of the idea of the West, and the literary, psychological, and anthropological dimensions of the idea's history.

[GOVT 458] Comparative Democratization  
4 credits. Not offered 1997-98.

[GOVT 468] Global and Domestic Dimensions of Science and Technology Policy (also S&S 425)  
4 credits. Not offered 1997-98.

Political Theory

Government 161 is recommended.

[GOVT 361] Modern Ideologies: Liberalism and Its Critics #  
4 credits. Not offered 1997-98.

[GOVT 362] Politics of Sexuality (also Women's Studies 262)  
4 credits. Not offered 1997-98.

[GOVT 364] The Selfish Individual and the Modern World  
Fall. 4 credits. N. Hirschmann.

Michael Milken and Ivan Boesky broke the law: but did they really do anything wrong? Is acting selfishly simply human nature, or its perversion? Do we have natural obligations to others, or is everyone out for themselves? This course will consider these questions through the lens of modern political theory from Hobbes to contemporary times. We will consider the relation of the individual to society to examine different understandings of "the individual," and how they change over time. In the process, we will examine how these understandings affect the meaning of concepts such as freedom, equality, and justice, as well as the form and role of government. This course will follow a seminar format and rely heavily on class discussion. Enrollment limited.

[GOVT 366] American Political Thought from Madison to Malcolm X (also History 316 and American Studies 366) #  
4 credits. Not offered 1997-98.

[GOVT 368] Global Climate and Global Justice (also Philosophy 368)  
4 credits. Not offered 1997-98.

[GOVT 369] Introduction to Feminist Political Thought (also Women's Studies 269)  
4 credits. Not offered 1997-98.

GOVT 370 Political Theory and Cinema  
Fall. 4 credits.

For description, see GERST 330.
GOVT 375 Visual Culture and Social Theory (also ART H 370 and Comp. Lit. 368) Fall. 4 credits. S. Buck-Morss. Introduction to theoretical concepts for the analysis of visual culture, in specific socio-historical contexts.

GOVT 377 Concepts of Race and Racism Spring. 4 credits. A. M. Smith. This course examines race and racism from a political theory perspective. We will discuss the different types of racism: traditional racism, "new racism," or cultural racism, scientific racism and contemporary hybrid racism. We will then examine the politically ambiguous "ethnicity theory." In the second half of the course, we will consider the works by Marable on African American political economy, women of color feminist theorists, native American theorists, Takaki on Asian American labor history, and Hero on Latinos/Hispanic studies. Some discussion of theoretical approaches before taking this course.

GOVT 378 Visual Culture and Social Theory (also SAT H 370 and Comp. Lit. 368) Fall. 4 credits. S. Buck-Morss. Introduction to theoretical concepts for the analysis of visual culture, in specific socio-historical contexts.

GOVT 377 Concepts of Race and Racism Spring. 4 credits. A. M. Smith. This course examines race and racism from a political theory perspective. We will discuss the different types of racism: traditional racism, "new racism," or cultural racism, scientific racism and contemporary hybrid racism. We will then examine the politically ambiguous "ethnicity theory." In the second half of the course, we will consider the works by Marable on African American political economy, women of color feminist theorists, native American theorists, Takaki on Asian American labor history, and Hero on Latinos/Hispanic studies. Some discussion of theoretical approaches before taking this course.

GOVT 468 Global and Domestic Dimensions of Science and Technology Policy Spring. 4 credits. S. Jasanoff. For description, see S&TS 425.

GOVT 470 Anthropology-Theory-Politics-Performance (also Anthropology 470) 4 credits. Not offered 1997-98.

GOVT 473 Marx, Nietzsche, Freud (also German Studies 415) 4 credits. Not offered 1997-98.

GOVT 474 Community, Nation, and Morality Spring. 4 credits. R. Miller. For description, see PHIL 446.

International Relations

Government 181 is recommended.

GOVT 294 Global Thinking (also Philosophy 294) @ Fall. 4 credits. No prerequisites; intended for Freshmen and Sophomores. Fulfills geographical distribution requirement. H. Shue. The analysis taught in this course is global and regional in nature. Students will develop skills in critical thinking and written expression. The course will be taught in a seminar format. It will cover contemporary issues, and to understand how concepts have been used to explain its evolution. The goals of the course are to gain insights into contemporary issues, and to understand how scholars of international relations and economics describe and explain problems in the global economy.


GOVT 391 Chinese Foreign Policy @ Spring. 4 credits. T. Christensen. This undergraduate lecture course will review and analyze the foreign policy of the People's Republic of China from 1949 to the present. Lectures will discuss the Cold War history of Beijing's relations with the Soviet Union, the United States, Southeast Asia and the Third World. Various theories of foreign policy will be discussed as potential tools for understanding Chinese foreign policy. The class will conclude with a discussion of the future of Chinese foreign policy in light of the end of the Cold War, changes in the Chinese economy and the post-Tiananmen legitimacy crisis in Beijing.

GOVT 392 International Relations of the Middle East (also NES 395) @ 4 credits. Not offered 1997-98.

This course will examine patterns of international relations in the Middle East in the twenty-first century, with special reference to the Arab-Israeli and Iran-Iraq conflicts. These conflicts will be treated as part of a Middle East system, whose other main elements are the interaction between domestic and external politics, inter-Arab relations, and the involvement of extraregional powers.

GOVT 393 Introduction to Peace Studies (also SOC 393) Fall. 4 credits. J. Repp. 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, 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 394 Comparative Foreign Policy Spring. 4 credits. M. Evangelista. This course explores the sources of differences in foreign-policy processes and outcomes between and within states. One school of thought holds that differences in the characteristics of the countries in question (large versus small, democratic versus authoritarian, industrialized versus developing, etc.) lead to differences in their foreign policies. Another argues that the important differences are not so much between countries as between policy preferences, for example, military policy versus trade policy. In this course, students will evaluate the competing explanations by looking at a number of aspects of foreign policy— including diplomacy, strategy, economic policy, and alliance policy—in several areas and historical cases: the World Wars, the Cold War era, etc.
War, arms races, North-South political and economic relations, foreign economic policies of advanced industrial, state-socialist, and developing countries. We will attempt to understand why some states are more successful than others in achieving the main goals of foreign policy: security and prosperity.

GOVT 395 Palestinian Nationalism (also NES 399) 4 credits. Not offered 1997–98.


GOVT 475 The Politics of International Monetary and Financial Relations Spring. 4 credits. J. Kirshner. Government 475 is a topical seminar which focuses on a different aspect of international political economy each time it is offered. The goal of the course is to explore the historical and theoretical background of a particular issue or controversy and consider the implications of that analysis for the contemporary system.

GOVT 477 Rational Choice Approaches to International Relations Spring. 4 credits. D. McDermott. Rational Choice paradigms are becoming increasingly predominant in International Relations scholarship. This course teaches international relations from a Rational Choice perspective. This course will cover modelling methodology and theoretical issues. Familiarity with mathematics is not required, but logical reasoning is emphasized. This course will cover rational choices approaches to social choice and public good problems, negotiation, alliances and constraints of domestic politics. Critics of balance of power, deterrence, and power transition theories from a rational choice perspective will be introduced. An introduction to Game Theory will be provided. Alternative psychological approaches will be mentioned briefly.

GOVT 482 International Relations of East Asia 4 credits. Not offered 1997–98.


GOVT 491 Conflict, Cooperation, and Norm: Ethical Issues in International Affairs Fall. 4 credits. M. Evangelista. This course examines current and historical issues in international relations from the perspective of international law, norms, and ethics. We develop general principles and concepts, such as “just war,” “national interest,” and “human rights,” and apply them to real-world situations. Most of the focus of the course is on particular cases that involve legal and ethical issues: violations of human rights and genocide; war crimes; military intervention; economic sanctions; environmental degradation; economic injustice. The first part of the course examines these issues using examples from 20th century international affairs, including recent events. The second part focuses on current issues that pose ethical problems for the foreign policy of the United States: internal violence and human rights abuses in the former Yugoslavia and former Soviet Union; indigenous uprisings in Mexico and their relation to U.S. foreign economic policy; the appropriate U.S. response to situations in countries such as Haiti, Nigeria, and China.

Honors Courses

Each April a limited number of junior majors are admitted to the honors program, their work to begin the following fall. Application forms and a full description of the program may be obtained in 125 McGraw Hall.

GOVT 494 Honors Seminar: Thesis Clarification and Research Fall. 4 credits. Each student works individually with a faculty member. The student initiates the tutorial by interesting a faculty member in his or her likely thesis project and by submitting to the director of undergraduate studies a form outlining the general area the thesis will treat and the thesis advisor’s signature. This form is due the third week of classes. The tutorial culminates in a ten-to-fifteen-page paper setting forth the central questions to be addressed by the thesis, the state of existing knowledge regarding those questions, and why they matter.

GOVT 495 Honors Thesis: Research and Writing Spring. 4 credits. Limited to students who have successfully completed Government 494. Students continue the work of the preceding semester typically with the same faculty tutor. Research on the thesis is completed and writing begun. The tutorial culminates in a thesis of some sixty to eighty pages. The grade for the tutorial is determined by the faculty tutor, while the degree of honors (if any) awarded the thesis is decided by a committee of faculty members established for that purpose.

Independent Study

Independent study, Government 499, is a one-on-one tutorial which is arranged by the student with a faculty member of their choosing. Government 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 tutor. 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 4 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 Readings Fall or spring. Fall or spring. 1–4 credits.

Graduate Seminars

Qualified undergraduates are encouraged to apply for seminars listed with 600 course numbers but may only register with the permission of the instructor. Students may consult the supplement that lists graduate courses, available in the department office.

Field Seminars

GOVT 603 Field Seminar in American Politics Fall. 4 credits. M. Lefler and J. Rabkin. The basic issues and institutions of American government and the various subfields of American politics are introduced. The focus is on substantive information and theoretical analysis and problems of teaching and research.

GOVT 606 Field Seminar in International Relations Fall. 4 credits. J. Kirshner and K. Christensen. A general survey of the literature and propositions of the international relations field. Criteria are developed for judging theoretical propositions and are applied to the major findings. Participants will be expected to do extensive reading in the literature as well as research.

GOVT 607 The Western Political Tradition: A Survey Fall. 4 credits. N. Hirschmann. An introduction to political theory through a reading of selected classics in political thought from Plato to Marx.

Methodology

GOVT 601 Scope & Methods of Political Analysis Fall. 4 credits. J. Cowden and J. Pontusson. This course introduces the major analytical approaches used in contemporary political science research. We touch on broad philosophical issues concerning the nature of theory and inference, the practices of cultural and historical interpretation, and the relevance of moral values and political commitments. Several kinds of research designs, including comparative case study and quasi-experimentation, are briefly examined. The basic analytical ideas involved in statistical methods such as sampling and regression analysis are introduced, as are the basic concepts of the theory of collective choice and the elementary methods of applied game theory.


GOVT 605 Comparative Methods 4 credits. Not offered 1997–98.


This course will present various normative and interpretive methodological approaches to issues in political science. Though the specific focus of the course will vary depending on the interests of the instructor, the general orientation of the seminar will be to expose students to the role of hermeneutic techniques and qualitative criticism in political analysis. This course will fulfill departmental requirements for the second methodology course.
American Government and Institutions

**GOVT 609 Political Parties and Elections**

**GOVT 611 The Political Economy of American Development, 1860–1900**
Fall. 4 credits. R. Bensel.

This course will trace and describe 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. Utilizing a broad survey of the historical literature on these periods, the course will investigate: (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 remold the southern political economy; (4) the role of finance capital markets in industrial and western agrarian expansion and the consequent emergence of monetary issues in national politics; and (5) the political economy of possible developmental trajectories other than the high-tariff, gold-standard one actually followed.

**GOVT 612 American Political Development II: Social Movements and State Expansion in the Twentieth Century**

**GOVT 613/413 Finance, Federalism, and Politics**

**GOVT 615 State and Economy in Comparative Perspective**
Spring. 4 credits.

This course reviews the extensive literature on the political economy of comparative state formation and institutional change. Among the topics covered will be war-making and state expansion, regime evolution and economic development, and market processes and class transformations. Although much of the reading will focus on the United States and Europe, the limits of these cases as theoretical prototypes for the remainder of the world will also be considered.

**GOVT 618 Politics, Markets, and the Middle Classes**
Spring. 4 credits. E. Sanders and R. Bullock.

The middle sectors—white collar workers, farmers, professionals, and small business people—have played critical roles in development, democratization, and social movements, but the literature analyzing their class identities, values and coalitional tendencies is rather sparse. Readings for this course will be diverse, ranging from the U.S. and Europe to East Asia and developing countries. However, the course is primarily intended as a research workshop, with members presenting their work-in-progress during the second half of the semester.

**GOVT 620 The United States Congress**

**GOVT 623 The Politics of Courts**
Spring. 4 credits. J. Rakbin.

All modern or westernized governments have judicial organs, designed to provide impartial decisions on certain kinds of disputes. But the kinds of issues that are left to courts vary widely from country to country and from era to era; the forms and degrees of political insulation for courts also vary widely; even the official rationales for such institutions vary a good deal. All of these differences are sometimes subjects of political controversy. This course will survey various forms and doctrines of judicial authority, seeking to clarify the relationship between particular judicial models and the political systems in which they operate. Supra-national courts and administrative organs will be included in the survey, but principal emphasis will be on the role of courts in English-speaking countries.

**GOVT 629 Cleavages and Coalitions in Contemporary American Politics**

**GOVT 703 Political Economy**

**GOVT 705/405 Government and the Economy**

**GOVT 707 The Politics of Education**
Fall. 4 credits. E. W. Kelley. See Govt 406 for description.

**GOVT 626 Workshop on Law, Science and Technology (also S&T 626)**

**GOVT 627 Comparative Government**

**GOVT 629 Latin American Political Economy**
Spring. 4 credits. H. Scharrer.

The central goal of this seminar is to examine the magnitude and scope of the decades-long process of economic transformation in the region and capture its implications for political stability. In order to do so, we will adopt a historical political economy approach. Old concepts—populism, corporatism, nationalism—will be reviewed in light of new developments. Different economic phases and strategies—export-led growth, import-substituting industrialization, market-oriented reform—will be analyzed in light of the region's changing social structures, unstable political institutions, and shifting preferences and ideologies of social actors. And classic theoretical approaches—Modernization, Dependency, Bureaucratic-Authoritarianism—will be reevaluated in light of the current convergence toward marketization and democratization.

**GOVT 639 Studying Political Culture**
Fall. 4 credits. V. Shue.

Selected readings deploying a range of differing approaches to the study of the relations between culture and politics. Discussion of central methodological and interpretive questions including the linkage of cultural with structural explanations and the framing of informative comparisons across cultures. Readings and discussion focused on, but not confined to, Asian examples.

**GOVT 642 Comparative Political Economy: East and Southeast Asia**
Fall. 4 credits. R. Bullock.

This seminar focuses on the political economy of rapid growth in postwar Japan, South Korea, and Taiwan. Seminar themes include: Japanese colonial legacies; containing models of East Asian economic success; international implications of rapid growth; the "Japanese model of development" and regional variance; one-party conservative rule; structural corruption and political scandal; ongoing efforts at political-economic liberalization; and Southeast Asian cases as second-generation NICs.

**GOVT 644 Sociotechnical Aspects of Irrigation**
Not offered 1997–98.

**GOVT 645 Chinese Politics**
Spring. 4 credits. V. Shue.

Review and assessment of several of the major currently competing approaches to the study of Chinese politics. Discussion and evaluation of leading works in the field analyzing Chinese state and society, policymaking and policy implementation, bureaucratic politics, elite political culture, and political economy. Special attention to problems of research and interpretation.

**GOVT 647 Political Anthropology: Southeast Asia**

**GOVT 648 Political Economy of Change: Rural Development in the Third World**

**GOVT 649 Agrarian Political Economy: Land, Labor, and Nature**

**GOVT 652 Southeast Asia Seminar: The Philippines (also Asian Studies 601)**

**GOVT 653 The Plural Society Revisited (also Asian Studies 602 and 607)**

**GOVT 655 Gender, Politics and Welfare Policies in Europe and the U.S. (also Govt 442)**
Fall. 4 credits. U. Liebert.

How can we rethink the welfare state from a gender perspective? How do welfare reforms restructure and welfare debates re- and/or deconstruct gender relations? To what extent do institutional constraints and gender representation matter in explaining gender bias in different welfare retenchment policies? By comparing recent experiences and developments in the U.S. and Europe (European Union), we will discuss and further develop the emerging body of feminist
theories on democratic welfare state politics and policies. Situated at the intersection of gender studies and welfare state analyses, the materials will cover the following areas: (1) feminist as well as "mainstream" theories of the welfare state and its "retreat" in the context of global change; (2) comparative analyses of the impact of distinct welfare regimes on the development of gender relations; (3) cultural and discourse analyses of how welfare reform debates are framed and how they de- and reconstruct gender relations differently in different countries; (4) the institutional constraints on and incentives for gender politics, including gender representation and welfare policies, that are embodied in various forms of party government.

**GOVT 656 Comparative Political Economy**


**GOVT 657 Comparative Democratization**

Fall. 4 credits. H. Schamis.

This course will focus on the transition from authoritarian to liberal politics in Eastern Europe and in Latin America. Particular attention will be 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 democratization—in particular, Spain, Portugal, Italy, and Greece. Our focus will be equally divided between the empires of these transitions and the theoretical understandings of transitions to democracy.

**GOVT 660 Globalization and Social Movements and Contentious Politics (also SOC 660)**

Spring. 4 credits. S. Tarrow.

This is a research seminar on the relationships among politics, organized social movements, and periods of mass mobilization like those that swept through Western Europe and the U.S. in the 1960s and in Eastern and Central Europe today. The course begins with a theoretical introduction to major approaches to social movements and collective action, concentrating on the factors that induce masses of people to adopt disruptive forms of collective action. It moves from there to a historical section focusing on cycles of protest in the recent and not-so-recent past. It continues with case materials that illustrate a series of theoretical problems in the study of movements and collective action—particularly that of the relations between protest and reform. Students will write term papers on particular cycles of protest and reform.

**GOVT 692 The Administration of Agricultural and Rural Development**

Spring. 4 credits. N. Uphoff.

For description, see INTAG 603.

**Political Theory**

**GOVT 663 Political Theories of Power**

Spring. 4 credits. A. M. Smith.

Through reading and discussion of theorists such as Lukes, Gramsci, Laclau and Mouffe, Nietzsche, Foucault, Connolly, Fraser, Butler, (Biddy) Martin, (Renata) Saclel, (Joan) Scott, (Jacqueline) Rose and (Mike) Davis, we will explore the contemporary debates on the structure of power relations. Seminar themes will include: social agents and interests, hegemony, disciplinary regimes, subjectivity and resistance. Seminar participants should already have a basic familiarity with the treatment of power in the political theory tradition.

**GOVT 664 Contemporary Democratic Theory**

Fall. 4 credits. A. M. Smith.

Many theorists and activists working on questions of class, racial, gendered and sexual identities have claimed that we must develop a rigorous critique of "essentialism" in order to make way for a truly democratic form of political practice. How are these diverse claims, in post-Marxist texts, critical studies of race and feminism, feminist theory and lesbian, bisexual and gay studies, structurally similar? How do the political practices envisioned in these anti-essentialist texts differ from each other strategies? Do the demands for anti-essentialist theories and practices risk the erasure of politically important identity claims? The reading list will change from year to year; it will probably include selections from the work of Ernest Laclau, Chantal Mouffe, Stuart Hall, Etienne Balibar, Patricia Williams, Yvon Ware, Teresa de Lureis, Biddy Martin, Chandra Talpade Mohanty, Joan Scott and Judith Butler.

**GOVT 665 American Political Thought: From Madison to Malcolm X**


**GOVT 669 Modern Social Theory I**

Fall. 4 credits. S. Buck-Morss.

Readings include works of this course are whether something resembling a transnational society is developing and what are the effects of transnational movements on the state.

**GOVT 670 Modern Social Theory II**

Spring. 4 credits. S. Buck-Morss.

**GOVT 671 Graduate Seminar in Feminist Political Theory**

Spring. 4 credits. A. Hirschmann.

This seminar will examine contempor­ary feminist theory from the perspective of political theory. We will study the work of feminist theorists who work specifically within the discipline of political science, as well as the specifically political dimensions of work not generally considered political theory. Though particular readings and topics will change from year to year in response to the most recent literature, in general the course will focus on questions of epistemology and methodology as a way to explore a variety of issues of relevance to feminism as an academic, intellectual, and political enterprise. The course is open to undergraduates who have taken Government 463 or other courses in feminist theory, with permission of the instructor.

**GOVT 674 Theory and Practice of Nationalism**


**GOVT 675 Gramsci and Cultural Politics (also German Literature 665)**


**International Relations**

**GOVT 681 Politics of Transnationalism**

Spring. 4 credits. M. Evangelista and S. Tarrow.

With the globalization of the world economy and media and the diffusion of new international organizations and institutions, economists, political scientists and sociologists have been asking whether the monopoly of the nation-state or international society is eroding. Such erosion could be part of the explanations for the mobility of capital and employment, the diffusion of transnational movements, and for the apparent inability of states to control identity politics within and contagion from without. The central questions of this course are whether something resembling a transnational society is developing and what are the effects of transnational movements on the state.

**GOVT 682 International Relations of the Middle East**


The focus of this seminar will be patterns of alliances among Middle Eastern states. We will examine the applicability of competing theories of alliance formation in the Middle East, including those that focus on power distribution, perceptions, and domestic politics.

**GOVT 683 Foreign Policy Analysis**


This seminar will survey theories of foreign policy and examine their applicability by comparing the foreign policy making in several states. Both theories emphasizing the role of the international system and theories highlighting the relevance of domestic politics will be assessed.

**GOVT 685 International Political Economy**

Spring. 4 credits. J. Kirshner.

An exploration into a range of contemporary theories and research questions in the field of international political economy. The seminar will cover different theoretical perspectives and a number of substantive problems.

**GOVT 686 International Strategy**

Spring. 4 credits. T. Christensen.

This seminar will analyze and compare national security strategies, including military doctrine, alliance policies, and foreign economic policy. We will examine how various factors—international structure, domestic politics, and leadership psychology—contribute to policy outcomes. We will study how different strategies act as stabilizing or destabilizing influences in the international system. We will examine how variation in the international distribution of power (e.g., bipolar, multipolar) affects both individual nations' policies and international stability more generally. Specific topics will include great power strategy, China's Cold War strategies, and factors for stability and instability in the post-Cold War world.

**GOVT 687 International Environmental Policy**

Not offered 1997–98.

**GOVT 688 Political Economy and National Security**


**GOVT 689 International Security Politics**


**GOVT 691 Normative Elements of International Relations**

Fall. 4 credits. M. Evangelista and H. Shue.

We examine selected normative elements of international affairs, divided into three inter­locking clusters. First are issues about
conflict, including both low-intensity military intervention and nuclear weapons. Second are questions about cooperation, especially between rich nations and poor nations. Third are debates about the authority and status of the major players in the international system: individual persons, nation-states, and international regimes. Questions considered include: is the retention by some nations of nuclear weapons morally justified? Is the world economy unjust? Should national governments be pressured to respect individual human rights?

[GOVT 694 Research Design and Grant Writing
4 credits. Not offered 1997-98.]

Independent Study
This course is NOT open to undergraduates. Undergraduates wishing to conduct supervised study should register for Government 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 will be designed through consultation between the student and the instructor. Graduate students in government who are looking to use this as an option to fulfill their course requirements should check with their chairs to be certain that the program of study is acceptable for this purpose. Applications must be completed and signed by the instructor and by the chair of their special committees. They are available from, and must be returned to, the graduate secretary in 125 McGraw Hall.

GREEK
See Department of Classics.

HEBREW
See Department of Near Eastern Studies.

HINDI-URDU
See Languages Courses under Languages and Linguistics.

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.

The Major
To complete the history major, a student must fulfill the requirements listed below:

Entry requirement: completion of any two History courses excluding Freshman Writing Seminars.

1) Take history department courses totaling 40 credits and complete all these courses with a grade of C or better. (Courses taken for entry may count towards to 40 credits.)

2) Of the courses totaling 40 credits, take a minimum of:
   a. 16 credits outside of American history
   b. 12 credits in history before 1800.

Courses used to fulfill Requirement (1) above may also be used to fulfill Requirement (2), in respect both to (a) and (b) if applicable. A course in American history before 1800 may be used to fulfill Requirement (2b).

A course before 1800 in a field other than American history can be used toward fulfillment of both Requirements (2a) and (2b).

3) Of the courses totaling 40 credits, take at least one 400-level seminar. Appropriate seminars may be used to fulfill Requirements (2a) and (2b).

Honor Program
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 Seminar (History 400) and an additional 400-level seminar, preferably during their junior year, and complete 44 credits in history before the fourth week of April. In May each honors candidate is given an oral examination administered by the supervisor; examination focuses on the essay as well as the specific subfield of history in which the student has conducted research (e.g., Periclean Athens, seventeenth-century science, nineteenth-century America). To qualify for a bachelor of arts degree with honors in history, a student must (1) sustain at least a B+ 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
History of science
American history
Latin American history
African history
Asian history
Near Eastern history
Ancient European history
Medieval, Renaissance, and early modern European history
Modern European history
Honors and research courses

Course Numbering System
100–level courses are very general introductory courses (like 151–152, 190–191) and freshman writing seminars.

200–249–level courses are similar to freshman writing seminars, except that there is greater emphasis on subject matter and less on writing.
250–299–level courses have no prerequisites and admit freshmen. They cover a relatively broad geographical area, period of time, or subject.

300–399–level courses may have specified prerequisites or deal with more-specialized subjects than do those numbered 250–299. Admission of freshmen varies from course to course and is indicated in the course descriptions.

400–499 are upper level undergraduate courses.

600–699 and 700–799 are graduate level courses.

**Comparative History**

**HIST 274 Foodways: A Social History of Food and Eating**
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 will be drawn widely across space and time, from Pharaoh's Egypt to the 1990s.

**HIST 360 Early Warfare, East and West**
Spring. 4 credits. C. Peterson.
A study of the principal modes of warfare found both in the East and the West from ancient times up to the eighteenth century. Tactical evolution and the impact of innovations are stressed, but attention is also paid to the general social and cultural background and the role of nonmilitary factors.

**HIST 380 Social History of Western Technology**
For description, see History of Science.

**HIST 393 Images of Humanity in Medieval China (also Asian Studies 393)**
Fall. 4 credits. Prerequisite: any course on modern China or Chinese religions, or permission. Not offered 1997–98. C. Peterson.

**HIST 405 Population and History**

**HIST 409 Seminar on Work in Europe and America**
A comparative study of the meaning of work in different societies from premodern times to the present. Emphasis on the "representations" of work of the actors themselves who worked, as well as of those who for various critical reasons did not work. The seminar will examine not only ideology but also the organizational, social, and physical place of work. It will explore theory as well as "cases," and draw on anthropological and sociological as well as historical materials.

**HIST 432 The City in History: Europe and America**
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1997–98; next offered 1998–99. S. Blum

Reading and discussion of significant interpretations of the rise, role, and character of cities in medieval and early modern Europe and in modern Europe and America. Individual research projects.

**HIST 451 Lord and Peasant in Europe: A Seminar in Social History**
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997–98; next offered 1998–99. S. L. Kaplan.

**HIST 454 The Herodotean Moment: The Uses and Abuses of "Western Civilization" (also Government 454)**
Fall. 4 credits. Limited to 20 students. Prerequisite: permission of instructor. J. Najemy, M. Bernal.
The basic premise of the seminar is that the concept of "Western civilization" is a problematic one in need of critical and historical analysis. The course will examine the evolution and transformation of this concept from antiquity to the twentieth century by focusing on selected moments (and texts in which they are represented) of actual and/or perceptual encounters with other civilizations. It will also inquire into the political uses and abuses of the idea of the West, and the literary, psychological, and anthropological dimensions of the idea's history. Readings include selections from Herodotus's History, Virgil's Aeneid, Augustine's City of God, The Song of Roland, Petrarch, Pico, Machiavelli, Montesquieu, Flaubert, Shelley's Hellass, Arnold, Hegel's Philosophy of History, James Mill's History of British India, and, from secondary critical literature, Tzvetan Todorov's The Conquest of America and Edward Said's Orientalism.

**History of Science**

**HIST 250 Technology in Society**
(also Engineering General Interest 250, Electrical Engineering 250, and Science and Technology Studies 251)
Fall. 3 credits. R. Kline.
For description, see ENGRG 250.

**HIST 281 Science in Western Civilization**
(also Science and Technology Studies 281)
Fall. 4 credits. History 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 science as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek Antiquity to the twentieth century form the framework for current Western views of the world, while the roots of the present-day dominance of "science" as a symbol of progress and modernity lie in an alliance between knowledge of nature and power over nature that took shape in the nineteenth century after a long period of emergence. 281 is tailored for the pre-eminent guide to practical action has deep roots in the thought of 18th-century Europe, the period known as the Enlightenment. The practice and image of science in the Enlightenment show how this idea has been developed and understood, and what its meanings and implications were. Those meanings, and their associated values, remain strongly with us today. This course will investigate our current scholarly understanding of many themes and issues relating to "enlightened science," as well as studying writings of the period itself in a variety of topical areas, from political economy to astronomy and natural history, in

**HIST 282 Science in Western Civilization**
(also Science and Technology Studies 282)
Spring. 4 credits. History 281 is not a prerequisite to 282. P. R. Dear.

How did the natural philosophy of the 18th century become the natural science of the 19th and 20th centuries? This course will explore the changing conceptions of knowledge in the West with particular attention to the connections among theories of nature, political cultures, and commercial and industrial practices. In addition to the traditional discussions of such fundamental figures and constellations of events as William Herschel, the Chemical Revolution and the French Revolution, Darwin and the theory of evolution, and natural philosophy in the Scottish Enlightenment, lectures will also focus on the development of research in the sciences in Germany, the role of research schools in dissemination new knowledge and experimental practice, and the different national styles of support for science during the period.

**HIST 287 Evolution**
(also Biology-General Courses 207; Science and Technology Studies 287)
Fall. 3 credits. Not offered 1997–98. W. Provine.
For description, see BIO G 207.

**HIST 292 Inventing the Power and Information Societies (also Engineering General Interest 298, Electrical Engineering 298, and Science and Technology Studies 292)**
For description, see ENGRG 298.

**HIST 380 Social History of Western Technology**
Studies in the interaction between technological changes and social changes in Western Europe and America since the eighteenth century. Readings and lectures will deal both with instances of social transformation that accompanied technological changes and with the role of technology in social thought and cultural expression. Special attention to three periods: Britain during the Industrial Revolution, America in the nineteenth century, and America during the Vietnam War.

**HIST 415 Seminar in the History of Biology**
(also Biology-General Courses 467, Biology and Society 447; Science and Technology Studies 447)
Summer. 4 credits. W. Provine.
For description, see BIO G 467.

**HIST 416 Enlightened Science**
(also Science and Technology Studies 416)
Spring. 4 credits. P. R. Dear and M. A. Dennis.
"Science" is a term that is often associated with "rationality." The idea that "reason," rather than "truth" or "tradition" should be the pre-eminent guide to practical action has deep roots in the thought of 18th-century Europe, the period known as the Enlightenment. The practice and image of science in the Enlightenment show how this idea has been developed and understood, and what its meanings and implications were. Those meanings, and their associated values, remain strongly with us today. This course will investigate our current scholarly understanding of many themes and issues relating to "enlightened science," as well as studying writings of the period itself in a variety of topical areas, from political economy to astronomy and natural history, in
several national contexts including Scotland, France, and Germany. We will attempt to view these materials from the perspective both of developments from earlier periods and in relation to the later consequences of this ideology.

HIST 525 Seminar in the History of Technology (also Science and Technology Studies 525)  
Fall. 4 credits. R. Kline.  
For description, see STS 525.

HIST 465 Scientific Rhetoric in Historical Perspective (also Communication 465 and Science and Technology Studies 465)  
Spring. 4 credits. No prerequisites. Not offered 1997–98. R. P. R. Dear, B. Lewenstein. Exploration of the development of scientific discourse since the Scientific Revolution, with special emphasis on understanding the rhetorical purposes served by differing forms and techniques. Readings will include classics from Newton, Darwin, and others, along with representative samples of more routine scientific communications. Students will prepare brief reports during the semester and a final term paper.

HIST 680 Seminar in Historiographical Approaches to Science (also Science and Technology Studies 680)  
Fall. 4 credits. Not offered 1997–98. R. P. R. Dear.  
Examines philosophical, sociological, and methodological dimensions of recent historiography of science.

HIST 682 Topics in the Scientific Revolution (also Science and Technology Studies 682)  
Fall. 4 credits. Not offered 1997–98. R. P. R. Dear.  
This is a graduate seminar devoted to investigation of recent scholarship and issues in sixteenth- and seventeenth-century European knowledge of nature. Students will be expected to produce a substantial paper focused on the study of primary source documents. The seminar will focus alternately on the study of recent historiography in selected areas, and an examination of primary source materials intended to critique and test those historiographical approaches. Topics will include: credibility and social status; the academic environment; philosophy and court culture; the situated meaning of experiment.

HIST 711 Introduction to Science and Technology Studies (also Science and Technology 711)  
Fall. 4 credits. R. P. R. Dear.  
For description, see STS 711.

American History

HIST 101 Introduction to American History  
Fall. 3 credits. 101 is not a prerequisite to 102. M. Washington.  
A survey of American history from the colonial era to the Civil War. Major topics include cultural encounters of white, black, and Indian, the social construction of Colonial America, the American Revolution, conflict and consensus in the early republic, socioeconomic aspects in the rise of immigration, Indian relations and removal, slavery and reform, and the coming of the Civil War. Among the topics to be 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 102 Introduction to American History  
Spring. 3 credits. 101 is not a prerequisite to 102. G. Okitiro.  
An introductory survey of the development of the United States since the Civil War.

HIST 208 The Era of Franklin D. Roosevelt  
Spring. 4 credits. Primarily for sophomores. Prerequisite: permission of instructor. R. Polenberg. The impact of the Great Depression and World War II on American politics, law, and culture.

HIST 209 Political History of Indians in the United States (also American Indian Studies 209)  
Spring. 4 credits. D. Usner.  
An investigation of political organization and change among Native American societies. Discussions and assignments examine forms of tribal government, diplomacy, and warfare, as well as political relations with European colonies in the United States. Specific topics include pan-Indian confederacies, Indian policy, struggles over sovereignty, and Indian strategies of autonomy and resistance.

HIST 213 Asian American History (also Asian American Studies 213)  
Fall. 4 credits. Not offered 1997–98. G. Okitiro.  
Comparative introductory history of Asian Indians, Chinese, Filipino, Japanese, and Koreans in the U.S. from about 1850 to World War II. Themes include U.S. expansionism in the Pacific, Asian migrant labor in Hawaii and the American West, the anti-Asian movement, and Asian resistance.

HIST 214 Seminar on American Foreign Policy  

HIST 227 Men and Women in Modern America (also Women's Studies 227)  
Fall. 4 credits. Limited to 20 students. Permission of instructor required.  

HIST 238 History of Women in the West (also American Studies 238, and Human Development and Family Studies 288)  
For description, see HDFS 288.

HIST 251 Black Religious Traditions from Slavery to Freedom (also American Studies 251; Religious Studies 251)  
This course focuses on the black religious and spiritual traditions during bondage and the early years of freedom. The course will examine slave religion, the rise of black churches in the North, the formation of black churches after the Civil War, the independent church movement and the churches' role in social protest.

HIST 273 Women in American Society, Past and Present (also Women's Studies 273)  
Spring. 4 credits. M. B. Norton.  
A survey of women's experiences in America from the seventeenth century to the present. Among women's topics to be covered 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 208 American Indian History, 1500–1850 (also American Indian Studies 276)  
A survey of North American Indian history from the sixteenth century 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.

HIST 276 American Indian History, since 1850 (also American Indian Studies 277)  
Spring. 4 credits. D. Usner.  
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.

HIST 303 African-American Women in Slavery and Freedom (also Women's Studies 307)  
Historical exploration of African-American women from a sociopolitical perspective. Topics include women in Africa, slavery and freedom, sexuality, labor, the family, gender cross-culturally that began in the African background and ends at 1900.

HIST 304 American Culture in Historical Perspective, 1880–1980 (also American Studies 304)  
An introduction to American Studies and the study of modern American culture. Emphasis upon relationships between mass culture, popular culture, and high culture; and on the question of American exceptionalism (distinctiveness). Special attention also to the situation of subcultures and regions, to the changing role of entertainment in relation to leisure, the media, ethnicity (pluralism), the decorative and popular arts.

HIST 309 The U.S. and the Third World  
This course examines American relations with Asia, Africa, Latin America, and the Middle East, with particular emphasis on the post–World War II period. Connections between domestic factors in the United States and American foreign policy will be emphasized.
HIST 311 The Structure of American Political History (also American Studies 311) Fall. 4 credits. J. Silbey.
Examines the course of American politics from the eighteenth century to the Gilded Age, focusing on the development of American political culture, the nature of decision making, and the role of interest groups, political parties, and political elites in shaping our political history.

HIST 312 The Structure of American Political History Spring. 4 credits. J. Silbey.
A continuation of History 311 but can be taken independently. Examines the course of American politics from the 1800s to the present, focusing on the massive transformation of American political life in the late nineteenth and twentieth centuries in response to industrialism and urbanization, the depression and the international crises from the 1930s to the 1990s.

HIST 313 U.S. Foreign Relations, 1750-1812 Fall. 4 credits. Open to freshmen with permission of instructor. W. LaFeber.
Examines the development of the U.S. continental and global empires by analyzing policy and policymakers from Benjamin Franklin to Woodrow Wilson. Emphasis is placed on domestic events that shaped foreign policy. In conjunction with Hist. 313, a special course, 301, for discussion and guided research will be offered.

Students examine the emergence of the United States as a world power in the twentieth century. The course focuses on the domestic sources of foreign policy and the assumptions of the major policymakers (Wilson through Clinton). Important themes include the American response to a revolutionary world since 1912, the role of American racial views in the making of foreign policy, and the increasingly dominant role of the president in the making of U.S. foreign policy.

For description, see GOVT 365.

HIST 316 American Constitutional Development Fall. 4 credits. 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 "reution"; civil liberties and civil rights in modern American life; the institution of privacy; the contemporary Supreme Court.

HIST 318 American Constitutional Development Fall. 4 credits. 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 American life; the institution of privacy; the contemporary Supreme Court.

HIST 328 Indians, Settlers, and Slaves in the Early South (also American Indian Studies 328) Fall. 4 credits. D. H. Usner.
History of the American South from the sixteenth century to the early nineteenth century with an emphasis on intercultural relations. Topics include: the classification of the region by Spain, England, France, and the United States, American Indian adaptation and resistance, the evolution of slavery, African American relations with European and Indians, and the role of racial ideology and ethnic identity in the formation of the South as a distinct section of the United States.


An analysis of the factors leading up to the breakup of the Union, the impact of the war in North and South, and the problems of restoration and reconstruction of the seceded states.

America was born in the country and moved to the city. This course examines the transformation of America from a rural to a rapidly urbanizing society and culture, from the first European settlements to the era of the Civil War. It is also a history of the city itself, as a human community, and as a crucible of cultural contact and change.

America was born in the country and moved to the city. This course examines the transformation of America from the urbanizing society and culture of the mid-nineteenth century to the thoroughly metropolitan nation of the present (and near future). It is also a history of the city itself, as a human community, a crucible of cultural contact and change, and a focus of public policy.

Introductory course on African-Americans from 1619 to 1865. Emphasis will be 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.

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 Entrepreneurialism and Organization in the Age of the Corporation: Capitalism and Society in Modern America, 1840-2000 (also American Studies 337)]

[HIST 340 Recent American History, 1925-1960]
Fall. 4 credits. Not open to freshmen. Not offered 1997-98; next offered 1998-99. R. Polenberg. Topics include the Sacco-Vanzetti case; radicalism and reform in the New Deal; Franklin Roosevelt and World War II; the Holocaust and the atomic age; the Cold War and civil liberties; individualism and conformity in the 1950s.

[HIST 341 Recent American History, 1960 to the Present]
Spring. 4 credits. Not open to freshmen. R. Polenberg. Topics include the Supreme Court and civil rights; Kennedy, Johnson, and social reform; the Vietnam War and Watergate; politics and the presidency from Carter to Clinton; and class, race, and ethnicity in modern America.

[HIST 345 The Intellectual and Cultural Life of Nineteenth-Century Americans (also American Studies 345 and Religious Studies 345)]
Fall. 4 credits. R. L. Moore. An examination of the development of cultural and intellectual diversity in the United States. Particular emphasis will be placed on religious pluralism.

[HIST 346 The Modernization of the American Mind (also American Studies 346)]
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 American Studies 359, HDF 359, and Women's Studies 357)]
Spring. 3 credits. Prerequisite: HDF 150 or one 100-level social science or history course. S-U grades optional. Human ecology students must register for HDF 359. Not offered 1997-98. J. Brumberg. For description, see HDF 359.

[HIST 375 The African-American Workers, 1865-1910: The Rural and Urban Experience (also ILRCB 385)]
Fall. 3 credits. Prerequisite: juniors and seniors, or permission of instructor. Not offered 1997-98. N. Salvatore. For description, see ILRCB 385.

[HIST 376 The African-American Workers, 1619 to the present: Race, Work, and the City]
Not offered 1997-98. N. Salvatore. For description, see ILRCB 386.

[HIST 411 Undergraduate Seminar in American Political History]
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. J. Silbey.

[HIST 412 Undergraduate Seminar in Asian American History (also Asian American Studies 412)]
Spring. 4 credits. Not offered 1997-98. G. Okirho. A reading and research seminar that will cover various topics in Asian American history.

[HIST 414 Motivations of American Foreign Policy]
Fall. 4 credits. Prerequisite: Permission of instructor. W. LaFeber. Topic for Fall 1997: Willard and Dorothy Straight, the Chinese Revolution, and the origins of the American Century.

[HIST 418 Undergraduate Seminar in the History of the American South]

[HIST 419 Seminar in American Social History (also American Studies 419)]
Spring. 4 credits. Prerequisite: permission of instructor. N. Salvatore. This undergraduate seminar will focus this semester on the social and cultural dimension of the urban black experience in the decades following World War II. A research paper is required.

[HIST 421 Undergraduate Seminar in American Cultural History (also American Studies 421)]
Spring. 4 credits. Prerequisite: permission of instructor. N. Salvatore. This undergraduate seminar will focus this semester on the social and cultural dimension of the urban black experience in the decades following World War II. A research paper is required.

[HIST 422 Undergraduate Seminar in American Cultural History (also Women's Studies 426)]

[HIST 426 Undergraduate Seminar in Early American History (also Women's Studies 426)]

[HIST 428 Undergraduate Seminar in American Frontier History]
Fall. 4 credits. D. Usner.

[HIST 429 Undergraduate Seminar in Indians of Eastern North America (also American Indian Studies 429)]
Fall. 4 credits. D. Usner. A seminar examining the history of Native Americans in the eastern woodlands from colonial times to the present. The cultural and economic participation of Indians in the evolution of frontier societies will be examined. Major topics include fur-trade networks, political relations, removal, and the persistence of Indian communities in eastern states.

[HIST 432 The City in History: Europe and America]
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98; next offered 1998-99. S. Blumin. Reading and discussion of significant interpretations of the rise, role, and character of cities in medieval and early modern Europe, and in modern Europe and America. Individual research projects.

[HIST 438 Reform in Antebellum America]
Spring. 4 credits. Prerequisite: permission of instructor. M. Washington. An examination of American society from 1830 to 1860 through the eyes of people attempting to bring change. The emphasis will be on individuals, such as William Lloyd Garrison, Abby Kelly Foster, and Horace Bond. The course will also emphasize issues such as slavery, temperance, Indian removal, and public education.

[HIST 440 Undergraduate Seminar in Recent American History]

[HIST 442 Religion and Politics in American History (also Asian American History, Women's Studies 442 and Religious Studies 442)]
Fall. 4 credits. R. L. Moore. A reading and research seminar concerned with popular culture in nineteenth-century America (publications, performances, and audiences).

[HIST 458 Female Adolescence in Historical Perspective (also Women's Studies 436 and Human Development and Family Studies 417)]
Spring. 3 credits. Prerequisite: permission of instructor. J. Brumberg. For description, see HDF 417.

[HIST 484 Seminar in the History of American Labor: Race, Work, and the City (also ILR 304)]
Fall. 4 credits. Open to juniors and seniors only with the permission of the instructor. Not offered 1997-98. N. Salvatore. For description, see ILRCB 304.

[HIST 486 Seminar on the 1960s]
Fall. 4 credits. T. Bontelmann. This course will explore the issues and developments of the most turbulent and significant decade in recent U.S. history. Major topics will include the civil rights movement, the Kennedy and Johnson administrations, the Vietnam War, the anti-war movement, the counterculture, the women's liberation movement, the media, and the Nixon administration. A substantial research paper will be required.

[HIST 500 Undergraduate Research Seminar (also American Studies 500)]
Fall and spring. 8 credits each term. J. Silbey and others. Offered in Cornell-in-Washington Program. An intensive research and writing experience utilizing the extensive resources of Washington, D.C.

[HIST 521 Seminar in American Cultural Studies (also American Studies 521)]
Fall. 4 credits. Not offered 1997-98; next offered 1998-99. M. Kammen. The focus will be the relationship between government and culture in historical perspective. After three contextual sessions devoted to 19th-century background, we will mainly be concerned with the period from the 1930s to the present. Several comparative sessions will be devoted to government as a patron of culture in other societies. A research paper is required.

[HIST 607 Writing Seminar on African-American Women]
Fall. 4 credits. Prerequisite: permission of instructor. M. Washington. This course is designed for students actively engaged in a writing project on African-
American women's history. Students must have already done the research and most of the reading for their papers prior to enrollment. Reading and discussion will focus on style, methodology, and theory. An extensive research paper is due at the end of the semester.


A reading and discussion topics seminar focusing on the experiences of African-American women in nineteenth-century America, including the Caribbean. Topics include women and labor, abolitionism, women's rights, sexuality and race relations, education and racial uplift, black women's literature, marriage and family.


Reading and discussion course focusing on the way historians write and interpret the Black experience in America. Students will be concerned with individual historians, various schools of thought, and historical approaches.


A reading and research seminar in twentieth-century American diplomatic history, emphasizing the Cold War period. Discussion will focus on interpretive approaches to U.S. foreign policy and on U.S. relations with the Third World since 1945. A research paper is required.


[HIST 618 Seminar in American Cultural History] Spring. 4 credits. R. L. Moore.

A reading and research seminar concerning selected topics in nineteenth century America.


[HIST 624 Graduate Seminar in American Indian History (also American Indian Studies 624)] Spring. 4 credits. Not offered 1997-98. D. Usner.

A reading and research seminar intended primarily for graduate students. Major works in American women's history will be carefully scrutinized, and each student will prepare a lengthy research paper.


A research seminar intended primarily for graduate students exploring society, culture, and politics of the United States between 1815 and 1896.

[HIST 640 Graduate Seminar in Recent American History] Fall. 4 credits. Prerequisite: permission of instructor. R. Polenberg.

A graduate research seminar that will examine American legal and constitutional history in the twentieth century.

[HIST 683 Seminar in American Labor History (also ILRCB 783)] Fall. 3 credits. Prerequisites: graduate students only. Not offered 1997-98. N. Salvatore.

For description, see ILRCB 783.


Examination of major approaches, periods, issues, and modes of interpreting American history. Readings include recent "classics" of American scholarship from diverse subfields and genres.

Latin American History

HIST 295 Colonial Latin America @ # Fall. 4 credits. T. Holloway.

Survey of Latin America from the rise of pre-Columbian civilizations through the European conquest, the establishment of the Spanish and Portuguese colonial societies, imperial rivalries in the New World, the background of the independence movements, and the achievement of political independence.

HIST 296 Latin America in the Modern Age @ Spring. 4 credits. Not offered 1997-98. T. Holloway.

Survey of the Latin American nations from independence to the present. Major themes include the persistence of neocolonialism, economic and social institutions, the development of nationalist and populist politics, revolutionary movements of the twentieth century, and United States-Latin American relations.


The development of rural patterns of wealth, status, and power, focusing on the role of country people in the larger society. Topics include disruption of the conquest, evolution from encomienda to hacienda, rise of plantation agriculture and export enclaves, decline of Indian communities, peasant protest, and land reform and development programs of the recent past.

[HIST 348 Contemporary Brazil @ Fall. 4 credits. Not offered 1997-98. T. Holloway.

With some historical background, the course focuses on the twentieth century. Topics include the impact of subordinating growth model, contradictions leading to military rule 1964-1985, transition to competitive politics, debt, ecology, regional and social disparities. Some comparisons are made to other Latin American countries.


This seminar focuses on ethnic interaction and class formation in the historical development of Latin American societies considering the roles of Native Americans, Europeans, and Africans. Each unit will be approached as an analysis of the historical origins of contemporary patterns, and comparisons will be made among units in a search for underlying and overarching themes.


African History

HIST 255 Cultures and Ecology in Precolonial Africa @ # Fall. 4 credits. S. E. Greene.

This course will cover the history of Africa from the origins of humankind through the emergence of small-scale societies and state systems, such as Egypt, Meroe, Mali, Bunyoro, the Swahili city states and the Zimbabwe complex that had regional and international significance. Emphasis will be placed on understanding the character of preindustrial societies, and the way in which historic ecological conditions affected processes of change and the character of African cultures up to 1800.

HIST 390 Southern African History @ # Spring. 4 credits. Not offered 1997-98. G. Okhio.

Southern African history from foundations to union, or from the earliest human inhabitants to 1910. Major themes will include the peopling of southern Africa, the interaction and change among the San, Khoikhoi, and Bantu-speaking peoples, the arrival and expansion of Europeans, African state systems, and the economic transformation of the 1870s and 1880s leading to the South African war and union.

HIST 391 Riot and Revolution in Nineteenth Century Africa: The Birth of the Modern Era Spring. 4 credits. S. E. Greene.

The beginning of the nineteenth century witnessed the rapid and often times forceful expansion of Islam in West Africa, the end of the Atlantic slave trade, the transformation of the Zulu from a small, inconsequential people to the largest and most powerful ethnic group in South Africa, and the wild fire spread of Swahili as a lingua franca in east and central Africa. This course explores these revolutionary changes and the upheavals that accompanied them as Africa remade itself to face the modern era. Lectures, readings and discussions will focus on the causes and consequences of these events and their significance for understanding contemporary Africa.
HIST 434  Gender and Sexuality in the Social History of Africa (also Women's Studies 477) @ #
Spring. 4 credits. S. Greene.
This course will examine theoretical literatures and case studies on the history of gender relations and sexuality in African social history. The course will be organized topically on such themes as gender and political-economy, gender and social relations, gender and (homo-/hetero) sexuality, and gender and the religions of Africa. Readings for each topic will cover both the precolonial and colonial periods.

Asian History

[HIST 190  Introduction to Asian Civilizations @ #]
An introduction to the distinctive cultures of China, India, Japan, and Southeast Asia that features an intensive examination of selected topics and periods of particular significance in the history of each.

[HIST 191  Introduction to Modern Asian History @]
Fall. 4 credits. S. Cochran, D. Wyatt.
The history of Asia-Pacific from the nineteenth century to the present, focusing on relations of China, Japan, and Southeast Asia with each other and with the West.

[HIST 293  History of China up to Modern Times @ #]
A survey of the principal developments in the history of China from the earliest times to the eighteenth century that also undertakes a topical introduction to Chinese culture and civilization, in part by the use of visual materials.

[HIST 294  History of China in Modern Times @ #]
Spring. 4 credits. S. Cochran.
A survey that concentrates on the rise of the last imperial dynasty in the seventeenth and eighteenth centuries, the upheavals resulting from domestic rebellions and foreign imperialism in the nineteenth century, and the twentieth-century efforts to achieve social mobilization, political unity, and commercial expansion.

[HIST 297  Japan Before 1600 @ #]
Spring. 4 credits. J. Piggott.
This course explores Japan before 1600 from a variety of perspectives. Analysis of primary sources, including literary and archaeological experiences compared with those of other societies around the globe. History 297 is a good introduction to issues of premodern historical study and to the general study of East Asia. (Graduate students or more advanced undergraduates who would like to do a research project should register for History 497.)

[HIST 298  State, Society, and Culture in Modern Japan @ #]
Spring. 4 credits. J. V. Koschmann.
A survey of Japan from early-nineteenth century to the present, which attempts to connect the political, socio-economic, and imaginative realms of modern Japanese life so as to achieve a complex view of modern Japanese society. Pays particular attention to the changing situation of women and men in Japan's modern period, and problems of historical representation and consciousness. Readings will include Japanese works in translation as well as secondary sources.

[HIST 322  Taming the Samurai: Warrior History in Japan @ #]
Fall. 4 credits. J. Piggott.
This course explores the role of the samurai at various epochal moments in Japan, and the effects samurai-centered governance has had on culture writ broadly up to the early modern era. This is very much a hands-on course in which analysis and writing are emphasized—students will do extensive primary and secondary source readings, write a critical book review, and write a final essay.
Graduate students are welcome but should register for History 522 after consultation with the instructor.

[HIST 326 From Medieval to Early Modern in Japan @ #]
A course on the development of samurai warfare and society from the Heian to the Edo periods.

[HIST 352 The Past as Prologue? Japan in Asia, Germany in Europe (also Government 396) @ #]
Fall. 4 credits. Not offered 1997–98.
Katzrin, Koschmann.

[HIST 360  Early Warfare, East and West #]
Spring. 4 credits. C. A. Peterson.
For description see Comparative History.

[HIST 393  Images of Humanity in Medieval China (also Asian Studies 393) @ #]

[HIST 395  Southeast Asia to the Eighteenth Century @ #]
Fall. 4 credits. R. Mrazek.
A survey of the earlier history of Southeast Asia, concentrating particularly on regional movements of economic, social, cultural, and political change and using, to the extent possible, readings in translated primary sources.

[HIST 396  Southeast Asian History from the Eighteenth Century @ #]
Spring. 4 credits. R. Mrazek.
A survey of the modern history of Southeast Asia with special attention to the formation of modern states (colonial as well as national), changing economic and social structure, and consciousness. Primary texts will be read in translation whenever feasible.

[HIST 420  Japan in the Year 1000: The Tale of Genji in Historical Perspective @ #]
The tale of Genji is a classic of premodern Japanese literature that provides readers a broad view into Japan's courtly society at a time when many of the elements of Japan's classical tradition were taking form. Additional primary source readings and secondary sources provide insight into the countryside beyond the capital as well. Previous study of premodern Japan is advised.

[HIST 448  Gender and Family in Classical Japan @ #]
An inquiry into structures of family and gender from the eighth to the fourteenth centuries. Themes will include kinship and family, state formation, and gender construction, and those interested in these themes in comparative perspective are invited to enroll. "Breaching" reading, primary source materials, and comparative reading placing Japan in an East Asian context will be assigned. Previous study of some aspect of premodern Japan is recommended.

[HIST 466  Kings and Shoguns @ #]
Spring. 4 credits. J. Piggott.
The turn of the fourteenth century witnessed epochal changes in Japan as structures of monarchy, court-Bakufu relations, landholding, judiciary, international relations, and popular culture were deeply affected by the failure of Go-Daigo Tenno's royal restoration. Core readings of the seminar will include portions of the epic, the Taiheiki, and other materials from which insights into these transformations can be drawn. Previous course work in Japanese history, especially History 322, is recommended.

[HIST 489  Seminar in Modern Japanese History @]
Fall. 4 credits. Prerequisites: History 298 or equivalent. J. V. Koschmann.
Topic for Fall 1997: Japan Since World War II.

[HIST 492  Undergraduate Seminar in Medieval Chinese History @ #]
Spring. 4 credits. Prerequisite: History 190, 293, 360, or permission of instructor. C. A. Peterson.
Topic for spring 1998: The intellectual and cultural life of the medieval Chinese literati including an examination of their careers, literary output, and private lives.

[HIST 493  Problems in Modern Chinese History (also History 653) @]
Fall. 4 credits. Prerequisite: History 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 494  The Japanese in Asia @]
Spring. 4 credits. Not offered 1997–98.
J. V. Koschmann.

[HIST 495  Asian Kingship and State Formation @]
Fall. 4 credits. J. Piggott.
The turn of the fourteenth century witnessed epochal changes in Japan as structures of monarchy, court-Bakufu relations, landholding, judiciary, international relations, and popular culture were deeply affected by the failure of Go-Daigo Tenno's royal restoration. Core readings of the seminar will include portions of the epic, the Taiheiki, and other materials from which insights into these transformations can be drawn. Previous course work in Japanese history, especially History 322, is recommended.
This course gives each student an opportunity to participate in a special weekly colloquium. Students will attend History 297 lectures and from a variety of historical perspectives.

HIST 499 Problems in Modern Chinese Japanese colonial policy and practice in and/or Japanese history but need for comparative or other purposes to develop a familiarity with the main problems and contours of modern Korean history. Readings will be selected primarily from English-language works on Korea from the 1870s through the post-World War II era, including Japanese colonial policy and practice in Korea, the Korean War, and the postwar history of the Republic of Korea.

HIST 588 Proseminar in Modern Korean History
Fall. 4 credits. Prerequisite: a course on East Asian history or equivalent. J. V. Koschmann.

Designed primarily for graduate students in East Asian Studies who specialize in Chinese and/or Japanese history but need for comparative or other purposes to develop a familiarity with the main problems and contours of modern Korean history. Readings will be selected primarily from English-language works on Korea from the 1870s through the post-World War II era, including Japanese colonial policy and practice in Korea, the Korean War, and the postwar history of the Republic of Korea.

HIST 598 Colloquium in Modern Japanese History
Spring 4 credits. J. V. Koschmann.

For graduate students only. Students will attend lectures and do the reading for History 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 Studies 609)

The course will provide both a historical introduction to and critical analysis of the constitution of modern Japan studies as a "field" of postwar academic inquiry. While reading texts particularly influential in the early and contemporary formation of the field, we will consider such questions as the domestic and international contexts in which Japanese studies has been institutionalized and maintained, and the relationship between "Japan" as object of area studies discourse and "Japan" as represented in American journalism, popular culture, and politics. Interdisciplinary and team-taught, the course will aim to introduce students to a range of methodological and topical issues developed in historical and critical works, problematizing assumptions in each case. Possibilities for cross-disciplinary research (along lines recently undertaken in areas such as feminist criticism and cultural studies, for example), will also be explored.]

[HIST 693 Problems in Modern Chinese History (also History 493)
Fall. 4 credits. Prerequisite: 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 History 498)
Spring. 4 credits. Prerequisite: permission of instructor. S. Cochran.

For description, see HIST 499.

HIST 695 Early Southeast Asia: Graduate Proseminar
Fall. 4 credits. D. Wyatt.

Introduction to the history of Southeast Asia for graduate students. Students will be expected to attend the lectures and complete the readings for History 395, and they will meet separately as a group to further explore selected topics.

HIST 696 Modern Southeast Asia: Graduate Proseminar
Spring. 4 credits. R. Mazek.

Introduction to the modern history of Southeast Asia for graduate students. Students will be expected to attend the lectures and complete the readings for History 396, and they will meet separately as a group to further explore selected topics.

[HIST 791 Seminar in Medieval Chinese History
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. C. A. Peterson.]

[HIST 792 Seminar in Medieval Chinese History
Spring. 4 credits. Prerequisite: permission of instructor. C. A. Peterson.

[HIST 795 Seminar in Modern Southeast Asian History
Fall. 4 credits. Permission of the instructor. Not offered 1997-98.]

[HIST 796 Seminar in Southeast Asian History
Spring. 4 credits. Prerequisite: reading knowledge of relevant languages. Not offered 1997-98. D. Wyatt.]

[HIST 797 Seminar in Japanese Thought
Fall. 4 credits. Prerequisite: reading knowledge of Japanese desirable. Grad only. J. V. Koschmann.

Topic for fall 1997: Taisho thought and culture.

[HIST 798 Seminar in Japanese Thought
Fall. 4 credits. Prerequisite: reading knowledge of Japanese and permission of instructor. Not offered 1997-98; next offered 1998-99. J. V. Koschmann.

Near Eastern History

[HIST 248 History of the Near East: 1250-1914 (also Near Eastern Studies 258 and Religious Studies 258)
Fall. 3 credits. Not offered 1997-98. L. Pierce.

For description, see NES 258.]

[HIST 254 Islamic History: 600-1258 (also Near Eastern Studies 257 and Religious Studies 257)
Fall. 3 credits. D. Powers.

For description, see NES 257.]

[HIST 317 Politics and Culture in Late Medieval Central Asia and the Near East (also Near Eastern Studies 353)
Fall. 4 credits. L. Peirce.

For description, see NES 353.]

[HIST 372 Introduction to Islamic Law (also History 652, Near Eastern Studies 351/651, Religious Studies 350)
Fall. 4 credits. Enrollment is limited to 25 students. D. Powers.

For description, see NES 351.

[HIST 437 Sexuality, Society, and the State in the Near East (also Near Eastern Studies 456/657, History 657 and Women's Studies 455/655)

For description, see NES 456.]

[HIST 441 Ottoman History: 1600-1923 (also History 641, Near Eastern Studies 359/659)
Spring. 4 credits. L. Peirce.

For description, see NES 359.

[HIST 446 Ottoman History, 1300-1600 (also History 646, Near Eastern Studies 358/658)
Fall. 4 credits. Enrollment is limited to 20 students. L. Peirce.

For description, see NES 358.

[HIST 457 Women, Men and the Law in Muslim Court (also History 657, Near Eastern Studies 459/659)
Fall. 4 credits. Prerequisites: previous course within Islamic Studies desirable but not essential. L. Peirce.

For description, see NES 459.

[HIST 460 Seminar in Islamic History: Muhammad and the Rise of Islam (also Near Eastern Studies 418 and Religious Studies 418)

For description, see NES 418.]

[HIST 461 Seminar in Islamic History 600-750 (also History 671, Near Eastern Studies 451 and 650, and Religious Studies 451)
Spring. 4 credits. Enrollment is limited to 25 students. D. Powers.

For description, see NES 451.

[HIST 641 Ottoman History: 1600-1923 (also History 441, Near Eastern Studies 359/659)
Spring. 4 credits. L. Peirce.

For description, see NES 359.

[HIST 646 Ottoman History: 1300-1600 (also History 446, Near Eastern Studies 350/650)
Spring. 4 credits. Enrollment is limited to 20 students. L. Peirce.

For description, see NES 358.

[HIST 652 Introduction to Islamic Law (also History 372, Near Eastern Studies 351/651, Religious Studies 350)
Fall. 4 credits. Enrollment is limited to 25 students. D. Powers.

For description, see NES 351.

[HIST 460 Seminar in Islamic History: Muhammad and the Rise of Islam (also Near Eastern Studies 418 and Religious Studies 418)

For description, see NES 418.]

[HIST 461 Seminar in Islamic History 600-750 (also History 671, Near Eastern Studies 451 and 650, and Religious Studies 451)
Spring. 4 credits. Enrollment is limited to 25 students. D. Powers.

For description, see NES 451.

[HIST 641 Ottoman History: 1600-1923 (also History 441, Near Eastern Studies 359/659)
Spring. 4 credits. L. Peirce.

For description, see NES 359.

[HIST 646 Ottoman History: 1300-1600 (also History 446, Near Eastern Studies 350/650)
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For description, see NES 451.

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Spring. 4 credits. L. Peirce.

For description, see NES 359.

[HIST 646 Ottoman History: 1300-1600 (also History 446, Near Eastern Studies 350/650)
Spring. 4 credits. Enrollment is limited to 20 students. L. Peirce.

For description, see NES 358.

[HIST 652 Introduction to Islamic Law (also History 372, Near Eastern Studies 351/651, Religious Studies 350)
Fall. 4 credits. Enrollment is limited to 25 students. D. Powers.

For description, see NES 351.
We will look at the impact of the reformation, counter-reformation and wars of religion on aspects of political, social and cultural life in 16th- and 17th-century Europe, exploring shifts in gender relations, the problem of social control, the effect of religious conflict on the power of the state and its contested boundaries with the church, the relationship of elite and popular religion, and the encounter of European missionaries with other cultures. Students will engage with major historiographical interpretations of the period, as well as with the close reading of primary sources.

**HIST 257 English History from Anglo-Saxon Times to 1485**
Fall. 4 credits. P. Hyams.

A survey of the government, social organization, and cultural and religious experience of the English people. Particular stress is laid on land settlement, the unification of the realm, the emergence of state institutions such as Parliament, and changes in economic organization (manors, towns and commerce).

The approach will be comparative within a context of contemporary European developments. The course offers students who wish to work on their writing skills an opportunity to do so, especially in the second paper.

**HIST 263 The Earlier Middle Ages: An Introduction and Contextualization**
Spring. 4 credits. P. Hyams.

As a single-semester alternative to History 263-4, this survey aims to convey what was significant in that area of the "West" that was to become Europe, between the end of the Roman Empire in the West and the Renaissance, from 395 to 1400. It thus takes a critical look at a formative period of Western Civilization. The course is organized into modules. The first of which surveys in five weeks the main public developments in Political and Church History over the period. Other modules focus in some depth on select aspects, such as technology, culture, material resources and religions, to other choice samples from the best of medieval culture. The emphasis is on students finding their own ways to win credit.

**HIST 265 Ancient Greece from Homer to Alexander the Great**
Spring. 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 657 Women, Men and the Law in Muslim Civilizations**
Fall. 4 credits. D. Peterson.

A study of legal aspects of gender in Muslim history. Topics include marriage, divorce, women's status, and the role of Islamic law. Readings draw from classical Islamic texts, as well as from contemporary sources.

We will look at the impact of the reformation, counter-reformation and wars of religion on aspects of political, social and cultural life in 16th- and 17th-century Europe, exploring shifts in gender relations, the problem of social control, the effect of religious conflict on the power of the state and its contested boundaries with the church, the relationship of elite and popular religion, and the encounter of European missionaries with other cultures. Students will engage with major historiographical interpretations of the period, as well as with the close reading of primary sources.

**HIST 268 History of Rome from Republic to Holy City**
Spring. 4 credits. Open to freshmen.

Fall. 4 credits. D. Peterson.

A study of Rome from its founding in the 8th century B.C. to the end of the Western Empire in 476. Topics include the Roman Republic, the Empire, and the Byzantine period. Readings draw from classical Roman texts, as well as from contemporary sources.
European and Italian politics in the early sixteenth century; the decline of the Florentine republic and the rise of the Medici principate; Machiavelli’s own career in government and his, and the republic’s, crisis in 1512-13; the intellectual traditions of Renaissance classical thought, and the revival of antiquity; vernacular literary currents and popular culture; and the remarkable generation of political figures, writers, and theorists with whom Machiavelli associated and corresponded. Emphasis will be 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 361 The Culture of the Renaissance I (also History of Art 350 and Comparative Literature 361)]
An interdisciplinary exploration of some major themes of Renaissance society and culture from the fourteenth to the sixteenth centuries. Using the perspectives of history, art history, and literature, the course will investigate the representation in primary texts and works of art (and with the aid of selected modern criticism) of Renaissance discourses of antiquity and authority, education and learning, republics and courts, politics, gender and family, love and eros, and cross-cultural encounters. Most of the attention will be to Italian history and culture, but with some comparisons to other European contexts.

Readings include selections from Petrarch, Boccaccio, Alberti, Machiavelli, More, Erasmus, and Vasari. Artists range from Ambrogio Lorenti to Mantegna, Durer, Titian, and others. Two lectures and a required discussion section each week.

(HISs 330 and 335, and Religious Studies 362; Music 390)

[HIST 364 The Culture of the Renaissance II (also Comparative Literature 362; English 325; Religious Studies 362; Music 390)]
Fall. 4 credits. C. Kaske, W. Kennedy. For description, see COM L 362.

[HIST 365 Medieval Culture, 400-1150 (also Religious Studies 365)]
Fall. 4 credits. Prerequisite: History 263 or permission of instructor. J. J. John. Intellectual and cultural developments in the age of monasticism, from St. Augustine and St. Benedict to St. Anselm and St. Bernard of Clairvaux.

[HIST 366 Medieval Culture, 1100-1300 (also Religious Studies 366)]
Spring. 4 credits. Prerequisite: History 264 or permission of instructor. Not offered 1997-98; next offered 1999-00. J. J. John.
The origin and development of the universi-
ties will be studied as background for a consideration of the scholastic mentality and its influence on the art, literature, philosophy, science, script, and theology of the period. Readings from Abelard, Hugh of St. Victor, Bonaventure, Thomas Aquinas, Dante, and others.

[HIST 367 Marriage and Sexuality in Medieval Europe (also Religious Studies 368, Women’s Studies 368)]
Spring. 4 credits. Not offered 1997-98. P. Hyams.
Few topics generate heat so readily as gender relations and sexuality. Behind the current controversies lie decisions made in the first Christian centuries, and firm ed in the course of the Middle Ages, these still affect all of us, believers and unbelievers alike. This course studies Western attempts to deal with the problem of sexuality up to about 1500. The class will first clarify the church’s normative rules of law and theology. Armed with this framework, it will then turn to more specific topics, including homosexuality, prostitution, rape, abduction and sexuality in medieval literature. The goal is to be able to compare the ideal model with the reality, and to assess the product the medieval church passed on to Western culture and ourselves. No formal prerequisite, though some prior knowledge of medieval European history is desirable.

[HIST 369 The History of Florence in the Time of the Republic, 1250-1530]
Spring. 4 credits. D. Baugh.
Frequent terms of enterprise, imperial policy, and naval power in the age of expansion. The rise and decline of the Portuguese and Spanish empires are considered, but the emphasis is on English, French, and Dutch rivalry in the Atlantic and Caribbean.

[HIST 374 War, Trade, and Empire, 1500-1815]
Spring. 4 credits. D. Baugh.
Maritime enterprise, imperial policy, and naval power in the age of expansion. The rise and decline of the Portuguese and Spanish empires are considered, but the emphasis is on English, French, and Dutch rivalry in the Atlantic and Caribbean.

[HIST 377 Medieval Latin Literature (also Women’s Studies)]
An inquiry into how masculinity and femininity were defined in early modern Europe. Questions to be explored include: What purpose did gender distinctions serve in this particular society? To what extent were men and women able to shape and redefine the meaning of their gender? How was their ability to do so affected by such events as the Reformation and the French Revolution?

[HIST 405 Population and History]
For description, see Comparative History.

[HIST 408 Secular Culture in Medieval France, 1000-1300]
An upper-level seminar on the main currents of noble lay culture in France, which led European fashions in love, warfare, entertainment, and environment through most of the
period. There will be heavy emphasis on contemporary sources (in English), including lively and complete readings from epic literature (the Song of Roland), lives, and chronicles.

For description see Comparative History.

[HIST 427 Power and Society in Early Medieval Europe and Japan] Spring. 4 credits. Prerequisite: a course in medieval European or Japanese historiography or permission of instructor. Not offered 1997–98. P. Hyams and J. Figgott.
This seminar will focus on structures, processes, and practices of society in early medieval Europe and Japan. It will provide a forum for discussion of the ways in which, in some very different societies, Europeans and Japanese handled power. We will also be interested in comparing historiographical methodologies employed and issues considered by historians of these societies.
The nature of power and authority and characteristic organizational practices, including kingship, land tenure, status systems, and religious and military structures; the formation of ideology through art, ritual, literature, and law; and various means of linking center and periphery in these societies will be topics for discussion.

This seminar concentrates on a time (late 9th-13th centuries) when much of Europe lacked formal systems of justice, and so handled questions of social control quite largely by extra-legal means. Its subject is in one sense political history upside-down, as viewed by individuals rather than their rulers. We examine ways anthropologists and some recent approaches to law can assist: the readings will be partly anthropology, partly translated medieval accounts of actual conflicts, with samples of recent interpretation. The topics covered could be of interest to law students and majors in anthropology and other modern social sciences.

[HIST 443 Gifts, Commodities and Alliances: Historical Perspective on Exchange] Spring. 4 credits. Not offered 1997–98. Almost all forms of social interaction are predicated on some type of exchange, whether equal or unequal, voluntary or coerced, real or fictive. This course is an exploration of the varieties of exchange. Readings will combine classic theoretical treatment (Marx, Mauss, Goody and others) with historical monographs from both the Western and non-Western worlds, as well as contemporary literature in economic anthropology. The main themes of the course will be the social corollaries of exchange and the homologies between material and immaterial modes of exchange.

[HIST 447 Crusaders and Chroniclers] Fall. 4 credits. P. Hyams.
An intensive reading seminar offering a natural progression from History 259 The Crusades. It will examine contemporary accounts of the crusading movement in English translation. The twin goals are to follow select themes of crusading history to a deeper level than is possible in History 259 and to study medieval historiography through whole chronicles and other primary sources.

[HIST 450 Power and the Sacred in Late Medieval and Early Modern Europe] Fall. 4 credits. D. Petersen.
Explores the transformations of European religious life in a period of declining ecclesiastical authority, new secular powers, and social changes brought on by the rise of commerce, the towns, and plague. Primary and secondary readings on topics in rough chronological order, including: humanist, and “popular” religion; heresy, dissent, minorities and religious discipline; ritual and charitable communities; prophecy, mysticism, and women’s religious experience. In a European framework, roughly 1200–1500, with special attention to Italy and urban settings.


This graduate seminar tentatively explores the comparative study of medieval English history to that of the British Isles and its inhabitants within the wider context of Europe and Western Christendom. Readings will mostly be representative original sources. The precise texts and topics studied will depend on the interests (and especially future teaching plans) of participants, but will certainly allow for a critical examination of existing literature on the general and cultural history of England, Scotland, Ireland and Wales.

[HIST 463 Graduate Seminar in Renaissance History] Spring. 4 credits. Open to undergraduates with permission of instructor. J. Najemy.


[HIST 469 Politics, Power, and Culture in Early Modern England] Fall. 4 credits. R. Weil.
An inquiry into how the ruling class ruled, and what that meant to and for everyone else. Topics include: the invention of the "state," the relationship of central and local power, clientage and corruption, the construction of categories of "public" and "private," representations of monarchy, hegemony and resistance, court culture, the social interpretations of the English Revolution and their critics. Focus is on historiography and methodology, with some engagement with primary sources.
Modern European History

HIST 152 Introduction to Western Civilization (1600 to the end of World War II) #
Spring. 4 credits. P. Holquist and R. Weil.
This course is designed to introduce students to some of the main themes of European history from the Reformation to the present. The lectures are organized around the problems of state-building and social order: how have European societies ordered and reproduced themselves? why did the modern state and modern civil society develop? how have a succession of political ideologies legitimized them? how have state and society responded to crisis and disruption? what balance has been struck between acquiescence and force; between law and violence, in upholding or questioning order? Readings emphasize primary works by figures such as Luther, Hobbes, Tocqueville, Marx, etc.

HIST 217 Totalitarianism
Spring. 4 credits. P. Holquist.
One of the distinguishing features of the twentieth century is the rise of a qualitatively new political project, one that produced massive violence and fundamentally reordered the societies it operated upon. Totalitarianism seeks to explain these developments as related to the emergence of a certain political ethos and the development of particular state tools. This seminar will first examine totalitarianism as a concept through a reading of classic studies on this phenomenon, and then test the concept's applicability in a range of case studies (especially Stalinist Russia and Nazi Germany, but including also Fascist Italy and Maoist China) and see how it operated in a variety of spheres (aesthetics, politics, economic policies, state measures for the population, repressive policies). This course is designed primarily for sophomores, to acquaint them with historical issues and methodologies and to develop their writing abilities.

HIST 218 The Russian Imperial and Foreign Policy #
Fall. 3 credits. W. Pintner.
An examination of Imperial Russian foreign policy, examining military, economics, and social factors. Examples will be taken from various periods ranging from the early Muscovite period to the First World War. Students will write 6 to 7 short papers, do extensive reading, and participate in class discussion.

HIST 220 The French Experience: An Introduction (also French Literature 224)
Spring. 3 credits. S. Kaplan.
An examination of French society and institutions. What has made French culture so distinctive? Its literature and its revolutions, its gastronomy and fashion, its painting, cathedrals and cinemas. Looking attentively at texts, images and contexts, at selected moments in the seventeenth, eighteenth, nineteenth, and twentieth centuries, we will attempt to unravel some of the defining enigmas of the French experience. Two lectures/week in English and one course section (one section conducted in English, one in French). Readings available both in French and English translation.

HIST 224 The British Empire, ca. 1760-1960
Spring. 3 or 4 credits. Not offered 1997-98. D. A. Baugh.
A seminar covering the key instances of British rule on five continents. Topics will explore dynamics of colonization, interactions with native peoples, and the goals, successes, and failures of British imperial policies and institutions.

HIST 235 Antisemitism and the Crisis of Modernity: From the Enlightenment to the Holocaust (also Jewish Studies 254)
Spring. 4 credits. V. Caron.
This course will examine the role of antisemitism in nineteenth and twentieth century European ideological, political and socioeconomic developments. Attention will be paid to the way in which antisemitism illuminates the underside of European history, allowing us to see how anti-Jewish intolerance and prejudice became embedded in the worldviews of significant sectors of the European population, culminating in the Holocaust. Topics will include: the Christian roots of antisemitism and the extent to which modern antisemitism marks a break with the medieval past; the politicization of antisemitism by both Left and Right; the role of antisemitism in socioeconomic conflicts linked to the rise of capitalism; Jewish responses to antisemitism; antisemitism in the Nazi and Fascist revolutions; and contemporary interpretations of antisemitism.

HIST 252 Russian History to 1800 #
Fall. 4 credits. W. Pintner.
The origin and development of the fundament­al social, political, economic, and cultural institutions that have determined the nature of contemporary Russian society.

HIST 253 Russian History since 1800 #
Nineteenth- and twentieth-century Russia up to the revolution of 1917, with emphasis on the major social, political, and economic changes that have transformed Russia since the mid-nineteenth century.

HIST 258 English History from the Revolution to the Restoration
An introductory course encompassing political, social, economic, imperial, and constitutional developments. Major themes are the significance of 1688, eighteenth-century society and politics, the rise and decline of liberalism, the Irish Question, the impact of the two world wars, and the challenges and achievements of the welfare state.

HIST 283 Europe in the Technological Age
An introduction to politics, culture, and technology in contemporary Europe. In the sections on politics a survey of party systems and their interactions with social movements is followed by examinations of post-Communist constitutions and political structures, the New Germany, and the European Union. The section on European culture pays special attention to the European press and electronic media as shapers and reflectors of cultural values. A section on the struggle over the control of the past deals with tensions and conflicts in European national memories. In the section on Nationalism and ethnicity, political and cultural approaches are combined in consideration of the wars in former Yugoslavia as well as conflicts between nationalists and members of ethnic minorities elsewhere in Europe. The section on technology deals with the design of products and processes as a cultural phenom­enon, making cross-national comparisons of some of the social, cultural, and institutional influences on engineering performance.

HIST 290 Twentieth-Century Russia and the Soviet Union
Fall. 4 credits. P. Holquist.
An introductory lecture course spanning the lifetime of the USSR (1917-1991), but covering the last years of the Russian Empire and the first years of the post-communist present as well. Geographically, it focuses on the Russian heartland and the non-Russian areas of the Soviet Union. The course will explore the roots and consequences of the Russian Revolution; the nature and evolution of Leninism, Stalinism and Soviet communism; the entrenchment of reform of the post-Stalinist system; and the legacy of communism for the region's new regimes. Students are introduced to a wide variety of historical materials, including documents, essays, memoirs, literature and film.

HIST 291 Modern European Jewish History, 1789-1948 (also Jewish Studies 252)
Spring. 4 credits. V. Caron.
Jewish life in Europe experienced a profound transformation as a result of the process of Jewish emancipation which began at the end of the eighteenth century. While emancipation offered Jews unprecedented social, economic and political opportunities, it also posed serious challenges to traditional Jewish life and values by making available new avenues of integration. This course will examine the ways in which Jewish and non-Jewish society responded to these new developments from the eighteenth century Enlightenment to the post-World War II era. Topics will include Jewish responses to emancipation, including assimilation and new varieties of religious accommodation, the development of modern anti-semitism; the rise of Zionism and the creation of the state of Israel; the modernization of Eastern European Jewry; the impact of mass immigration; and the Nazi era.
The course will focus on the making of violence and volatility from 1890 through that is the political, cultural, economic and social consequences of the First World War. Emphasis on the relations between the "Great Powers," their ideologies, their repertoire of interventions, the growth of extreme nationalism, and the arms race. It ends by considering why the war was so long and destructive and why, afterwards, no one could put the pieces back together again.

[HIST 380 Social History of Western Technology]

[HIST 383 Europe, 1900-1945]
Fall. 4 credits. J. Weiss. An investigation of the major developments in European politics between 1900 and the end of the Second World War. Emphasis on the rise and fall of democratic political systems and their alternatives. Topics include the reorientation of liberalism and socialism, the transforming effects of war and depression, the dynamics and diplomacy of fascism, the European response to the economic and ideological influence of America and the Soviet Union, the changes in Eastern Europe during the interwar years, and the interaction between politics and social structure.

[HIST 384 Europe, 1945-1968]
Spring. 4 credits. J. Weiss. A political and social history of Europe between the fall of fascism and the political crises of 1968. Emphasis on the comparative study of the elaboration of democratic institutions and ideologies. Topics include the origins and course of the Cold War in Western and Eastern Europe, Gauß and Christian Democracy, the emergence of welfare states, liberal-democratic and Communist culture, the end of colonial empires in the West, opposition movements in Eastern Europe, and the general upheaval of 1968.

[HIST 385 Europe in 20th Century: 1968-1990]
Spring. 4 credits. Not offered 1997–98. J. Weiss. The major political developments in Europe between the upheaval of 1968 and the collapse of Communist regimes. Topics will include the effects of economic turmoil in 1973–1974; the response to terrorism, regionalist movements, new ethnic minorities and their governments; 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 Population and History]

[HIST 406 The People in the French Revolution]
Fall. 4 credits. S. Kaplan. The Revolution was nothing if not a mass event. Mass action played a critical part in shaping its course. The "re-invention" of France affected the population down to every village and demanded decisions from virtually every adult. This course will focus on the people as actors: their collective memory, their ideologies, their repertoire of interventions, the formation of a popular political culture. It will examine the encounters between the people (in their multiple incarnations) and the revolutionary elites who sought to articulate and appropriate the Revolution. A major theme will be the tension between the ambitions to achieve liberty and equality.

[HIST 409 Seminar on Work in Europe and America]
Fall. 4 credits. Not offered 1997–98; next offered 1998–99. S. L. Kaplan. For description, see Comparative History.

[HIST 435 Collective Action and Politics in Modern Europe]
Not offered 1997–98. S. Kaplan, S. Tarrow. For description, see GOVT 435.

[HIST 441 Seminar in the European Enlightenment]

[HIST 451 Lord and Peasant in Europe: A Seminar in Social History]

[HIST 456 Seminar in European Cultural History]

[HIST 457 Seminar in European Fascism]
HIST 462 Popular Culture in European History  
Spring. 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 will focus on the specific manifestations of popular culture, its various languages and gestures, and its complex relations with the dominant/elite cultures.

HIST 463 The Gates to Modernity: From Karlbad to the 1848 Revolution (also German Studies 635)  
4 credits. Prerequisite: permission of instructor. Not offered 1997–98.  
W. Pintner.  
The collapse of the Soviet Union provides an opportunity to reconsider the entire Stalinist experience, both on the basis of newly accessible documents and from fresh perspectives. This course approaches Stalinism as an entire system, examining the links between high politics, foreign relations, culture and everyday strategies. Readings will include historical studies as well as newly available primary materials. Knowledge of Russian not required.

HIST 464 Russian Social History  
Fall. 4 credits. Prerequisite: one semester of Russian history or permission of instructor. Not offered 1997–98.  
W. Pinter.  
Examines the development of major social groups throughout Russian history in the sixteenth and twentieth centuries and compares them to similar groups in other societies.

HIST 465 The Historical Origin of the Post-Soviet Successor States  
Spring. 4 credits. Not offered 1997–98.  
Permission of the instructor required.  
J. Weiss.

HIST 466 Seminar in Modern European Intellectual History  
Spring. 4 credits. Not offered 1997–98.  
Juniors, and seniors. D. Baugh.

HIST 467 Seminar in Modern European Political History  
Spring. 4 credits. Not offered 1997–98.  
Permission of instructor required.  
J. Weiss.

HIST 468 Twentieth-Century Britain  
Spring. 4 credits. Open to sophomores, juniors, and seniors. D. Baugh.  
A seminar course, focusing on political and social history. The main emphasis is on the two world wars and their role in British economic and imperial decline. The course also looks at some great personalities—Lloyd George, Churchill, and Bevin—and the major political and social transitions, taking departure from Edwardian era.

HIST 469 Empire, State, and Nation in Russian and Soviet History  
Fall. 4 credits. Not offered 1997–98.  
P. Holquist

HIST 470 Graduate Seminar in European Cultural and Intellectual History (also Music 605)  
Fall. 4 credits. Anchor course. Not offered 1997–98.  
P. Holquist

HIST 471 Seminar on the Politics of the Enlightenment  

HIST 472 Seminar in European Intellectual History  
Fall. 4 credits.  
W. Pinter.

HIST 473 Seminar in Modern European and Soviet History  
Spring. 4 credits. Permission of the instructor required.  
J. Weiss.

HIST 474 Topics in Modern European Intellectual History  
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997–98.  
D. LaCapra.

HIST 475 Social and Cultural History of Contemporaneous Europe  
Fall. 4 credits. J. Weiss.

HIST 476 Seminar in Modern European Intellectual History  
Fall. 4 credits.  
Juniors, and seniors. D. Baugh.

HIST 477 Seminar in the Politics of the Enlightenment  
An inquiry into the historical origins of European (especially French) political, social, and economic thought, beginning in the 1680s, at the zenith of Louis XIV's absolutism, and culminating in the French Revolution a century later. The emphasis is on the relation of criticism and theory to actual social, economic, religious, and political conditions. An effort is made to assess the impact of enlightened thought on the eighteenth-century world and to relate its intellectual heritage to modern political discourse. Readings in translation from such authors as Bayle, Montesquieu, Voltaire, Rousseau, Diderot, and others as well as from modern scholarship and polemical literature.

HIST 478 Stalinist Civilization  

HIST 479 The Historical Origin of the Post-Soviet Successor States  
Spring. 4 credits. Not offered 1997–98.  
W. Pinter.

HIST 480 Twentieth-Century Britain  
Spring. 4 credits. Open to sophomores, juniors, and seniors. D. Baugh.

HIST 481 Seminar on the Politics of the Enlightenment  
Spring. 4 credits.  
W. Pinter.

HIST 482 Popular Culture in European History  
Spring. 4 credits. S. L. Kaplan.

HIST 483 The Gates to Modernity: From Karlbad to the 1848 Revolution (also German Studies 635)  
4 credits. Prerequisite: permission of instructor. Not offered 1997–98.  
J. Weiss.

HIST 484 Seminar in Modern European Political History  
Spring. 4 credits. Not offered 1997–98.  
Juniors, and seniors. D. Baugh.

HIST 485 The Historical Origin of the Post-Soviet Successor States  
Spring. 4 credits. Not offered 1997–98.  
W. Pintner.

HIST 486 Seminar in Modern European Intellectual History  
Fall. 4 credits.  
J. Weiss.

HIST 487 Seminar in Modern European Political History  
Spring. 4 credits. Not offered 1997–98.  
Juniors, and seniors. D. Baugh.

HIST 488 Seminar in Modern European Intellectual History  
Fall. 4 credits.  
J. Weiss.

HIST 489 Empire, State, and Nation in Russian and Soviet History  
Fall. 4 credits. Not offered 1997–98.  
P. Holquist.

HIST 490 Empire, State, and Nation in Russian and Soviet History  
Fall. 4 credits. Not offered 1997–98.  
P. Holquist.

HIST 491 Seminar on the Politics of the Enlightenment  

HIST 492 Seminar in European Intellectual History  
Fall. 4 credits.  
W. Pinter.

HIST 493 Seminar in Modern European Intellectual History  
Fall. 4 credits.  
J. Weiss.

HIST 494 Seminar in Modern European Political History  
Fall. 4 credits. Not offered 1997–98.  
J. Weiss.

HIST 496 Graduate Seminar in European Cultural and Intellectual History (also Music 605)  
Fall. 4 credits. Not offered 1997–98.  
P. Holquist

HIST 497 Seminar on the Politics of the Enlightenment  

HIST 498 Twentieth-Century Britain  
Spring. 4 credits. Open to sophomores, juniors, and seniors. D. Baugh.

HIST 499 Empire, State, and Nation in Russian and Soviet History  
Fall. 4 credits. Not offered 1997–98.  
P. Holquist.

HIST 500 Graduate Seminar in European Cultural and Intellectual History (also Music 605)  
Fall. 4 credits. M. Steinberg.

HIST 501 Supervised Reading  
Fall or spring. 2 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.

HONORS AND RESEARCH COURSES  
Note: History 301–302 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 301 Supervised Reading  
Fall or spring. 2 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.

HIST 302 Honors Thesis  
Fall or spring. 4 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.

HIST 303 Honors Research  
Fall or spring. 4 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.

HIST 304 Honors Project  
Fall or spring. 4 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.
The major in history of art enables students to acquire a familiarity with the art of many different cultures and a deeper knowledge of selected periods and places. The major strengthens visual, analytic, and interpretive skills, and reading and writing abilities. The major has requirements to ensure both breadth and depth, but it is also flexible enough to be tailored to each student's interests. In their junior and senior years, majors work closely with their advisers to determine their own course of study.

Admission to the Major

Students wishing to major in the history of art should complete two courses at Cornell in the department by the end of their sophomore year. One of the two courses required for entry into the major must be at the 200-level and one must emphasize material either predominantly before 1800 or outside Europe/America. These two courses are prerequisites for the major and may not be counted toward fulfillment of the major requirements. Prospective majors should consult with the director of undergraduate studies.

Requirements for the Major

Department majors acquire a broad understanding of the history of art in several chronological and geographical areas: ancient, medieval, Renaissance, Baroque, modern, Southeast Asia, China, Japan, and Africa. 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 encouraged strongly.

Honors

To become a candidate for the degree of Bachelor of Arts with honors in the history of art, a student must have a cumulative average of B+ for all courses taken in the department and in all second-year courses. Applicants to write an honors thesis must 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. The senior year the honors candidate will include in his/her course load, History of Art 600 and 601. These courses address the research and writing of the senior thesis under the direction of the student's project advisor.

Course Numbering System

100-level courses are all freshman writing seminars. 200-level courses are introductions to the major subdivisions of Western and non-Western art and they often have large enrollments. 300-level courses are more specialized, and some have the introductory course in the appropriate area as a prerequisite. Freshmen are advised to take the introductory courses unless they already have substantial background in the history of art. 400-level courses are upper-level seminars, primarily for undergraduates, although graduate students in the history of art and other fields also take them. 500-level courses are primarily graduate seminars, which undergraduates may also take.

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ART H 230 Introduction to Art History: Monuments of Medieval Art (also Religious Studies 230) #
Spring. 4 credits. Each student must enroll in a section. R. G. Calkins.
An introduction to the approaches to art history through a study of selected works of art from the Middle Ages: architecture, sculpture, painting, manuscript illumination, metalwork, and ivory.

ART H 245 Introduction to Art History: Renaissance and Baroque Art #
Fall. 4 credits. Each student must enroll in a section. C. Lazzaro.
A survey of major works of European painting, sculpture, and architecture from 1400 to 1700. The focus is on preeminent artists, workshop methods, style, meaning, patronage, and the function of art in a range of social contexts. The course also covers the methods of art history currently practiced in Renaissance and Baroque studies. Weekly section meetings are required.

ART H 260 Introduction to Art History: The Modern Era
Spring. 4 credits. Not open to students who have taken History of Art 261. Each student must enroll in a section.
J. E. Bernscock.
A discussion of the most important developments in art from 1780 to the present. The emphasis is on major movements and artists such as Romanticism (Delacroix), Realism (Courbet), Impressionism (Monet), Post-Impressionism (van Gogh), Cubism (Picasso), Fauvism (Matisse), Surrealism (Miro), Abstract Expressionism (Pollock), and Pop Art (Warhol).

ART H 261 Introduction to Art History: Modern Art
Summer only. 3 credits. Staff.
An introduction to early modern art as it developed between the French Revolution and World War I. Both European and American movements are examined, including Romanticism, Impressionism, and Cubism. Units are organized around central figures such as Mary Cassatt, Edgar Degas, Thomas Eakins, and Vincent van Gogh. Lectures are supplemented with discussions of methods of inquiry, including social history and feminism, fundamental to interpreting works of art.

ART H 280 Introduction to Art History: Approaches to Asian Art #
Fall. 3 credits. K. McGowan.
Arranged according to selective focus and emphasis rather than broad chronological survey, this course introduces students to the varied responses of the Asian artist in diverse social, geographical and historical contexts. Indian miniature paintings, Japanese prints, high-fired ceramics from Thailand and Vietnam, Indonesian textiles and jewelry, Javanese shadow-puppet theater, and Balinese ritual and performance traditions will be explored. A number of class sessions will meet in the Herbert F. Johnson Museum of Art.

ART H 309 Dendrochronology of the Aegean (also Classics 309 and Archaeology 309)
Fall and spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students. P. J. Kuniholm.
Participation in a research project of dating modern and ancient tree-ring samples from the Aegean and Mediterranean. Supervised reading and laboratory work. A possibility exists for summer fieldwork in Greece and Turkey.

ART H 320 The Archaeology of Classical Greece (also Classics 320) #
4 credits. Not offered 1997-98.
A. Ramage.

ART H 321 The City of Rome (also Classics 351 and Archaeology 351) #
Fall. 3 credits. M. Landon.
For description, see CLASS 351.

ART H 322 Arts of the Roman Empire (also Classics 350) #
4 credits. Not offered 1997-98.
A. Ramage.
The visual arts in the service of the first world state. The course starts with the architecture, painting, and sculpture of the Etruscan and Republican period but concentrates on monuments of the Imperial era in Italy and the provinces until the time of Constantine. Art made for private patrons is considered, along with the official presentations of the emperors.

ART H 323 Painting in the Greek and Roman World (also Classics 323) #
4 credits. Not offered 1997-98.
A. Ramage.

ART H 325 Greek Vase Painting (also Classics 325) #
Spring 4 credits. A. Ramage.
A stylistic and iconographical approach to an art in which the Greeks excelled. The course will be arranged chronologically from the early (eleventh century B.C.), anonymous beginnings to the "personal" hands of identifiable masters of the fifth and fourth centuries B.C. Styles of cities other than Athens will be stressed.

ART H 326 Greek Cities and Towns (also Classics 326)
J. Coleman.

ART H 327 Greek and Roman Coins (also Classics 327) #
Fall. 4 credits. A. Ramage.
The varied issues of Greek cities and the Roman state are examined. Coins are considered as art objects as well as economic and historical documents. The changes in design, value, and metals from the origins of coinage to the late Roman period are studied. Lectures, student presentations, and work with the actual examples.

ART H 328 Greeks and Their Neighbors (also Classics 328) #
J. Coleman.
For description, see CLASS 322.

ART H 329 Greek Sculpture (also Classics 329) #
4 credits. Not offered 1997-98.
J. Coleman.
For description, see CLASS 329.

ART H 332 Architecture in the Middle Ages (also Architecture 382, Religious Studies 332) #
4 credits. Not offered 1997-98.
R. G. Calkins.

ART H 333 Early Medieval Art and Architecture #
4 credits. Not offered 1997-98.
R. G. Calkins.
Sculpture, painting, and architecture in the period from the late antique through the Carolingian era (A.D. 300-900). The evolution of the early Byzantine tradition will also be considered.

ART H 334 Romanesque Art and Architecture #
4 credits. Not offered 1997-98.
R. G. Calkins.
The painting, manuscript illumination, sculpture, and architecture of the eleventh and twelfth centuries, primarily in France, England, and Spain. Particular attention will be paid to the art of the Pilgrimage Roads, the manifestation of specific regional styles, the problems of Byzantine influence, the significance of the art of the church treasuries, and the factors that brought about the transition to the early Gothic.

ART H 335 Gothic Art and Architecture (also Religious Studies 335) #
4 credits. Not offered 1997-98.
R. G. Calkins.

ART H 336 Prelude to the Italian Renaissance (also Religious Studies 336) #
4 credits. Not offered 1997-98.
R. G. Calkins.

ART H 337 The Medieval Illuminated Book (also Religious Studies 337) #
4 credits. Not offered 1997-98.
R. G. Calkins.
A study of selected major examples of medieval illuminated manuscripts from between A.D. 300 and 1500. Facsimiles of major manuscripts such as the Lindisfarne Gospels, the Book of Kells, and the Hours of Mary of Burgundy will be examined. Students will write a research paper on a manuscript of their choice.

ART H 341 Flemish Painting (also Religious Studies 342) #
4 credits. Not offered 1997-98.
R. G. Calkins.
An examination of Flemish painting in the 15th century, with emphasis on the works of Robert Campin, Jan van Eyck, Roger van der Weyden, Hugo van der Goes, Hans Memling, and ending with Jerome Bosch. Issues of the social, economic, and devotional context will be discussed as they pertain to the particular development of Northern Realism and Symbolism during this century.

ART H 342 Italian Renaissance of the Fifteenth Century #
4 credits. Not offered 1997-98.
C. Lazzaro.

ART H 344 Italian Renaissance of the Sixteenth Century: Leonardo, Michelangelo, and Raphael #
4 credits. Not offered 1997-98.
S. Reiss.
A detailed examination of the art and architecture of these three great artists and of the cultural and historical environment in which they worked. The primary focus of the course will be works of art and architecture created by Leonardo, Michelangelo, and Raphael, but their writings will be studied as well. The importance of drawing for these artists will be studied, as well as the profound impact of their art and thought on other sixteenth-century painters, sculptors and architects. The course will emphasize...
ART H 345 Rome, Florence, and Venice in the Sixteenth Century # Spring. 4 credits. C. Lazzaro.
This course examines the distinctive cultural identities and their visual representation of three city-states in sixteenth-century Italy: Rome, Florence, and Venice. A papal turned duchy ruled by the Medici dynasty, and an oligarchic republic, they had in common a shared culture: a social and intellectual elite of both rulers and patricians joined by a shared classical culture. Artistic models and mythological figures from classical antiquity provided a universal visual language, which was modified by local artistic traditions and histories. The course examines the images and symbols of each state; center of power, including St. Peter’s, the Vatican, and the Capitoline Hill in Rome, the Piazza Signoria and San Lorenzo complex in Florence, and the piazzas of San Marco and the Doge’s palace in Venice; government-sponsored propagandistic works of sculpture, wall painting, architecture, and spectacle in the buildings and squares, issues of church and state relations, and in Florence of civic and dynastic ideas of the state; and also the role of private collections and commissions (of portraits, allegorical paintings, palaces, and gardens) in establishing cultural identity. The course discusses works of some of the major artists of the sixteenth century, including Michelangelo, Raphael, Bronzino, and Titian, but focuses on topics and issues, which are examined through class lectures, discussions, weekly readings, and term paper.

ART H 350 The Culture of the Renaissance I (also History 361 and Comparative Literature 361) # 4 credits. Each student must enroll in a section. Not offered 1997–98. C. Lazzaro, J. M. Najemy.
ART H 351 The Culture of the Renaissance II (also Religion Studies 362, History 364, Music 390, Religious Studies 362, English 325) # Fall. 4 credits. W. J. Kennedy, C. Kaske. For description, see COM L 362.

ART H 355 Art as Spectacle: The Italian Baroque (also Religious Studies 352) # Fall. 4 credits. K. Barzman.
This course examines the Italian Baroque as a society of spectacle. Lectures and discussions will focus on frescoes, public sculpture, architecture, and the re-organization of urban space in Italian cities from the end of the Council of Trent (1563) through the papacy of Clement XII (1706). Emphasis will be placed on speculatively the forms of address intended to guide and impress the viewer, and on the various institutions and individuals served by this kind of cultural production. Artists covered include Bernini, Borromini, Caravaggio, Carracci, Gaulli, Cortona, and Tiepolo.

ART H 356 Religion and Images Across the Americas (also Religious Studies 360) # Spring. 4 credits. K. Barzman.
This course will look at the religious use of images from the fourteenth through the eighteenth centuries. It will take a cross-cultural perspective, focusing on Italy, France, the Low Countries, Spain, and Spanish colonial South America and Meso-America. The emphasis will be on major iconographic themes (e.g., the Passion of Jesus, Eucharistic imagery, the miraculous interventions of Mary and the saints) and on the incorporation of images in rituals of devotional practice revolving around marriage, birth, illness, death, and the salvation of the soul. We will concentrate on works ranging from anonymous production to the masterpieces of early modern artists (including Giotto, van Eyck, Dürer, Grünewald, Caravaggio, Rubens, Ribera, and Murillo.)

Nineteenth-century American painters often constructed images of "exceptionalism." DeTocqueville’s term for the social harmony and material abundance he considered unique to the New World. Embedded in these icons of national cohesion, however, were signs of race, class, and political conflict that we will decode through interdisciplinary methods. Our topical units include New England portraiture and commodity, Hudson River landscape and corporate (railroad) patronage, images of African-Americans and Reconstruction, images of Native Americans, the West, and Manifest Destiny. Through these, we will challenge the assumption that American art celebrated democracy, and consider more conflicted attitudes. Our key artists include John S. Copley, George Caleb Bingham, Caleb Bingham, Winslow Homer, Mary Cassatt, and Thomas Eakins. Our readings include art historical texts and others by Poe, Emerson, and Whitman.


ART H 362 Impressionism and Society Spring. 4 credits. L. Melnick.
This course discusses French Impressionism as it relates to nineteenth-century public life. Chief artists include Manet, Cassatt, Morisot, Degas, Pissarro, Monet, Seurat, Toulouse-Lautrec, and Van Gogh. Images are interpreted as cultural products of the Third Republic, with close attention to cafe and brothel society, middle-class leisure, japonisme and imperialism, workers’ movements, and Le Bon’s theory of crowds. Women into history is considered, as are more theoretical considerations of utopia, capital, pathology, and the public body. Overarching issues of class, gender, and power in urban Paris will be addressed through the writings of Baudelaire, Benjamin, Pollock, Jameson, and Zola.

ART H 365 Art from 1940 to 1990 Fall. 4 credits. J. E. Bernstein.
Major artists and movements in the United States since 1940, beginning with Jackson Pollock and Abstract Expressionism, and continuing through recent developments in art. Attention is devoted to the critical reception that artists have received and to artists’ statement themselves.


ART H 370 Visual Culture and Social Theory (also Government 375 and Comparative Literature 368) # Fall. 4 credits. A. Vidler, S. Buck-Morss.
For description, see Government 375.

A historical and critical survey of the architecture of Washington. Attention will be given to the periods, styles, architects, and clients—public and private—of notable buildings and to the urbanscape of the nation’s capital. The vocabulary of architectural analysis and criticism will be taught. Field trips required.

ART H 378 Art in African Culture and Society (also AS&RC 310) # Fall. 3 credits. S. Hassan.
For description, see AS&RC 310.

ART H 380 Introduction to the Arts of China (also Archaeology 380 and Asian 382) # Fall. 4 credits. S. Oertling.
A one semester introduction to the arts of China, this course will examine the visual arts of the world’s oldest continuous civilization in a topical rather than strict chronological framework. The lectures will cover the major contributions the Chinese have made in the areas of ritual bronzes, burial art, Buddhist sculpture, pottery and porcelain, caligraphy and painting. A substantial part of the course will be devoted to the development of landscape painting, particularly in the later centuries of Chinese art. Sections for the course will meet in the Kress Library to examine original works from the museum’s large Chinese collection.

ART H 381 Buddhist Art in Asia # 4 credits. Not offered 1997–98.
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<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>[ART H 310]</td>
<td>Art History Majors: The History and Practice of Art History</td>
<td>Fall</td>
<td>4 credits. Prerequisite: History of Art majors only. Enrollment is limited. K. Barzman.</td>
</tr>
<tr>
<td>[ART H 311]</td>
<td>Seminar on Roman Art and Archaeology [also Classics 435 and Archaeology 425]</td>
<td>Spring</td>
<td>4 credits. Prerequisite: permission of instructor. P. I. Kuniholm.</td>
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<tr>
<td>[ART H 312]</td>
<td>Seminar on Museum Issues</td>
<td>Fall</td>
<td>4 credits. Prerequisite: permission of instructor. Limited enrollment. All classes will meet in the Johnson Art Museum Study Gallery. M. W. Young and museum staff.</td>
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<tr>
<td>[ART H 401]</td>
<td>Independent Study</td>
<td>Fall or spring</td>
<td>2-4 credits. May be repeated for credit. Prerequisite: permission of department faculty member. Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.</td>
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<tr>
<td>[ART H 407]</td>
<td>Seminar on Museum Issues</td>
<td>Fall</td>
<td>4 credits. Prerequisite: permission of instructor. Limited enrollment. All classes will meet in the Johnson Art Museum Study Gallery. M. W. Young and museum staff.</td>
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<tr>
<td>[ART H 408]</td>
<td>Independent Study</td>
<td>Fall or spring</td>
<td>2-4 credits. May be repeated for credit. Prerequisite: permission of department faculty member. Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.</td>
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<tr>
<td>[ART H 409]</td>
<td>Women in Italian Renaissance Art (also Women’s Studies 451)</td>
<td>Spring</td>
<td>4 credits. Prerequisite: permission of instructor. C. Lazzaro.</td>
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<tr>
<td>[ART H 415]</td>
<td>Prints of the Fifteenth through the Seventeenth Century</td>
<td>Fall</td>
<td>4 credits. Prerequisite: permission of instructor. C. Lazzaro.</td>
</tr>
<tr>
<td>[ART H 416]</td>
<td>Seminar in Baroque Art</td>
<td>Spring</td>
<td>4 credits. Prerequisite: permission of instructor. K. Barzman.</td>
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<tr>
<td>[ART H 417]</td>
<td>Seminar in Baroque Art</td>
<td>Spring</td>
<td>4 credits. Recommended: Classics 220 or History of Art 220, Classics 221 or History of Art 221, or permission of instructor. P. I. Kuniholm.</td>
</tr>
<tr>
<td>[ART H 418]</td>
<td>Intersection of Art and Representation</td>
<td>Spring</td>
<td>4 credits. Prerequisite: permission of instructor. A. Ramage. Topic for spring 1998: buildings, administration and power.</td>
</tr>
</tbody>
</table>

This seminar assembles key works of art from various cultures and periods, with an emphasis on the role of the house in shaping cultural identity. It will explore the construction and transmission of notions of art, identity, and power, and examine the relationship between art and the world in which it is created. The seminar will be taught by A. Ramage and will meet in the Johnson Art Museum Study Gallery. Enrollment is limited to 15 students, and students interested in this course should notify the department directly at the time of pre-registration. Students will be expected to give brief presentations on prints in the collection and to consider the social and cultural issues raised in the medium of prints and their unique visual language. These issues include: the construction and transmission of notions of art, identity, and power; the representation of the urban and rural environment; the relationship between art and the world in which it is created; and the social and cultural issues raised in the medium of prints and their unique visual language.
for professional and amateur artists from the sixteenth through twentieth centuries.


[ART H 462] Topics in Early Modernism # Fall. 4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not open to freshmen or sophomores. L. L. Meixner.

Seminar Topic for fall 1997: Early Modernism in America. Using the Armory Show (1913) as its center, this interdisciplinary seminar examines American modernism prior to World War II. Against the backdrop of post-World War I society and politics, we will examine the machine aesthetic and kinetic poetry, the rise of photography at *291,* Precisionism, American Dada, the Harlem Renaissance, and the work of women artists from antiquity to the present. This seminar will be devoted to a study of the major sculptors, such as Auguste Rodin, Constantin Brancusi, Henry Moore, David Smith, Alberto Giacometti, Louise Nevelson, George Segal, Donald Judd, Robert Morris, Eva Hesse, and Richard Serra.


Topic for 1996: Modern Sculpture. Developments in modern sculpture will be explored from their beginnings in the late nineteenth century. A wide range of styles, media, and content will be studied. The focus will be on major sculptors, such as Auguste Rodin, Constantin Brancusi, Henry Moore, David Smith, Alberto Giacometti, Louise Nevelson, George Segal, Donald Judd, Robert Morris, Eva Hesse, and Richard Serra.

[ART H 464] Studies in Modern Art Spring. 4 credits. Prerequisite: permission of instructor. Auditing is not permitted. J. E. Bernstock.

Topic for 1998: To be announced.

[ART H 466] Women Artists (also Women's Studies 404) Fall. 4 credits. Prerequisite: permission of instructor. J. E. Bernstock.

This seminar will be devoted to a study of the work of women artists from antiquity to the present. The works of the most prominent women artists from each period will be studied in relation to the changing roles of women in society. The artists to be studied include Jennifer Bartlett, Artemisia Gentleschi, Elizabeth Vigee-Lebrun, Mary Cassatt, Käthe Kollwitz, Georgia O'Keeffe, Louise Nevelson, Joan Mitchell, Judy Chicago, and Barbara Kruger.

[ART H 470] Postmodernist Art and Criticism (also Comparative Literature 474) 4 credits. Prerequisite: permission of instructor. Not offered 1997–98. H. Foster.


[ART H 482] Ceramic Art of China and Southeast Asia # 4 credits. Prerequisite: permission of instructor. Not offered 1997–98.


Seminar participants will examine the impact of feminist theory on art historical practice. Based on critical analysis of texts from the early 1970s to the present, we will consider the range of methods employed, the discursive traditions to which they belong (e.g., liberal, Marxist, psychoanalytic, poststructuralist), the relative merits of the methods, and the interpretive problems they present. At the graduate level, some additional meetings and work required.

[ART H 520] Seminar in Classical Archaeology (also Classics 630 and Archaeology 520) Fall. 4 credits. Prerequisite: permission of instructor. P. L. Kuniholm.


[ART H 531] Problems in Medieval Art and Architecture (also Religious Studies 531) Spring. 4 credits. Prerequisite: permission of instructor. R. G. Calkins.

Topic for spring 1998: Narrative and miniatures in medieval illuminated manuscripts.


This seminar will examine assumptions about meaning and how meaning is produced in Renaissance art. Various interpretive strategies will be examined, among them iconographic, semantic, feminist, and psychoanalytic, within a specifically Renaissance literary, intellectual, and social context. Texts by Panofsky and critical discussions of them, Baxandall, Bryson, and others will be read and discussed with reference to particular works of art. The seminar is intended primarily for graduate students in all areas of the history of art and those in other disciplines with an interest in the Italian Renaissance. Senior History of Art majors with background in the Italian Renaissance are also welcome.


This seminar focuses on early modern rituals of family, church, and state in which palaces, shrines, streets, and squares provided a theatre for the rehearsal of formalized practices and the constitution of various economies (of pleasure, fear, mastery, control) in an asymmetrical field of social exchange. Emphasis will be placed on mixed media and ephemeral displays as the backdrop for civic parades, the elevation of popes and crowned heads of state, the reception of diplomats, trials, public executions, feastday celebrations, religious processions, funerals of state, family obsequies, banquets, weddings, and other rites of passage. Opera, ballet, and staged drama (liturgical and secular) will be introduced as more codified forms of public performance, with which performances of the self and of corporate community had much in common. Students are encouraged to attend lectures for ART H 555 in addition to required seminar meetings.

[ART H 570] Theories of Modernism Topic: Shock and Trauma (also Comparative Literature 672) 4 credits. Prerequisite: permission of instructor. Not offered 1997–98. H. Foster.

[ART H 571] African Aesthetics (also AS&RC 503) Fall. 4 credits. S. Hassan.

For description, see AS&RC 503.

[ART H 580] Problems in Asian Art (also Religious Studies 580) Fall. 4 credits. Prerequisite: permission of instructor. K. McGowan.

Topic for fall 1997: Religion in South and Southeast Asian art.

[ART H 591–592] Supervised Reading 591, fall; 592, spring. 4 credits. May be repeated for credit. Limited to graduate students.


[ART H 595] Art History and Visual Culture (also Comparative Literature 625) Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997–98. H. Foster.

[ART H 600] Honors Work Fall or spring. 8 credits. Prerequisite: History of Art 600. Selected for senior art history majors who have been admitted to the honors program. Basic methods of art historical research will be discussed and individual readings assigned, leading to the selection of an appropriate thesis topic.

[ART H 601] Honors Work Fall or spring. 8 credits. Prerequisite: History of Art 600. The student under faculty direction will prepare a senior thesis.

HUNGARIAN

See Language Courses under Languages and Linguistics.
LANGUAGES, MODERN


Language is enormously complex and encompasses virtually all areas of human endeavor.

Learning individual languages is, of course, integral to understanding language itself as well as to understanding other cultures. The Department of Modern Languages is responsible for a large variety of language courses (the departments of linguistics, classics, Near Eastern studies, and Africana studies offer still others). In addition to fulfilling the College of Arts and Sciences language requirement, some language courses satisfy the college's breadth requirements.

Courses at all levels are offered not only in Spanish, French, German, Italian, Chinese, Japanese, and Russian, but also in some less familiar languages such as Korean, Hindi, Indonesian, Quechua, and many others—a total of about thirty. See the listings below under the rubric "Language Courses." The department's resources include the Center for Language Learning at Noyes Lodge, a state-of-the-art facility where instructors can create high-tech language study materials and students can use them in a beautiful setting on Beebe Lake.

The study of language itself is part of many disciplines and this is offered in various departments in the College of Arts and Sciences. The members of the professorial faculty in the Department of Modern Languages are linguists who have interests in common with the faculty of the Department of Linguistics. The contributions of the Department of Modern Languages lie mainly in the areas of language use, language perception and production, language acquisition, textual and discourse analysis, cognitive, social and cultural aspects of language, and the structure, history, or social circumstances of a particular language or language family.

LINGUISTICS

S. McConnell-Ginet, chair; J. Whitman, director of graduate studies (320 Morrill Hall); M. Diesing, director of undergraduate studies (212 Morrill Hall); J. Bowen, W. Browne, V. Casstens, A. Cohn, C. Collins, W. Harbert, S. Hertz, J. Jasanoff, A. Nussbaum, F. Parkinson, M. Suter, D. Zec, A. Zucchi. Visiting: F. Parkinson.

Linguistics, the systematic study of human language, lies at the crossroads of the humanities and the social sciences, and much of its appeal derives from the special combination of intuition and rigor that the analysis of language demands. The interests of the members of the Department of Linguistics and linguistic colleagues in the Department of Modern Languages and other departments span most of the major subfields of linguistics: phonetics and phonology, the study of speech sounds; syntax, the study of how words are combined; semantics, the study of meaning; historical linguistics, the study of language change over time; sociolinguistics, the study of language's role in social and cultural interactions; and applied linguistics, which relates the results of linguistic research to problems of bilingual education, second-language learning, and teaching.

Studying linguistics is not a matter of studying many languages. Linguistics is a theoretical discipline with ties to such areas as cognitive psychology, philosophy, logic, computer science, and anthropology. Nonetheless, knowing particular languages (e.g., Spanish or Japanese) in some depth can enhance understanding of the general properties of human language. Not surprisingly, then, many students of linguistics owe their initial interest to a period of exposure to a foreign language, and those who come to linguistics by some other route find their knowledge about languages enriched and are often stimulated to embark on further foreign language study.

Students interested in learning more about linguistics and its relationship to other disciplines in the humanities and social sciences are encouraged to take Linguistics 101, which is a prerequisite for most other courses in the field, or one of the freshman writing seminars offered in linguistics on topics such as metaphor, American Sign Language, and the science of language). Linguistics 101 and other introductory courses fulfill the social science distribution requirement. Most 100- and 200-level courses have no prerequisites and cover various topics in linguistics (e.g., Ling 118 Varieties of Human Language, Ling 200 Introduction to Bilingualism, Ling 216 Mathematical Linguistics) or focus on the linguistics of a particular geographic region or historical development of particular languages (e.g., Ling 217 History of the English Language, Ling 230 Introduction to Southeast Asian Languages and Linguistics). Some of these courses also fulfill the breadth requirements.

Talks and discussions about linguistics are offered through the Undergraduate Linguistics Forum and the Cornell Linguistic Circle. These meetings are open to the university public and anyone wishing to learn more about linguistics is most welcome to attend.

The Major

For questions regarding the linguistics major, contact Professor Molly Diesing (212 Morrill Hall, 255-8635, md20@cornell.edu).

The prerequisite for a major in linguistics is the completion of Linguistics 101 and either Linguistics 201 or 203. The major has its own language requirement, which should be completed as early as possible: qualification in two languages other than English, one of which must be either non-European or non-Indo-European. With approval of the department's director of undergraduate studies, this requirement may be waived (i.e., reduced to the normal arts college language requirement).
The requirements for the linguistics major are as follows:

1) Linguistics 201 (Introduction to phonetics and phonology) or Linguistics 203 (Introduction to syntax and semantics), whichever one was not taken as a prerequisite to the major
2) Linguistics 410 (Historical)
3) Three of the following five courses, one of which must be either Phonology I or Syntax I:
   - Linguistics 301 (Phonology I)
   - Linguistics 303 (Syntax I)
   - Linguistics 309 or 310 (Morphology I or II)
   - Linguistics 319 (Phonetics I)
   - Linguistics 421 (Semantics I)
4) A course at or beyond the 300 level in the structure of English or some other language, or a typological or comparative structure course such as Linguistics 401, 402, or Field Methods.
5) One additional linguistics course for at least 4 credit hours, which may be a course with significant linguistic content in a related field.

Honors. Applications for honors should be made during the junior year. 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 begun 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. Linguistics 493 and 494 may be taken in conjunction with thesis research and writing but are not required.

The courses in both the Department of Modern Languages and the Department of Linguistics are listed below under the following rubrics: General Linguistics, Linguistics of Particular Languages, Language Courses.

General Linguistics

 Fees: Depending on the course, a small fee may be charged for photocopied texts for course work.

Freshman Writing Seminars

LING 100 Language, Thought, and Reality
For descriptions, see freshman writing seminar brochure.

LING 101 Theory and Practice of Linguistics
Fall, spring, or summer. 4 credits each term. F. Parkinson; S. McConnell-Ginet
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 110 Language Learning and Language Use
Fall. 3 credits. J. Sereno.
Language permeates every aspect of our life—cognitive, social, economic, and political. In this course, we will explore how language is used in everyday conversation and how language is learned. What communicative functions does language serve? What is the social significance of language use? How does language relate to the mental capacities that people have? How do we learn language as children? Is this process different from learning languages as an adult? How does literacy influence the processing of language?

LING 115 Language and Culture
Spring. 3 credits. J. Whitman.
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 theory of language structure, which posits a link between basic properties of languages and crosscultural differences in worldview. We also examine potential cultural determinants of variation in language: pronouns and honorifics, systems of ritual and taboo, and the impact of narrative organization on grammar. Special attention is paid to 'extreme' forms of language: invented languages from Esperanto to Klingon; glosсалa and trances languages; language games and secret languages.

LING 118 Varieties of Human Language
Fall. 3 credits. P. Patkinson.
Language diversity has a place in our complex world. Whether spoken by a handful of speakers or by hundreds of millions, each language manages the same tasks of communication and fits in with its social environment. Language identification, literacy, and multilingualism are among the issues touched on.

LING 170 Introduction to Cognitive Science (also Cognitive Studies 101, Computer Science 101, and Psychology 102)
For description, see COGST 101.

LING 200 Introduction to Bilingualism
Spring. 3 credits. J. Sereno.
A basic introduction to the study of individual and societal bilingualism. Characteristics of bilingual language learning and use, and possible cognitive consequences will be discussed. Aspects of societal bilingualism in terms of social and political issues will also be considered.

LING 201 Introduction to Phonetics and Phonology
Spring. 4 credits. Prerequisite: Linguistics 101 or equivalent. F. Parkinson
An introduction to the study of human speech sounds and how they pattern in languages. The first part of the course will focus on phonetics: the production, acoustics, and perception of speech, with attention to both the common and the less common sounds of the world's languages. The second part of the course will focus on phonology: how human speech sounds pattern within and across languages, with an emphasis on the rules that govern these patterns and their possible representation.

LING 203 Introduction to Syntax and Semantics
Fall. 4 credits. Prerequisite: Linguistics 101 or equivalent or permission of instructor. C. Collins.
This course focuses on language as a system of knowledge that enables native speakers to create and interpret the structures of their language. Part of the course will consider issues of syntactic structure, such as the order of constituents, the hierarchical organization of grammars, and universal grammar. The other part of the course will focus on meaning and interpretation, addressing such issues as the role of context, how information is structured, and how it is encoded in the syntax.

LING 215 Psychology of Language (also Psychology 215)
Not offered 1997-98. J. Whitman.
For description, see PSYCH 215.

LING 216 Mathematical Linguistics
Spring. 4 credits. A. Zucchi.
The course is an introduction to the mathematical concepts and techniques most frequently used in theoretical linguistics.

LING 220 Acquisition of Spoken Language
A survey of phonetic aspects of language learning, focusing on first- and second-language acquisition. Relevant concepts in phonetics and psycholinguistics will be introduced at every stage. Topics include the role of innate knowledge versus linguistic experience in phonological development, language-universal aspects of speech learning, the phonetics of motherese, the existence of a critical period for language learning, and the phonetics of foreign accents.

LING 240 Experiments on Language Use and Gender Relations (also Women's Studies 244)
Spring. 4 credits. For non-majors 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 conversation structure the social worlds of women and men? Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and the general women's studies and feminist theory.
A general survey of syntactic theories that highlight grammatical function and reveal its role in discourse structure.

LING 309 Morphology
Spring. 4 credits. Prerequisite: Linguistics 101 or equivalent. Not offered 1997–98. Fall: F. Parkinson; spring: D. Zee.

A general survey course focusing on the relationship of meaning and form in morphological analysis. Current research on form-meaning questions is discussed.

LING 310 Morphology II
Fall. 4 credits. Prerequisite: Linguistics 203 or permission of instructor. Fall, not offered 1997–98. Spring. Prerequisite: Linguistics 203 or permission of instructor. Not offered 1997–98. Staff.

LING 311 Syntax I
Fall. 4 credits. Prerequisite: Linguistics 201 or permission of instructor. A. Jongman.

Provides a basic introduction to the study of syntax. Topics to be covered include grammar and phonology of the speech production apparatus, transcription and production of world's sounds, basic acoustics, computerized methods of speech analysis.

LING 312 Syntax II
Spring. 4 credits. Prerequisite: Linguistics 203 or permission of instructor. V. Carstens.

Prerequisite: Linguistics 203 or permission of instructor. Not offered 1997–98. J. Lantolf, Y. Shirai.

A general survey of syntactic theories that highlight grammatical function and reveal its role in discourse structure.
LING 405 Sociolinguistics
Fall. 4 credits. Prerequisite: Linguistics 101, 110, or permission of instructor. J. Wolff.
Systematically within the interactions between language and social context, we will examine dialect usage (diglossia, multilingualism, code-switching) variation and language change (network theory, change in progress), ethnography of communication and speech acts; language and culture; and language and gender, race, and power (including pidgins and creoles).

LING 406 Ethnolinguistics
Spring. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. J. Wolff.
This course will be an introduction to the study of pidgin and creole languages and the issues surrounding them both in and beyond linguistics. Topics covered will include: genesis of pidgins and creoles; classification of pidgins and creoles; creoles and language universals; creoles and sociolinguistic variation; a module on Saramaccan Creole English; educational and language planning issues; sociolinguistic issues; Black English.

LING 409 Psycholinguistics of Second-Language Reading
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1997-98. G. Appel.
In-depth analysis of the research on the reading process in a second language. Topics include processing of narrative vs. expository texts (descriptive, problem solving, causative, etc.); comparison of the reading process in native vs. second languages, and development of methodologies for the teaching of reading in the second-language classroom.

LING 410 Introduction to Historical Linguistics I
Spring. 4 credits. Prerequisite: Linguistics 201 or permission of instructor. J. Jasanoff.
A survey of the basic mechanisms of linguistic change, with examples from a variety of languages.

LING 413 Topics in Historical Linguistics I
Fall. 4 credits. Prerequisite: Linguistics 410 or permission of instructor. W. Haberb. J. Jasanoff, and C. Rosen.
Examines a selection of recent research illustrating a variety of productive and innovative approaches to problems in historical linguistics. Readings center on phonological and morphological evolution in the Romance and Germanic families. Students carry out guided research projects.

LING 421-422 Semantics I, II
421, fall. 422, spring. 4 credits each term. Prerequisites: for Linguistics 421, Linguistics 203; for Linguistics 422, Linguistics 421 or permission of instructor. Fall: M. Diesing, spring: A. Zucchi.
421: An introduction to semantics of natural language. The course starts from basic foundational questions concerning the nature of meaning and the empirical domain of semantic theory. Truth-conditional and logical theories and their application to the investigation of the structure of natural languages are extensively explored (with some comparisons with other approaches). Through the study of quantification, scope, anaphora, modalities, presuppositions, and the like, one tries to gain insight into general characteristics of the cognitive apparatus that is at the basis of our capacity for understanding sentences.
422: Guides students into current work in semantic theory. The first half of the course is an introduction to Montague-style semantics, whose influence on current research is quite extensive. The second half of the course focuses on selected topics that have grown out of (and sometimes against) classical Montague semantics. Such topics are usually drawn from the following: generalized quantifiers and anaphora, type-shifting, problems of tense and aspect, the linguistic relevance of algebraic approaches to properties, propositions, events and thematic roles, and discourse representation theory.

LING 436 Language Development (also Human Development and Family Studies 436 and Psychology 436)
Spring. 4 credits. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. Offered alternate years. B. Lust.
A survey of basic issues, methods, and research in study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental linguistic issues of universal grammar and the biological foundations for acquisition as well as the issues of relations between language and thought. The acquisition of communication systems in nonhuman species such as chimpanzees are addressed, but major emphasis is on the child.

LING 493 Honors Thesis Research
Fall. 4 credits. Staff.
May be taken before or after Linguistics 494, or may be taken independently.

LING 494 Honors Thesis Research
Spring. 4 credits. Staff.
May be taken as a continuation of, or before, Linguistics 493.

LING 600 Field Methods
Spring. 4 credits. Prerequisites: Linguistics 201 and 203 or permission of instructor. Not offered 1997-98. Staff.
Elicitation, recording, and analysis of data from a native speaker of a non-Western language not generally known to students.

LING 601 Topics in Phonological Theory
Spring. 4 credits. Prerequisites: Linguistics 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: Linguistics 301 or 303 or permission of instructor. D. Zec.
Selected topics in current morphological theory.

LING 604 Research Workshop
Fall. 4 credits. S-U grade only. Prerequisite: thesis or more semesters of graduate study in linguistics. V. Carstens, A. Cohn. Participants will present their ongoing research and discuss it with their colleagues. Individual topics will be chosen on the basis of interest to the instructor, and probable focus of dissertation research.

LING 607 Twentieth-Century Approaches to Language
Fall. 4 credits. Prerequisite: at least one course in linguistics or permission of instructor. Offered alternate years. L. Waugh, M. Bernal.
The development of 20th-century approaches to language in America and Europe. Work in 19th-century approaches will also be considered in their relation to 20th-century approaches, and will be given special attention in fall 1997.

LING 608 Discourse Analysis (also Comparative Literature 618)
Linguistic theory applied to relationships beyond the sentence.

LING 616 Syntax III
Fall. 4 credits. Prerequisites: Linguistics 304 or permission of instructor. C. Collins.
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 633 Seminar in First-Language Acquisition: Cross-linguistic Studies of the Acquisition of Anaphora (also Human Development and Family Studies 633)
Fall. 1-4 credits. Prerequisite: Linguistics 436 or equivalent or permission of instructor. Not offered 1997-98. B. Lust.
This seminar will review and critique current theoretical and experimental studies of the first-language acquisition of anaphora, with a concentration on insights gained by cross-linguistic study of this area. The seminar will focus on relating current developments in syntactic theory regarding anaphora to current experimental research on first-language acquisition of anaphora. Attention will also be given to the development of research proposals.

LING 637 Experimental Research for Language Sciences
Fall. 4 credits. M. McCarthy, J. Sereno.
A detailed study of experimental procedures for carrying out research in linguistics, especially in the areas of applied linguistics, phonetics, and language acquisition. Quantitative and qualitative research methods are considered.

LING 648 Speech Synthesis by Rule
Spring. 4 credits. Prerequisite: Linguistics 301, 319, or permission of instructor. Offered alternate years. Not offered 1997-98. S. Hertz.
Investigates the nature of the acoustic structure of speech synthesis, using speech as a tool for exploring this structure. A particular acoustic model will be proposed, developed, and motivated by considering the relationship between phonological and acoustic structure, speech timing, phonetic universals, articulation, and speech perception. The primary tool for investigation will be the Delta System, a powerful software system for investigating phonology and phonetics through speech synthesis. The course is meant for graduate students and advanced undergraduate students in linguistics, but may also be of interest to students in psychology/psycholinguistics, computer science, and cognitive studies.

LING 700 Seminar
Fall or spring, according to demand. Credit to be arranged. Seminars are offered according to faculty interest and student demand. Topics in recent years have included subject and topic.
Montague grammar, speech synthesis, lexicon, classical and autonomous phonology, Japanese sociolinguistics, relation grammar, semantics and semiotics, and others.

LING 701-702 Directed Research
701, fall, 702, spring. 1-4 credits. Hours to be arranged. Staff.

LING 773-774 Proseminar in Cognitive Studies I, II (also Cognitive Studies 773-774, Psychology 773-774, Philosophy 773-774, and Computer Science 773-774)
Fall: R. Grade; spring: S-U only. 4 credits. J. Sereno.
This year-long seminar is intended to provide graduate students with an interdisciplinary introduction to the study of knowledge, its representation, acquisition, and use.

Linguistics of Particular Languages
Fees: Depending on the course, a small fee may be charged for photocopied texts for course work.

African

[LING 235 Introduction to African Languages and Linguistics @] Fall. 3-4 credits variable. Not offered 1997-98. C. Collins.
This is a survey of aspects of language use in Africa. We will discuss the relation between language and culture, the structural characteristics of African languages, and the historical relationships between different African languages.

[LING 431 Structure of an African Language] Spring. 4 credits. Prerequisite: Linguistics 101 or permission of the instructor. Offered alternate years. Not offered 1997-98. V. Carstens.
A survey of the grammar of an African language in light of current linguistic theory.

Selected topics in the syntax of African languages.

Arabic

LING 416 Structure of the Arabic Language (also Near Eastern Studies 416) @
For description, see NES 416.

Celtic

[LING 236 Introduction to Gaelic] Spring. 3 credits. W. Harbert.
This course is an introduction to the history, structure, and current status of the Scottish Gaelic language, oriented around elementary Gaelic texts.

LING 238 Introduction to Welsh
Spring. 3 credits. W. Harbert.
This course surveys the history, structure, cultural and political situation of the Welsh language. It includes several sessions of elementary language instruction and a brief introduction to Welsh literature.

LING 239/539 The Celtic Languages
Fall. 4 credits. Graduate students register under Ling 539. Not offered 1997-98.
W. Harbert.
This course surveys the history, structure, and political and social situation of the Celtic languages (Welsh, Scottish Gaelic, Irish Gaelic, Breton, Cornish, and Manx). The course includes a few days of introductory language instruction in some of these languages.

LING 437 Celtic Linguistic Structures
Fall. 4 credits. Prerequisite: Linguistics 303. W. Harbert.
This course will treat selected topics in the syntax and morphosyntax of the modern Celtic languages.

LING 623-624 Old Irish I, II
623, fall; 624, spring. 4 credits each term. Prerequisite for 624: 623 or permission of instructor. Not offered 1997-98.
J. Jasanoff.

LING 625 Middle Welsh
Fall. 4 credits. Prerequisite: permission of instructor. W. Harbert.
Students develop a reading knowledge of Middle Welsh through reading prose and poetic texts with emphasis on prose tales, including the Mabinogi.

LING 627 Advanced Old Irish]

Chinese

CHIN 403 Structure of the Chinese Language: Introduction to Chinese Linguistics @
Spring. 4 credits. Prerequisite: permission of instructor. H. Tao.
This course will be an introduction to the structure of Chinese and to general issues related to Chinese linguistics. Special attention will be paid to Chinese discourse and pragmatics and to general questions of language use.

English

LING 217 History of the English Language #
Fall. 4 credits. W. Harbert.
This course explores the development of the English language from its Indo-European beginnings to the present. Topics covered include changes in sound, vocabulary and grammatical structure, external influences, Old English, Middle English, Standard English, dialects, and World Englishes.

LING 311 The Structure of English: Demystifying English Grammar
Spring. 4 credits. W. Harbert.
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 will make 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 will consider dialectal variation, matters of style, how sentence structure conveys viewpoint, and other discourse phenomena.

LING 649 Structure of Old English
Spring. 4 credits. Prerequisite: Ling 441. Offered alternate years. Not offered 1997-98.
W. Harbert.
Linguistic overview of Old English, with emphasis on phonology and syntax.

French

The Major
The French major has three separate tracks: the literature track, the area studies track, and the linguistics track. The linguistics track is described here; for the literature and area studies tracks, see the description under Romance Studies. The major in French linguistics is designed to give students proficiency in the oral and written language and to develop skills in the linguistic analysis of French.

While prospective majors should try to plan their programs as far ahead as possible, no student will be refused admission merely because of a late start. It is even possible for a student to begin French and/or linguistics at Cornell and become a major. Students are admitted to the major in French linguistics by the director of undergraduate studies of the Department of Romance Studies, Professor Jacques Béraud, but will be guided by their individual advisers.

The French Linguistics Major
To be admitted to the major, students should have completed Linguistics 101 and French 200, 203, 205, or 213 (or their equivalents) by the end of the sophomore year. It is expected that all students in the major will also take either French 220, 221, or 222, preferably by the end of the sophomore year.

To complete the major, a student must:
1) acquire a sound degree of competence in French. This competence is demonstrated by the successful completion of French 312 (or its equivalent) or by the passing of a special examination. Typically, students in the major will have taken 312 by the end of their junior year.
2) take six courses in French, Romance, and general linguistics (in addition to Linguistics 101). These courses will include at least one course concerning the history of French (e.g., Romance Linguistics 321, French 629 [listed under Romance Studies]), one course concerning the structure of French (e.g., French 405, 408, 410, Linguistics 323), and one other course in French linguistics.
3) take two courses (preferably a sequence) in some allied area, for example,
(a) French literature and civilization,
(b) psycholinguistics, (c) philosophy of language, (d) French history, culture, music, or history of art or architecture. (This requirement may be waived for students who are double majors in other fields.)

Honors. The honors program encourages well-qualified students majoring in French linguistics 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 practically possible in the case of course papers.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have
meet the minimum requirements for the major. An award of honors is determined by the student's grades in the major and the quality of the honors essay. [FRDML 405 Contemporary Theories of French Grammar] Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1997–98. L. Waugh. Selected topics in twentieth-century French linguistics.[FRDML 408 Linguistic Structure of French I (also Linguistics 408)] Fall. 4 credits. Prerequisites: qualification in French and Linguistics 101 or Linguistics 400, or permission of instructor. Offered alternate years. Not offered 1997–98. L. Waugh. A synchronic study and analysis of modern French, with emphasis on its phonology and morphology.[FRDML 410 Linguistic Structure of French II: Semantics, Pragmatics, and Discourse Analysis] Fall. 4 credits. Prerequisite: qualification in French. Offered alternate years. Not offered 1997–98. L. Waugh. A synchronic study and analysis of modern French, with emphasis on semantics, pragmatics, and discourse analysis.[FRDML 700 Seminar in French Linguistics] Spring. according to demand. Credit to be arranged. Seminars are offered according to faculty interest and student demand. Topics in recent years have included current theories in French phonology, current theories in French syntax, and semantics of French.[LING 232 The French Language Today (also French 222)] Fall. 3 credits. Prerequisite: Linguistics 101. Not offered 1997–98. A. Cohn. Designed for students with a working knowledge of French, this course explores the structure of French and how it is used. The course investigates the sound system, word structure and sentence structure of French as well as different varieties of French, including regional and social variation and formal vs. informal differences. [LING 315–316 Old Norse] 315, fall; 316, spring. 4 credits each term. H. Bernhardsdottir. Old Norse is a collective term for the earliest North Germanic literary languages: Old Icelandic, Old Norwegian, Old Danish, and Old Swedish. The richly documented Old Icelandic will be the center of attention, and the purpose is twofold: the student will gain (a) knowledge of an ancient North Germanic language, important from a linguistic point of view, as well as (b) 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 13th-century narrative based on the Eddic poetry. 316: Extensive reading of Old Norse texts, among them selections from some of the major Icelandic family sagas: Njal's saga, Grettis saga, and Egils saga, as well as the whole Háf妖nki saga.[LING 441 Introduction to Germanic Linguistics] Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. J. Jasonoff. Survey of major issues in historical Germanic linguistics.[LING 607 Topics in Historical Germanic Morphology] Fall. 4 credits. Prerequisite: Ling 441. Not offered 1997–98. J. Jasonoff. The Germanic verbal system and its Indo-European origins.[LING 608 Topics in Historical Germanic Syntax] Fall. 4 credits. Prerequisite: Ling 441. Not offered 1997–98. W. Harbert. A diachronic and comparative investigation of syntactic processes in the older Germanic languages.[LING 710 Seminar in Germanic Linguistics] Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits. Not offered 1997–98.[LING 720 Seminar in Comparative Germanic Linguistics] Fall or spring, subject to the needs of students and to the limitations of staff time. 4 credits. Not offered 1997–98. W. Harbert, M. Diesing. This course surveys the history, structure, and use of the modern Germanic languages (English, German, Dutch, Afrikaans, Swedish, Danish, Icelandic, Norwegian, Faroese, and Yiddish).[LING 241 Yiddish Linguistics] Spring. 3–4 credits variable. Prerequisite: Linguistics 101 or permission of instructor. Not offered 1997–98. M. Diesing. This course will cover 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 424 Indo-Aryan Structures] Fall. 4 credits. Prerequisite: Linguistics 101. Not offered 1997–98. J. Gair. A basic introduction to the linguistic and sociolinguistic character of the subcontinent, with special attention to their implications for Greek historical grammar and dialectology.[LING 609 Greek Comparative Grammar (also Classics 421)] Fall. 4 credits. Prerequisite: thorough familiarity with the morphology of Classical Greek. A. Nussbaum. The diachrony and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.[LING 611 Greek Dialects (also Classics 425)] 4 credits. Not offered 1997–98; next offered 1998–99. A. Nussbaum. A survey of the dialects of ancient Greek through the reading and analysis of representative epigraphical and literary texts.[LING 613 Hellenistic Philology (also Classics 427)] 4 credits. Prerequisite: ability to read Homeric Greek. Not offered 1997–98; next offered 1999–2000. 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 615 Mycenaean Greek (also Classics 429)] 4 credits. Prerequisite: thorough familiarity with the morphology of Classical Greek. Not offered 1997–98. 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.
Indo-European

LING 131-132 Elementary Sanskrit (also Classics 131-132 and Sanskrit 131-132)

For description, see SANSK 131-132.

[LING 251-252 Intermediate Sanskrit (also Classics 251-252 and Sanskrit 131-132) @ #

For description, see SANSK 131-132.]

LING 617-618 Hittite

617, fall; 618, spring. 4 credits each term.
Prerequisites: for Linguistics 617, permission of instructor; for Linguistics 618, Linguistics 617 or permission of instructor.
Not offered 1997-98. J. Jasanoff.

LING 619 Rigveda

Fall. 4 credits. Not offered 1997-98.
J. Jasanoff, C. Minkowski.
Reading and linguistic analysis of selected Vedic hymns.

LING 631 Comparative Indo-European Linguistics

Fall. 4 credits. Prerequisite: permission of instructor. J. Jasanoff.
An introduction to the comparative grammar of the Indo-European languages.

LING 635-636 Indo-European Workshop

635, fall; 636, spring. 4 credits each term.
Prerequisite: permission of instructor. Not offered 1997-98. Fall: J. Jasanoff, spring: A. Nussbaum.
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.

ITALIAN

ITALA 403 Linguistic Structure of Italian

Fall. 4 credits. Prerequisites: Linguistics 101 or equivalent and qualification in any Romance language. Offered alternate years. Not offered 1997-98. C. Rosen.
Survey of Italian syntax, using simple theoretical tools to bring hidden regularities to light. Topics include auxiliaries, modal clitics, reflexive constructions, agreement, impersonal constructions, causatives.

ITALA 404 History of the Italian Language #

Spring. 4 credits. Prerequisites: Linguistics 321 and either Italian 201, 203, or equivalent. Offered alternate years. C. Rosen.
Overview of Italian and its dialects from the earliest texts to the present day. Emergence of the standard language. External history and sociolinguistic circumstances.

Japanese

LING 404 Linguistic Structure of Japanese (also Japanese 404) @

Fall. 4 credits. Prerequisites: Japanese 102 or permission of instructor and Linguistics 101 or equivalent introductory course in linguistics. Offered alternate years. J. Whitman.

Introduction to the linguistic study of Japanese, with an emphasis on morphology and syntax.

LING 411 History of the Japanese Language (also Japanese 410) @ #

Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. 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.

Korean

LING 430 Structure of Korean

Spring. 4 credits. Offered alternate years. 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.

Latin and Italian

LING 610 Latin Comparative Grammar (also Classics 422)

The prehistory and evolution of the sounds and forms of classical Latin as reconstructed by comparison with the other Indo-European languages.

LING 612 Italic Dialects (also Classics 424) @

4 credits. Not offered 1997-98.
A. Nussbaum.
The phonology and morphology of Faliscan, Oscan, and Umbrian studied through the reading of epigraphical texts. Attention to the relations of these languages to Latin and the question of proto-Italic.

LING 614 Archaic Latin (also Classics 426) @

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.

Russian and Slavic

LING 417-418 History of the Russian Language (also Russian 401-402) @ #

417, spring, 418. 4 credits each term.
Prerequisites: for Ling 417, permission of instructor; for Ling 418, Ling 417 or equivalent. Offered alternate years. Ling 418 not offered 1997-98. W. Browne.
Phonological, morphological, and syntactic developments from Old Russian to modern Russian.

LING 443-444 Linguistic Structure of Russian (also Russian 403-404)

443, fall; 444, spring. 4 credits each term.
Prerequisites: for Linguistics 443, Linguistics 101 and permission of instructor; for Linguistics 444, Linguistics 443 or equivalent. Offered alternate years. Ling 444 not offered 1997-98. W. Browne.
A synchronic analysis of the structure of modern Russian. Linguistics 443 deals primarily with morphology and its relation to syntax and 444 with syntax and word order. Topics covered include case theory, the functions of word order, voice, agreement, impersonal constructions, negation, nonuniversal categories, and the relation between morphology and syntax.

LING 671-672 Comparative Slavic Linguistics (also Russian 651-652)

671, fall; 672, spring. 4 credits each term.
Prerequisites: for Linguistics 671, Russian 601 taken previously or simultaneously or permission of instructor; for Linguistics 672, Linguistics 671 or permission of instructor. Offered alternate years. Not offered 1997-98. W. Browne.
Sounds and forms of the Slavic languages and of prehistoric common Slavic; main historical developments leading to the modern languages.

RUSSA 601 Old Church Slavic

Fall. 4 credits. This course is prerequisite to Russian 602. Offered alternate years. W. Browne.
Grammar and reading of basic texts.

RUSSA 602 Old Russian Texts

Spring. 4 credits. Prerequisite: Russian 601. Offered alternate years. W. Browne.
Grammatical analysis and close reading of Old Russian texts.
Topics chosen according to the interests of staff and students.

**Southeast Asian**

**KHMER 403-404** Structure of Khmer @ 403, fall; 404, spring. 4 credits each term. Prerequisite: Linguistics 101 or equivalent. G. Diffloth.

Introduction to the linguistic study of Khmer.

**LING 230** Introduction to Southeast Asian Languages and Linguistics @

Fall. 3–4 credits variable. For non-majors or majors. Not offered 1997–98. A. Cohn, J. Wolff.

This is a survey of the languages of Southeast Asia. The goal of this course is to expose students to Southeast Asia as a linguistic area and introduce them to the rich language diversity of the region. It includes three main parts: 1) sociolinguistic and ethnolinguistic issues of language and politics, language and culture, and language use; 2) language structures and typological patterns of the area's languages; 3) historical linguistics, genetic relations between languages, as well as the linguistic effects of language contact and linguistic evidence for prehistory.

**LING 653-654 Seminar in Southeast Asian Linguistics**

653, fall; 654, spring. 4 credits each term. Prerequisite: Linguistics 303 or permission of instructor. Linguistics 653 is not a prerequisite for 654. Not offered 1997–98. G. Diffloth.

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**

655, fall; 656, spring. 4 credits each term. Prerequisite: Linguistics 655. Linguistics 101 and permission of instructor; for Linguistics 656, Linguistics 655. J. Wolff.

Descriptive and comparative studies of Malayo-Polynesian languages.

**LING 657-658 Seminar in Austroasiatic Linguistics**

657, fall; 658, spring. 4 credits each term. Prerequisite: Linguistics 101, 110, or permission of instructor. G. Diffloth.

Descriptive and comparative studies of Austroasiatic languages.

**Spanish**

**The Major**

The 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 the linguistic analysis of Spanish. (For the major in Spanish literature see the description under Romance Studies.) Satisfactory completion of the major should enable students to meet language requirements for teaching, to continue with graduate work in Spanish or other appropriate disciplines, or to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake pre-professional training for graduate study in law, medicine, business, etc. Students interested in a Spanish major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of undergraduate studies for Spanish linguistics, Professor Margaret Sufer (218 Morrill Hall).

**The Core**

All majors will work out a plan of study in consultation with their advisers. Previous training and interests as well as vocational goals are taken into account when the student's program of courses is determined. Spanish 201 and 204 or 212 (or equivalent) are prerequisite to entering the major in Spanish. All majors normally include the following core courses in their programs:

1) Spanish 315–316–318
2) Spanish 311 and 312 (or equivalent)

Spanish majors have great flexibility in devising their programs of study and areas of concentration.

**The Linguistic Option**

Spanish linguistics, for which the program normally includes at least 20 credits, and at least 8 additional credits in general or Spanish linguistics (such as 306, 405, 407, 408, and others). (Linguistics 101 is recommended before entering this program.) The J. G. White Prize and Scholarships are available annually to students who achieve excellence in Spanish.

**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 engaged in Spanish literature or linguistics to supervise their work and direct the writing of their honors essays (see Spanish 429–430).

**LING 366 Spanish in the United States (also Spanish 366 and Latino Studies Program 366)**

Fall. 4 credits. Prerequisite: some knowledge of Spanish. M. Sufer.

Examination of major Spanish dialects in the United States from a linguistic perspective. Contrast with the standard language. Borrowing, interference, and code switching. Syntactic, morphological, and phonological characteristics. Sex-related phenomena.

**LING 407 Applied Linguistics: Spanish (also Spanish 407)**

Spring. 4 credits. Prerequisite: proficiency in Spanish or permission of instructor. M. Sufer.

This course seeks to equip the advanced student or the future teacher of Spanish with insights into problem areas for foreign language learners with the aid of linguistic descriptions. The intent is to narrow the gap that is known to exist between the knowledge that a native speaker has and the incomplete one that a foreign language learner possesses.

**[SPAND 405 Hispanic Dialectology](#)**


**[SPAND 408 The Grammatical Structure of Spanish](#)**

Spring. 4 credits. Prerequisites: Linguistics 101 and proficiency in Spanish or permission of instructor. Offered alternate years. Not offered 1997–98. Survey of the salient morphological and syntactic characteristics of contemporary Spanish.

**[LING 655-656 Seminar in Austronesian Linguistics](#)**

Prerequisite: for Bengali 201, Bengali 122 or examination. D. Sudan.

The emphasis is on basic grammar, speaking, and comprehension skills; Bengali script will also be introduced.

**BENGALI 201-202 Intermediate Bengali**

Reading @

201, fall; 202, spring. 3 credits each term. Prerequisites: for Bengali 201, Bengali 122 or examination; for Bengali 202, Bengali 201 or examination. D. Sudan.

Continuing instruction in grammar with attention to speaking and reading skills.

**BENGALI 203-204 Intermediate Bengali Composition and Conversation @**

203, fall; 204, spring. 3 credits each term. Prerequisites: for Bengali 203, Bengali 122 or examination; for Bengali 204, Bengali 203 or examination. D. Sudan.

Continuing instruction in grammar with attention writing skills.
BENG 300 Directed Studies
Fall or spring. 1–4 credits variable.
Prerequisite: permission of instructor.
D. Sudan.
Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

BENG 303-304 Bengali Literature I, II
303, fall; 304, spring. 4 credits each term.
Prerequisites: Bengali 203–204 or equivalent. D. Sudan.
An introduction to noted Bengali writers. Selections of works by Rabindranath Tagore and Abanindranath Tagore and short stories by Bonophul will be covered. The course will be devoted to reading these works and developing literary criticism and creative writing in Bengali.

BURM 301-302 Advanced Burmese
Taught on a specialized basis to address writing.

BURM 401-402 Burmese Directed Independent Study
401, fall; 402, spring. 2–4 credits variable each term.
Prerequisite: permission of instructor. S. Tun.
Various topics according to need.

Cambodian
See Khmer.

Chinese
For literature courses (conducted in English or Chinese) and Classical Chinese, see Asian Studies.

Chinese
For literature courses (conducted in English or Chinese) and Classical Chinese, see Asian Studies.

CHIN 101-102 Elementary Standard Chinese ('Mandarin')
101, fall; 102, spring. 6 credits each term.
Prerequisite: for Chinese 102, Chinese 101 or equivalent. Since each section is limited to 15–18 students, students missing the first two 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 Chinese 102 fulfills the qualification portion of the language requirement.

CHIN 111-112 Beginning Cantonese (Spoken)
111, fall; 112, spring. 3 credits each term.
Prerequisite: for Chinese 112, Chinese 111 or equivalent.

CHIN 113-114 Beginning Reading for Cantonese Speakers
113, fall; 114, spring. 3 credits each term.
Prerequisite: everyday conversational ability in Cantonese. Completion of 114 satisfies the qualification portion of the language requirement.

CHIN 201-202 Intermediate Standard Chinese ('Mandarin')
201, fall or summer; 202, spring or summer. 4 credits each term.
Prerequisites: for Chinese 201, Chinese 102 with a grade of C+ or above or equivalent; for Chinese 202, Chinese 201 or equivalent.

CHIN 209-210 Intermediate Reading and Writing (Standard Chinese)
209, fall; 210, spring. 4 credits each term.
Prerequisites: for Chinese 209, Chinese 110 or equivalent; Chinese 210, Chinese 209.

CHIN 215 Mandarin for Cantonese Speakers
Fall or spring. 3 credits each term.
Prerequisites: basic conversational Cantonese and Chinese 114 or the equivalent. Native or near-native Cantonese (speakers/readers) will be allowed in this course. Staff.

CHIN 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.

CHIN 401-402 Advanced Chinese Reading
301, fall or spring; 302, fall or spring. 3 credits each term.
Prerequisites: for Burmese 301, Burmese 202 or permission of instructor; for Burmese 302, Burmese 301. S. Tun.
Continuing instruction in spoken and written Burmese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

CHIN 401-402 Advanced Chinese Reading
301, fall or spring; 302, fall or spring. 3 credits each term.
Prerequisites: for Burmese 301, Burmese 202 or permission of instructor; for Burmese 302, Burmese 301. S. Tun.
Continuing instruction in spoken and written Burmese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.
CHIN 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.

CHIN 301–302 High Intermediate Chinese
301, fall; 302, spring. 4 credits each term. Prerequisites: for Chinese 301, Chinese 202 or equivalent; for Chinese 302, Chinese 301. Staff.
Continuing instruction in spoken Chinese and in various genres and styles of written Chinese.

CHIN 303–304 Advanced Mandarin Conversation @
303, fall; 304, spring. 1 credit each term. Prerequisite: Chinese 201–202 or equivalent or permission from instructor. S-U grades only. Not offered 1997–98. Staff. Conversation and reading practice for students who wish to maintain language skills. Guided conversation and oral composition and translation. Corrective pronunciation drills.

CHIN 411–412 Advanced Chinese: Fiction, Reportage, Current Events
411, fall; 412, spring. 4 credits each term. Prerequisites: for Chinese 411, Chinese 302 or equivalent; for Chinese 412, Chinese 411. Q. Teng. Reading, discussion, and composition at advanced levels.

CHIN 413–414 Advanced Chinese: Focus on Current Events
413, fall; 414, spring. 3 credits each term. Prerequisites: for Chinese 413, Chinese 412 or equivalent or permission of instructor, for Chinese 414, Chinese 413. S-U grades only. Not offered 1997–98. Reading and discussion, with a focus on current events. One of the goals of this course is to build reading confidence and speed. The content will partially be determined by student need and interest.

CHIN 425 Special Topics
Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. S. Schaffzin. A number of different topics in advanced Chinese language, advertised the previous semester, will be offered under this title to accommodate the needs of advanced or specialized students, and take advantage of faculty interests. Topics include: correspondence and composition, excerpts from classical novels, Chinese documents, xiesheng comedy routines, etc. May be repeated for credit.

FALCON (Full-year Asian Language Concentration)
For full information, brochures, etc., see the FALCON secretary 413 Morrill Hall (e-mail: falcon@cornell.edu).

CHIN 160 Introductory Intensive Mandarin
Summer only. 8 credits. Completion of 160 fulfills the qualification portion of the language requirement. Staff. 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 Chinese 201.

CHIN 161–162 Intensive Mandarin @
161, fall; 162, spring. 16 credits each term. Prerequisites: for Chinese 161, Chinese 160 or equivalent or permission of instructor; for Chinese 162, Chinese 161. S-U grades only. Not offered 1997–98. Staff. Conversation and reading practice for students who wish to maintain language skills. Guided conversation and oral composition and translation. Corrective pronunciation drills.

Czech
Fees. A small fee may be charged for photocopied texts for course work.

[CZECH 131–132 Elementary Czech
131, fall; 132, spring. 3 credits each term. Prerequisite: for Czech 132, Czech 131 or equivalent. This language series (131–132) cannot be used to satisfy the language requirement. Not offered 1997–98. Staff. Covers all language skills: speaking, listening comprehension, reading, and writing.

[CZECH 133–134 Continuing Czech
133, fall; 134, spring. 3 credits each term. Prerequisites: for Czech 133, Czech 132 or equivalent; for Czech 134, Czech 133. Satisfactory completion of Czech 134 fulfills the qualification portion of the language requirement. Not offered 1997–98. Staff. An intermediate conversation and reading course.

[CZECH 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.

Danish
Fees. A small fee may be charged for photocopied texts for course work.

[DANISH 131–132 Elementary Danish
131, fall; 132, spring. 3 credits each term. Prerequisite: for Danish 132, Danish 131 or equivalent. This language series cannot be used to satisfy the language requirement. Not offered 1997–98. Covers all language skills: speaking, listening comprehension, reading, and writing.

[DANISH 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. Not offered 1997–98. Staff. Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Dutch
Fees. A small fee may be charged for photocopied texts for course work.

DUTCH 121–122 Elementary Dutch
121, fall or summer; 122, spring or summer. 4 credits each term. 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 123 Continuing Dutch
Fall. 4 credits each term. Prerequisite: Dutch 122 or equivalent. Satisfactory completion of Dutch 123 fulfills the qualification portion of the language requirement. M. Briggs. Improves speaking skills such as fluency and pronunciation, focusing on verbal communication skills; offering a wide range of readings and sharpening listening skills based on Dutch and Dutch-speaking cultures.

DUTCH 203 Intermediate Composition and Conversation
Spring. 3 credits. Prerequisite: Qualification in Dutch or permission of instructor. M. Briggs. Improved control of Dutch grammatical structures and vocabulary through guided conversation, compositions and reading, drawing on all Dutch-speaking cultures.

DUTCH 204 Intermediate Composition and Conversation
Fall. 3 credits. Prerequisite: Dutch 203 or permission of instructor. M. Briggs. Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

English
See Intensive English Program.

English for Academic Purposes
Fees. A small fee may be charged for photocopied texts for course work.

ENGLF 205 English as a Second Language
Fall or spring. 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.

ENGLF 206 English as a Second Language
Spring. 3 credits. Prerequisite: ENGLF 205 or placement by examination. S. Schaffzin. Designed for those who have completed ENGLF 205 and who need further practice, particularly in writing. Individual conferences are also included.

ENGLF 209 English as a Second Language
Fall or spring. 1 credit. Prerequisite: permission of instructor. S. Schaffzin. Practice in classroom speaking and in informal conversational English techniques for gaining information. Students also practice giving informal presentations. Individual conferences with the instructor supplement class work.
ENGL 210  English as a Second Language
Spring. 1 credit. Prerequisite: permission of instructor. S. Schaffzin.

Practice in academic speaking. Formal classroom discussion techniques and presentation of information in various forms. 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 will be restricted to the first five days of classes on a first-come, first-served basis. Must have signature of instructor before enrolling.

Classes begin the second week of the semester. D. Campbell.

Research paper writing. For the major writing assignment of this course, the students must have a real project that is required for the graduate work. This can be a thesis proposal; a pre-thesis; part of a thesis, such as the literature review or discussion section; a paper for another course or a series of shorter papers (with permission of the other instructor); or a paper for publication. Time limitations make it difficult to deal with work over 20 pages in length. Course work involves practice in paraphrase, summary, the production of cohesive, coherent prose, vocabulary use, and grammatical structure. Frequent individual conferences are a necessary part of the course. Separate sections for Social Sciences/Humanities and for Science/Technology.

ENGL 213  Written English for Non-Native Speakers
Spring. 3 credits. Prerequisite: permission of instructor. S. Schaffzin.

Designed for those whose writing fluency is sufficient for them to carry on regular academic work but who want to refine and develop their ability to express themselves clearly and effectively. Individual conferences supplement class work.

Freshman Writing Seminar

ENGL 215-216  English for Later Bilinguals
For description, see freshman writing seminar brochure.

French
For information on language placement and transfer credit, contact C. Waldron (403 Morrill Hall, 255-0702). For literature and advanced language courses see Romance Studies. For information on the literature and area studies tracks of the French major, see Romance Studies. For the linguistics track, see French under Linguistics of Particular Languages.

Study Abroad in France
French majors or other interested students may study in France for one or two semesters during their junior year. Offering for one of several study-abroad plans recognized by the Departments of Romance Studies and Modern Languages facilitates the transfer of credit. Information about these plans is available from Professor Jacques Béreaut, director of undergraduate studies, Department of Romance Studies. (For a description of the Study Abroad programs in Paris and in Geneva, see the listing under the Department of Romance Studies.)

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

FRDML 101  Basic Course I
Summer only. 6 credits. M. J. Highfield and staff.

An introductory course offering opportunities for student interaction and intensive practice in listening to, speaking, reading, and writing basic French in meaningful contexts. Students who have previously studied French must take the language placement test (LPF) or receive permission from the instructor before registering for this course. French 101 is the equivalent of 2 semesters of elementary French.

[FRDML 103-104  Intensive Elementary French]
103, fall; 104, spring. 6 credits each semester. Prerequisite: 103, none; students with previous study of French may enter only with instructor's permission. 104. FRDML 121, 103, placement score between 37 and 44, or equivalent, by permission of instructor. Students completing only 103 and 104 will have achieved qualification in French; placement in subsequent French courses will be by examination. Not offered 1997-98.
N. Gabriel.

While complete a core curriculum equivalent to that of 121-122, this course offers additional materials, presentations, activities and individualized intensive practice. It is intended to facilitate students' acquisition of active language skills as well as to offer insight into learning processes and into French language, culture, and society. In particular, there will be opportunities for students to choose to focus more intensively on certain skills than on others and to vary the pace of their language study.

FRDML 121  Elementary French
Fall or spring. 4 credits. Spring enrollment limited. No prerequisites. Students who have studied French before must take the language placement test (LPF).

Intended for beginning students or those placed by examination. Small classes provide the opportunity for student interaction and intensive practice in listening to, speaking, reading, and writing basic French in meaningful contexts, which offer insights into French language, culture, and society.

FRDML 122  Elementary French
Fall or spring. 4 credits. Prerequisite: French 121, LPF score 37-44, or SAT II 370-480. Students who receive an LPF score of 56 after French 122 attain qualification and may enter the 200-level sequence; otherwise, satisfactory completion of French 123 is required for qualification. Staff.

The goal of French 122 is to build on the students' elementary knowledge of French so that they can function in basic situations in a French-speaking culture. Courses offer intensive, context-specific practice in speaking, listening, reading, and writing.

FRDML 123  Continuing French
Fall, spring, or summer. 4 credits. Limited to students who have previously studied French and have an LPF score 45-55 or SAT II 490-500. Satisfactory completion of French 123 fulfills the qualification portion of the language requirement. Staff.

French 123 is an all-skills course designed to improve pronunciation, oral communication, and reading ability; to establish a groundwork for correct writing; and to provide a substantial grammar review. The approach in the course encourages the student to see the language within the context of its culture.

FRDML 200  Intermediate Reading and Writing
Fall or spring. 3 credits. Prerequisite: qualification in French (French 123, LPF score 50-64, or SAT II 600-680). Satisfactory completion of French 200 fulfills the proficiency portion of the language requirement. C. Sparfel.

Study of the language in different text types, prose and poetry, articles on current events, and a contemporary novel. Discussion of texts with emphasis on vocabulary development, grammar review and expansion, and appreciation of stylistic levels and cultural differences. Students have the opportunity to select reading material and work on their areas of interest.

FRDML 203  Intermediate Composition and Conversation I
Fall, spring, or summer. 3 credits. Prerequisite: qualification in French (French 123, LPF score 50-64, or SAT II 600-680). Satisfactory completion of French 203 fulfills the proficiency portion of the language requirement. Staff.

Readings, conversation, composition; various other activities based on films, videos, and newspaper articles. The course gives students the opportunity to expand their language skills and to strengthen their knowledge of grammar for better control.

FRDML 205  Intermediate French: le français multicolore
Fall. 3 credits. Prerequisite: qualification in French (French 123, LPF score 50-64, or SAT II 600-680). Satisfactory completion of French 205 fulfills the proficiency portion of the language requirement and can be used to satisfy the breadth requirement in French.

Opportunities to strengthen and expand active language skills within the context of the wider French-speaking world. Contemporary readings, video and audio materials, and people from francophone countries of Europe, Africa, and the Americas will provide bases for individual and group projects. Taught in French.
Study Abroad
All students planning to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of the Courses of Study. Interested students should contact Bonnie Buettner (German Stds) or Gunhild Lischke (Department of Modern Languages) as early as possible.

German Area Studies Major
See German Studies.

Honors
See German Studies.

Freshman Writing Seminar Requirement
See German Studies.

Fees
Depending on the course, a small fee may be charged for photocopied texts for course work.

GERLA 121 Elementary German I
Fall or spring. 4 credits. Intended for students with no prior experience in German or with a language placement test (LPG) score below 37, or an SAT II score below 370. Staff. Elementary German I is designed to familiarize students with basic vocabulary and structures so they can communicate about everyday life. Videos and audio tapes facilitate listening comprehension and insight into German culture. Daily practice in small classes provides the opportunity to learn vocabulary and structures.

GERLA 122 Elementary German II
Fall or spring. 4 credits. Prerequisite: GERLA 121, LPG score 37-44, or SAT II score 370-450. Students who obtain an LPG score of 56 or above after German 122 attain qualification and may enter a 200-level course, otherwise, successful completion of German 123 is required for qualification. D. McGraw and staff. Elementary German II, the second semester of elementary German, presupposes that students have not yet learned narrative past, subjunctive, passive or dependent word order. Topics include travel, free time, work and the work environment, Germany's role within the European Union, the dual education system, German news broadcasts, reading German newspapers on the www, and projects on current events, videos, and group projects. Topics include: awareness of culture, dependence of meaning on perspective, interviews with native speakers, and social changes in Germany. This course replaces GERLA 203 and GERST 201.

GERLA 123 Continuing German
Fall or spring. 4 credits. Limited to students who have previously studied German and have an LPG score 45-55 or SAT II 460-570. Satisfactory completion of German 123 fulfills the language qualification requirement. G. Valk and staff. German 123 is a course on the beginning intermediate level. Students will further develop their language proficiency by communicating about broadly cultural topics and themes. To provide each student with a maximum opportunity for speaking in German and getting as much help and feedback as possible, much of the work in class will be done in pairs and/or small groups.

GERLA 200 Contemporary German (also GERST 200)
Spring. 3 credits. Prerequisite: qualification in German (LPG score of 56-64 or SAT II score of 580-670 or GERLA 123). Successful completion of German 200 fulfills the Arts and Science language proficiency requirement and can be used in partial fulfillment of the Arts and Sciences humanities distribution requirement. G. Lischke and staff.

An intermediate language course designed to provide an introduction to modern German culture and literature while students develop language proficiency. Students will examine issues that shape German society, literature and thought as reflected in short stories, poems, socio-cultural and political texts, video and audio materials. Selected themes include: “Beyond the Wall: German Unification,” “Germany: a Multi-cultural Society?” “Speaking and Identity,” emphasize accurate and idiomatic expression. Successful completion of the course enables students to continue with more advanced courses in language, literature, and culture. This course replaces GERLA 203 and GERST 201.

GERLA 203 Intermediate Conversation and Composition
Fall or spring. 3 credits. Prerequisite: qualification in German (German 123 or an LPG score 56-64, or SAT II score between 580-670). Successful completion of German 203 fulfills the language proficiency requirement. D. Hobbs and staff. Conversation; review of selected points of grammar; composition, reading of literary and non-literary texts; discussion of current events and films, participation in group projects and presentations. Emphasis is on development of accurate and idiomatic expression. The topics of the course include: the fall of the Berlin wall and the unification of Germany, multicultural life, and social changes in Germany. This course will be replaced by GERLA/German 200 in spring 1998.

GERLA 204 Intermediate Conversation and Composition
Fall or spring. 3 credits. Prerequisite: German 203 or Gerst 201, or German/GERST 200, or placement by examination (placement score and CASE). G. Lischke. Emphasis on improving oral and written expression of idiomatic German. Enrichment of vocabulary and appropriate use of language in different conversational contexts and written genres. Material consists of readings in contemporary prose, articles on current events, videos, and group projects. Topics include: awareness of culture, dependence of meaning on perspective, interviews with native speakers, and social changes in Germany. This course replaces GERST 200.

GERST 205-206 Business German
205: Fall, 206: spring. 3 credits. Prerequisite: qualification in German (German 123) or an LPG score of 56-64 or an SAT II score between 580-670. Successful completion of German 203 fulfills the language proficiency requirement. G. Lischke.

Learn German and understand German business culture at the same time. This course examines the German economic structure and its major components: industry, trade unions, the banking system, and the government. Participants will learn about the business culture in Germany and how to behave in a work environment, Germany's role within the European Union, the dual education system, the importance of trade and globalization, and current economic issues in Germany. The materials consist of authentic documents from the German business world, TV footage and a Business German textbook.
GERLA 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.

GERLA 303 Advanced Conversation and Composition
Fall or spring. 4 credits. Prerequisite for German 303: German 204, GERST 202, GERST 220, or placement by examination (CASE). G. Valk, G. Lischke. Further enrichment of vocabulary and emphasis on improving students' oral and written style. Study of the language of different text types, including journalistic and literary texts. Discussion of current events provides insight into the historical, political and social-issues of German-speaking countries. Individual and group projects provide an opportunity for each student to pursue his/her field of interest and share it with the class.

GERLA 304 Advanced Conversation and Composition
Spring. 4 credits. Prerequisite: German 303 or placement by examination (CASE). G. Valk. Students in this course, already quite fluent in German, will have the opportunity to refine and improve both written and spoken language. Reading materials consist of two contemporary novels, articles from DER SPIEGEL and DIE ZEIT. German 304 provides students with an up-to-date picture of Germany, with a special emphasis on both East and West and the ongoing process of unification.

GERLA 306 Zeltungseutsch
Fall. 4 credits. Prerequisite: German 304 or equivalent. G. Lischke. Analysis of various German daily and weekly newspapers, magazines and German TV with special emphasis on stylistic differences in journalism; discussion of current events. Students have the opportunity to research material for class presentation, lead discussions and share their interests/special fields with the group.

GERLA 631-632 Academic German I and II
631, fall; 632, spring. 3 credits each term. Limited to graduate students. Prerequisite: for German 632, German 631 or equivalent. D. Hobbs. Intended primarily for beginners with little or no previous German knowledge. Emphasis in 631 on acquiring basic German reading skills. Emphasis in 632 on development of the specialized vocabulary of student's field of study.

Modern Greek
See listings under Classics.

Modern Hebrew
See listings under Near Eastern Studies.

Hindi
Fees. A small fee may be charged for photocopied texts for course work.

Hindi 101-102 Elementary Hindi-Urdu
101, fall; 102, spring. 6 credits each term. Prerequisite: for Hindi 102, Hindi 101 or equivalent. C. Fairbanks. A semi-intensive course for students without prior experience in Hindi-Urdu or a closely related language. A thorough grounding is given in all language skills: listening, speaking, reading, and writing. Students who have had exposure to Hindi-Urdu or a closely related language in the home or otherwise should generally take Hindi 109-110. Check with instructor regarding placement.

Hindi 109-110 Accelerated Elementary Hindi-Urdu
109, fall; 110, spring. 3 credits each term. Prerequisite for Hindi 110: Hindi 109 or equivalent. C. Fairbanks. An entry-level sequence for students with some prior exposure to Hindi-Urdu or a closely related language. This course sequence will provide a thorough grounding in all the language skills: listening, speaking, reading, and writing. Completion of this sequence, including satisfactory performance on an examination given at the end of Hindi 110, will constitute a level of performance equal to that of the 101-102 sequence, and will thus be considered to fulfill qualification for the language requirement plus eligibility for 200-level Hindi-Urdu courses. Check with instructor regarding placement.

Hindi 201-202 Intermediate Hindi Reading @
201, fall, 202, spring. 3 credits each term. Prerequisites: for Hindi 201, Hindi 102; for Hindi 202, Hindi 201 or permission of instructor. Not offered 1997-98. C. Fairbanks.

Hindi 203-204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Hindi 203, Hindi 102; for Hindi 204, Hindi 203 or permission of instructors. C. Fairbanks. Throughout this course sequence all aspects of language learning are practiced: listening, speaking, reading, and writing. In 203, video materials are used and the emphasis is on the conversational aspect of the language. In 204, the focus shifts to reading skills and the main text used is a popular novel.

Hindi 300 Directed Studies
Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. C. Fairbanks. Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Hindi 301-302 Advanced Readings in Hindi Literature @
301, fall; 302, spring. 4 credits each term. Prerequisites: for Hindi 301, Hindi 202; for Hindi 302, Hindi 301 or equivalent. Not offered 1997-98. C. Fairbanks. Selected readings in modern Hindi literature.

Hindi 303-304 Advanced Composition and Conversation @
303, fall; 304, spring. 4 credits each term. Prerequisites: for Hindi 303, Hindi 204 or equivalent; for Hindi 304, Hindi 303 or equivalent. C. Fairbanks.

Hindi 305-306 Advanced Hindi Readings @
305, fall; 306, spring. 4 credits each term. Prerequisites: for Hindi 305, Hindi 202 or equivalent; for Hindi 306, Hindi 305 or equivalent. Not offered 1997-98. Intended for those who wish to do readings in history, government, economics, etc., instead of literature.

Hungarian
Fees. A small fee may be charged for photocopied texts for course work.

HUNGR 131-132 Elementary Hungarian
131, fall; 132, spring. 3 credits each term. This language series cannot be used to satisfy the language requirement. Not offered 1997-98. Intended for beginners or students with limited knowledge of the language.

HUNGR 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.

Indonesian
For students who have completed Indonesian 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 Professor John Wolff (307 Morrill Hall, 255-0733).

Fees. A small fee may be charged for photocopied texts for course work.

INDO 121-122 Elementary Indonesian
121, fall; 122, spring. 4 credits each term. Prerequisite: for Indonesian 122, Indonesian 121. J. Wolff 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. Prerequisite: Indonesian 122 or equivalent. Satisfactory completion of Indonesian 123 fulfills the qualification portion of the language requirement. J. Wolff and staff. Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offers a wide range of readings and sharpens listening skills.

INDO 203-204 Intermediate Composition and Conversation
203, fall; 204, spring. 3 credits each term. Prerequisites: for Indonesian 203, Indonesian 123; for Indonesian 204, Indonesian 203 or permission of instructor. J. Wolff and staff.
INDO 205-206 Intermediate Indonesian
205, fall, 206, spring. 3 credits each term. Prerequisites: for Indonesian 205, Indonesian 120 or equivalent; for Indonesian 206: Indonesian 205 or equivalent. Satisfactory completion of Indonesian 205 fulfills the proficiency portion of the language requirement. J. Wolff and staff.

This course develops all four skills: reading, writing, speaking, and comprehension.

INDO 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. J. Wolff.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

[INDO 301-302 Advanced Readings in Indonesian and Malay]
301, fall; 302, spring. 4 credits each term. Prerequisites: for Indonesian 301, Indonesian 205-206 or equivalent; for Indonesian 302, Indonesian 301. Not offered 1997-98. J. Wolff and staff.

[INDO 303-304 Advanced Indonesian Conversation and Composition]
303, fall; 304, spring. 4 credits each term. Prerequisites: for Indonesian 303, Indonesian 206; for Indonesian 304, Indonesian 303 or equivalent. Not offered 1997-98. J. Wolff and staff.

[INDO 305-306 Directed Individual Study]
305, fall; 306, spring 2-4 credits.
Prerequisites: Indonesian 301-302 and 303-304 or equivalent knowledge of Indonesian or Malay. J. Wolff.

A practical language course on an advanced level in which the students will read materials in their own field of interest, write reports, and meet with the instructor for two hours a week for two credits and twice a week for four credits.

[INDO 401-402 Advanced Readings in Indonesian and Malay Literature]
401, fall; 402, spring. 4 credits each term. Prerequisites: for Indonesian 401, Indonesian 302 or equivalent; for Indonesian 402, Indonesian 401 or equivalent. Not offered 1997-98. J. Wolff and staff.

FALCON (Full-year Asian Language Concentration)

INDO 161-162 Intensive Indonesian
161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor. J. Wolff and staff.

Italian
For literature courses see Romance Studies. The Italian Major. Study Abroad in Italy. Italian majors may study in Italy, generally during their junior year, under any of those study-abroad plans organized by American universities that allow the transfer of grades and credit, such as the Cornell program in Rome. The College of Architecture, Art, and Planning maintains a program open to all qualified students attending Cornell. The program is housed in the sixteenth-century Palazzo Massimo, designed by the architect Baldassare Peruzzi, on the Corso Vittorio Emanuele in the heart of Rome. Students may enroll for a semester in the fall or spring. Courses regularly taught at the Palazzo Massimo include: Architecture 300, 401, 402, 500, 502, Design Studio; Architecture 336 and 399, Special Topics in Architectural History; Architecture 458, Special Projects in Design Communications; Architecture 367, Contemporary Italian Culture; Architecture 510, Thesis Introduction; Art 251, 311, 322, and 571; and History of Art 371, Renaissance and Baroque Art in Rome; Italian 111, 112, Elementary Italian 111 and 112 correspond to Cornell courses 121 and 122 respectively (see below). Students having passed 111 in Rome will be admitted to 122 when they get back to Cornell. Students having passed 112 in Rome will be granted credit but must take the language placement test (LPI) for satisfaction of the language requirement and for placement into more advanced courses upon their return to Cornell. Italian classes in Rome are also being organized. To be eligible, students must have completed the first two years of their curriculum requirements and be in good academic standing.

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

ITALA 101 Basic Course I
Summer only. 6 credits.
A thorough grounding in all basic language skills. Students who have previously studied Italian must take the placement examination before registering for this course.

ITALA 121-122 Elementary Italian
121, fall; 122, spring. 4 credits each term. Prerequisite: for Italian 122, Italian 121 or equivalent. Intended for beginners or students placed by examination. At the end of Italian 122, students who score 56 or higher on the LPI attain qualification and may enter the 200-level sequence; otherwise Italian 123 is required for qualification. K. Bättig, C. Rosen.

A thorough grounding in all the language skills: listening, speaking, reading, and writing. Language practice is in small groups. Lectures cover grammar and cultural information.

ITALA 123 Continuing Italian
Fall, spring, or summer. 4 credits. Limited to students who have previously studied Italian and have an LPI score of 45-55 or SAT II 460-580. Satisfactory completion of Italian 123 fulfills the qualification portion of the language requirement. Staff. Italian 123 is an all-skills course designed to improve speaking and reading ability, to establish a groundwork for correct writing, and to provide a substantial grammar review.

ITALA 203-204 Intermediate Composition and Conversation
203, fall or spring; 204, fall or spring. 3 credits each term. Prerequisites: for Italian 203, qualification in Italian; for Italian 204, 203 or equivalent. P. Swenson. Guided conversation, composition, reading, pronunciation, and grammar review emphasizing the development of accurate and idiomatic expression in the language.

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 will be arranged with instructor.

ITALA 313 Advanced Italian: Language and Social Issues
Spring. 3 credits. Prerequisite: Italian 204 or equivalent or permission of instructor. Italian 313 is not prerequisite to Italian 314 and may be taken after Italian 314. P. Swenson.

Further development of all skills. Readings and discussions center on two themes: (1) contemporary Italian life and (2) the Italian language, its origins, evolution, and present state, including the role of the dialects. Emphasis on vocabulary building and awareness of stylistic levels.

ITALA 314 Advanced Italian: Language and Social Issues
Fall. 3 credits. Prerequisite: Italian 204 or equivalent. Italian 313 is not prerequisite to Italian 314 and may be taken after Italian 314. S. Stewart.

Further development of all skills, with emphasis on self-expression. Content: evolution and crisis in Italian politics, values, and national identity against the background of European unification. Social movements, issues, and attitudes, especially as reflected in the mass media.

ITALA 631 Readings in Italian Opera Libretti
Spring. 2 credits. For graduate students only. Prerequisite: permission of instructor. Offered concurrently with appropriate seminars in the Department of Music. Not offered 1997-98.

Japanese
For literature courses see Asian Studies. Fees. A small fee may be charged for photocopied texts for course work.

JAPAN 101-102 Elementary Japanese
101, fall; 102, spring. 6 credits each term. Prerequisite for Japanese 102: Japanese 101 or placement by the instructor during registration. Intended for beginners or for those who have been placed in the course by examination. Staff.

A thorough grounding is given in all the language skills at beginning level: listening, speaking, reading, and writing.

JAPAN 122 Accelerated Introductory Japanese
Fall. 6 credits. Prerequisite: placement by the instructor at beginning of semester. Not offered 1997-98. Staff.
already acquired a limited facility in Japanese through residence in Japan or brief formal study, but who require additional training to qualify for admission to Japanese 102. Attend Japanese 101 lectures. Offered if enrollment is sufficient.

**JAPAN 141-142 Beginning Japanese at a Moderate Pace**
141, fall; 142, spring. 4 credits each term. Y. Shirai and staff.

Beginning-level training in listening, speaking, and basic reading and writing. This series of ‘Moderate Pace’ courses provides an alternate choice for students who find it difficult to schedule the more intensive 101-102 sequence into their schedules. Can be followed by the 241-242, 543-544 and 545-546 sequences. All students planning to study abroad apply through Cornell Abroad; please see the Cornell Abroad program description in the introductory section of the Courses of Study.

**JAPAN 201-202 Intermediate Japanese Reading I & II**
201, fall; 202, spring. 2 or 3 credits each term. Prerequisites: for Japanese 201, Japanese 102 or placement by the instructor during registration; for Japanese 202, Japanese 201 and 203 or placement by the instructor during registration. Staff.

Reading of elementary texts emphasizing practical materials, with development of writing skills.

**JAPAN 203-204 Intermediate Japanese Conversation**
203, fall and summer; 204, spring and summer. 4 credits each term. Prerequisites: for Japanese 203, Japanese 102 or placement by the instructor during registration; for Japanese 204, Japanese 203 or placement by the instructor during registration. Staff.

Training in listening and speaking for students who have acquired basic oral proficiency. Students are strongly encouraged to enroll in Japanese 201-202 concurrently.

**JAPAN 241-242 Intermediate Japanese at a Moderate Pace**
241, fall; 242, spring. 4 credits each term. Prerequisites: for Japanese 241, Japanese 160 or placement by instructor during registration; for Japanese 242, Japanese 241 or placement by instructor during registration period. Y. Nakashishi-Whitman.

Training in listening, speaking, reading, and writing for those students who have acquired a basic beginning-level command. Provides an alternate choice for students who find it difficult to schedule the more intensive Japanese 201/203 and 202/204 into their schedules: MBA students, engineering students, hotel school students, arts college students, and others. Also highly recommended for those with prior background in the language who are weak in the more complex and difficult grammar patterns. Students planning to major in Japanese studies should take 101–102, not 141–142.

**JAPAN 401–402 Advanced Japanese Reading**
401, fall; 402, spring. 4 credits each term. Prerequisite: Japanese 302 or permission of instructor.

**Section I: Area of Humanities.** Cannot be used for distribution. K. Selden. Reading of selected modern texts with emphasis on expository style.

**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 407-408 Oral Narration and Public Speaking**
407, fall; 408, spring. 2 credits each term. Prerequisites: for Japanese 407, Japanese 304 or placement by the instructor during registration; for Japanese 408, Japanese 407 or placement by the instructor during registration. N. Nakada.

Instruction in making and delivering socially appropriate and effective speeches, with emphasis on both the construction of discourse and Japanese patterns of oral delivery.

**JAPAN 421-422 Directed Readings**
421, fall; 422, spring. Credit to be arranged. Limited to advanced students. Prerequisite: placement by the instructor during registration. K. Selden.

Topics are selected on the basis of student needs.

**JAPAN 543-544 Intermediate Japanese for Business Students**
543, fall; 544, spring. 4 credits each term. Prerequisites: for Japanese 543, Japanese 160, 102, and permission of instructor or placement by instructors during registration period; for Japanese 544, Japanese 543, 102, or placement by instructors during registration. Y. Nakashishi-Whitman.

Training in listening, speaking, reading, and writing for students who find it difficult to acquire a basic oral proficiency. Course times are arranged to accommodate those in the MBA program, but the material is oriented toward any student. Particularly suited to students who find it difficult to schedule the more intensive 201-203 or 202-204 courses into their schedules.

**JAPAN 545-546 Advanced Japanese for Business School Students**
545, fall; 546, spring. 4 credits each term. Prerequisites: for Japanese 545, Japanese 544 or placement by instructors during registration period; for Japanese 546, Japanese 545 or placement by instructors during registration period. Not offered 1997–98. Staff.

Training in listening and speaking at an accelerated pace; continued work on reading and writing at intermediate level. Course times are arranged to accommodate those in the MBA program, but the material is oriented toward any student. Particularly suited to students who find it difficult to schedule the more intensive 201-203 or 202-204 courses into their schedules.

**FALCON (Full-year Asian Language CONcentration)**
R. Suke, 412 Morrill Hall, FALCON secretary, 413 Morrill Hall

**JAPAN 160 Introductory Intensive Japanese**
Summer only. 8 credits. R. Suke and staff.

This is the first term of the Japanese FALCON Program. It is a full-time, nine-week course; the degree of intensity does not allow students to take other courses simultaneously. Formal application must be made to the program, but admission is open to all students, not just those students intending to take the fall and spring terms of FALCON. The course is an introduction to Japanese from absolute beginning level, in speaking as well as in reading and writing. There are three small interactive classes per day conducted entirely in Japanese and one lecture in English and Japanese. Two hours during the day are required language labs. Additional preparation time in the language lab is necessary in the evenings. Students completing this course can move smoothly in the academic year into Japanese 241-242 or 543-544. These can be taken the following year by Japanese 341-342 or Japanese 545-546, respectively.

**JAPAN 161-162 Intensive Japanese (FALCON)**
161, fall; 162, spring. 16 credits each term. Prerequisites: for Japanese 161, Japanese 160 or Japanese 102 at Cornell, or placement prior to beginning of fall term by FALCON staff; for Japanese 162, Japanese 161, or placement prior to beginning of spring term by FALCON program. Students must apply formally to the program (applications available from FALCON secretary, 413 Morrill Hall). Admission is open to graduate and undergraduate students from Cornell or from elsewhere, provided the applicant...
has the necessary prerequisites or is able to place into this level. Work on spoken and written Japanese from intermediate into advanced level. This is a full-time program and a full academic load; the demands of the program do not normally permit students simultaneously to take other courses. With the sequence 150–161–162 a student can, in one calendar year complete as much Japanese as would be in three or more years of part-time study in many academic programs. This course also serves to fulfill the language requirement for the MA in Asian Studies and the joint MBA/MA in Asian Studies.

**Javanese**

Fees. A small fee may be charged for photocopied texts for course work.

**JAVA 131-132 Elementary Javanese**

101, fall; 102, spring. 3 credits each term. Prerequisite: for Javanese 132, Javanese 131 or equivalent. This language series (131–132) cannot be used to satisfy the language requirement. J. Wolff and staff.

An elementary language course for those who have had no previous experience in the language.

**JAVA 133-134 Continuing Javanese**

133, fall; 134, spring. 3 credits each term. Prerequisites: for Javanese 133, Javanese 132 or equivalent; for Javanese 134, Javanese 133 or equivalent. Satisfactory completion of Javanese 134 fulfills the qualification portion of the language requirement. J. Wolff and staff.

An intermediate conversation and reading course.

**JAVA 203-204 Directed Individual Study**

203, fall; 204, spring. 3 credits. Prerequisite: Javanese 134 or equivalent. J. Wolff and staff.

This is a practical language course on an intermediate level in which the students will work through readings and conversations under the guidance of a native speaker for three contact hours a week.

**JAVA 300 Directed Studies**

Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. J. Wolff.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**Khmer (Cambodian)**

Fees. A small fee may be charged for photocopied texts for course work.

**KHMER 101-102 Elementary Khmer**

101, fall; 102, spring. 6 credits each term. Prerequisite: for Khmer 102, Khmer 101 or equivalent. Staff.

A course for beginners or for 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. 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. Prerequisites: for Khmer 203, Khmer 102; for Khmer 204, Khmer 203. Staff.

Letter writing and other forms of composition.

**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, fall; 302, spring. 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. Staff.

Various topics according to need.

**Korean**

Fees. A small fee may be charged for photocopied texts for course work.

**KOREA 101-102 Elementary Korean**

101, fall; 102, spring. 6 credits each term. Satisfactory completion of Korean 102 fulfills the qualification portion of the language requirement. H. Diffloth and staff.

Covers the 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. Prerequisite: permission of instructor. Satisfactory completion of Korean 110 fulfills the qualification portion of the language requirement. H. Diffloth 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. Prerequisites: for Korean 201, Korean 102 or permission of instructor; for Korean 202, Korean 201. Staff.

Satisfactory completion of Korean 201 fulfills the proficiency portion of the language requirement. H. Diffloth and staff.

Covers the basics of speaking, reading, and writing at the intermediate level. Introduces some reading and writing with Chinese characters.

**KOREA 209-210 Intermediate Reading**

209, fall; 210, spring. 4 credits each term. Prerequisites: for Korean 209, Korean 110 or permission of instructor; for Korean 210, Korean 209 or permission of instructor. Satisfactory completion of Korean 209 fulfills the proficiency portion of the language requirement. 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. Prerequisites: for Korean 301, Korean 202 or equivalent; for Korean 302, Korean 301 or placement by instructor. H. Diffloth and staff.

Reading of advanced texts, including newspapers and Chinese character material, together with advanced drill on the spoken language.

**Languages**

Fees. A small fee may be charged for photocopied texts for course work.

**LANG 501 Teaching Second Languages**

Fall. 3 credits. Note: this course will count as out-of-college credit for College of Arts and Sciences undergraduates. Y. Shirai, M. McCarthy and staff.

This course is designed primarily for graduate teaching assistants in the Department of Modern Languages who have no prior experience in the teaching of foreign and second languages. It is also open to others interested in language teaching methodology. The course has a general component relevant to the teaching of all second languages as well as a language-specific component tailored to the pedagogical needs of particular languages. Topics include: observing and reflecting upon the language classroom; principles and research in second-language learning; teaching grammar, pronunciation, and vocabulary; teaching reading, writing, and speaking, teaching for proficiency; discourse and language functions; materials preparation, the task-based syllabus, lesson plans; evaluation and testing, student errors and teacher feedback, portfolios, discrete point and integrative tests, learner attitude, aptitude, motivation, and individual differences; learning strategies; individual and small group activities and collaborative learning; culture in the language classroom; and the role of technology in the language classroom.

**Latin**

See listings under Classics.

**Nepali**

Study Abroad in Nepal

Cornell and the central campus of the Nepalese national university—Tribhuvan—at Kirtipur, Kathmandu, co-sponsor an academic year in Nepal. North American students study and live with Nepalese students who come from outside the Kathmandu Valley to Tribhuvan University. Students may participate in one or two semesters. Courses are offered both at Tribhuvan University and at
Juniors and seniors in good academic standing in ecology/environment, and guided field research design and Nepali language (Tibetan and/or Newari) are encouraged to participate in the study abroad in Nepal program. Students should consult with the Cornell Abroad office (474 Uris Hall) for further information.

Fees. A small fee may be charged for photocopied texts for course work.

NEPAL 101-102 Elementary Nepali
101, fall; 102, spring. 6 credits each term. Prerequisite: for Nepali 102, 101 or examination. S. Oja.

Intended for beginners. The emphasis is on basic grammar, speaking and comprehension skills, utilizing culturally appropriate materials and texts. Devanagari script for reading and writing is also introduced.

NEPAL 160 Intensive Nepali
Summer only. 10 credits. Intended for beginners. Offered alternate years. Not offered 1997-98. S. Oja.

Emphasis will be on the spoken language, in dialogues, exercises, and conversation practice. In addition, however, special attention is given to assisting students to develop vocabularies and abilities appropriate to their unique professional needs. Reading and writing practice use both colloquial and scholarly materials in the Nepali (Devanagari) script.

NEPAL 201-202 Intermediate Nepali Conversation
201, fall; 202, spring. 3 credits each term. Prerequisite: for Nepali 201, Nepali 102 or examination; for Nepali 202, Nepali 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. Prerequisite: for Nepali 203, Nepali 102 or examination; for Nepali 204, Nepali 203 or examination. S. Oja.

A systematic review of written grammar and reading comprehension, with special attention to the technical vocabularies, necessary writing skills, and published materials typical of advanced students' professional fields.

NEPAL 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. S. Oja.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

NEPAL 301-302 Advanced Nepali
301, fall; 302, spring. 3 credits each term. Prerequisite: Nepali 204 or permission of instructor. S. Oja.

Reading of advanced texts, together with advanced drill on the spoken language.

Pali
Fees. A small fee may be charged for photocopied texts for course work.

PALI 131-132 Elementary Pali
131, fall; 132, spring. 3 credits each term. This language series cannot be used to satisfy the language requirement. J. Gair.

131 is an introduction to the language of the canonical texts of Theravada Buddhism. Reading of authentic texts of Theravada Buddhism. Emphasis on both content and grammatical structure. Familiarity with Sanskrit is not required. 132 is a continuation of 131 with further readings.

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. Not offered 1997-98. Staff.

Covers all language skills: speaking, listening, comprehension, reading, and writing.

POLISH 133-134 Continuing Polish
133, fall; 134, spring. 3 credits each term. Prerequisite: for Polish 134, Polish 133 or equivalent. Polish 134 fulfills the qualification portion of the language requirement. Offered alternate years. W. Browne, E. Domisch.

An intermediate conversation and reading course.

QUECH 131-132 Elementary Quechua
131, fall; 132, spring. 3 credits each term. Prerequisite: qualification in Spanish. This language series (131-132) cannot be used to satisfy the language requirement. L. Morató-Peña.

A beginning conversation course in the Cuzco dialect of Quechua.

QUECH 133-134 Continuing Quechua
133, fall; 134, spring. 3 credits each term. Prerequisite: Quechua 133; Quechua 131-132 or equivalent; for Quechua 134; Quechua 133 or equivalent. Satisfactory completion of Quechua 134 fulfills the qualification portion of the language requirement. L. Morató-Peña.

An intermediate conversation and reading course. Study of the Huarochiri manuscript.

QUECH 135-136 Quechua Writing Lab
135, fall; 136, spring. 1 credit each term. Letter grade only. L. Morató-Peña.

Computer-assisted drill and writing instruction in elementary Quechua.

QUECH 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. L. Morató-Peña.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Polish
Fees. A small fee may be charged for photocopied texts for course work.

POLISH 304 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. L. Morató-Peña.

Letter grade only. L. Morató-Peña.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

QUECH 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. L. Morató-Peña.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Quechua
Fees. A small fee may be charged for photocopied texts for course work.

POLISH 300 Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. L. Morató-Peña.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

Romainian
Fees. A small fee may be charged for photocopied texts for course work.
Russian

For literature courses see Russian Literature.

The Russian Major

See Russian Literature.

Study Abroad

Cornell is an affiliated institution in the Council on International Education Exchange program for Russian language study in St. Petersburg and other Russian cities. Cornell students also frequently go on the American Council of Teachers of Russian program in Moscow and other Russian language programs. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from Professor Patricia Carden or Diane Williams, 236 Goldwin Smith Hall.

Honors. Students taking honors in Russian undertake individual reading and research and write an honors essay.

Freshman Writing Seminar Requirement

See Russian Literature.

Russian Studies Major

See "Special Programs and Interdisciplinary Studies," which follows the department listings.

Fees. A small fee may be charged for photocopied texts for course work.

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. L. Paperno.

RUSSA 121-122 Elementary Russian

121, fall or summer; 122, spring or summer. 4 credits each term. May be taken alone and qualification will be achieved with satisfactory completion of 121-122-123; or may be taken concurrently with 103-104 and qualification will be achieved at completion of 122-124. V. Tsimberov and staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing. An experimental section, Beginning Russian through Film, will be taught in 1997-98 in addition to the regular sections. Most of the work in the experimental section will be based on video clips from original Russian films and TV programs.

RUSSA 123 Continuing Russian

Fall. 4 credits. Limited to students who have previously studied Russian or been placed by department. Satisfactory completion of Russian 123 fulfills the qualification portion of the language requirements. V. Tsimberov, S. Paperno, L. Paperno.

A course designed to prepare students for study at the 200 level. Passing this course is equivalent to qualification. Authentic Russian materials are used: TV, books, etc.

RUSSA 203-204 Intermediate Composition and Conversation

203, fall, or summer; 204, spring or summer. 3 credits each term. Prerequisites: for Russian 203, qualification in Russian; for Russian 204, Russian 203 or equivalent. L. Paperno, S. Paperno, V. Tsimberov.

Guided conversation, composition, reading, pronunciation, and grammar review. Emphasizing the development of accurate and idiomatic expression in the language. An additional experimental section, Intermediate Russian through Film, may be taught in 1997-98, with a significant portion of the work based on clips from an original Russian feature film.

RUSSA 205-206 Reading Russian Press

205, fall; 206, spring. 2 credits each term. Prerequisite: qualification in Russian (Russian 123 or placement by department). Both semesters must be taken in order to satisfy the proficiency level for the language requirement. This course cannot be used to satisfy the humanities requirement. Staff.

Reading unabridged articles on a variety of topics from current Russian periodicals.

Note: Students placed in the 200-level courses also have the option of taking courses in introductory literature; see separate listings under Russian 201 and 202 for descriptions of these courses, any of which may be taken concurrently with the 203-204 and 205-206 language courses described above. The introductory literature courses are offered by the Department of Russian Literature, and the 203-204 and 205-206 language courses by the Department of Modern Languages. Two sections will be in Russian. Section I: Russian Press for Everyday Culture. Section II: Russian Press for Business and Politics.

RUSSA 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.

RUSSA 303-304 Advanced Composition and Conversation

303, fall; 304, spring. 4 credits each term. Prerequisites: for Russian 303, Russian 204 or equivalent; for Russian 304, Russian 303 or equivalent. L. Paperno, S. Paperno, V. Tsimberov.

Writing, reading, and conversation: viewing and reading authentic language materials; current Russian films (feature and documentary), newspapers, TV programs, and other materials are used.
An intermediate conversation and reading course.

SEBCR 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.

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**Sinhala (Sinhalese)**

**Fees.** A small fee may be charged for photocopied texts for course work.

**SINHA 101–102 Elementary Sinhala**
101, fall; 102, spring. 6 credits each term. Prerequisite: for Sinhala 102, Sinhala 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. 10 credits. Intended for beginners. Offered alternate years. Not offered 1998.

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**
Reading &
201, fall; 202, spring. 3 credits each term. Prerequisites: for Sinhala 201, Sinhala 102; for Sinhala 202, Sinhala 201 or equivalent. Staff.

**SINHA 203–204 Intermediate Composition and Conversation**
203, fall; 204, spring. 3 credits each term. Prerequisites: for Sinhala 203, Sinhala 102 or permission of instructor, for Sinhala 204, Sinhala 203 or equivalent. 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 will be arranged with instructor.

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**Spanish**

For advanced Spanish language and literature courses see Romance Studies.

**Study Abroad in Spain**
Cornell, the University of Michigan and the University of Pennsylvania cosponsor an academic year in Spain program. Students enrolled in this program spend the first four weeks before the fall semester begins in a residential college located on the campus of the University of Madrid, where they take a course in Spanish language and contemporary society and take advantage of special lectures and field trips to Madrid and Castile. This course carries three credits. In early October the program moves to Seville, where students enroll in as many regular classes at the University of Seville as their language competency and general education permit. Their academic work is supplemented by courses designed explicitly for the program by Seville faculty, as well as a seminar regularly offered by the resident director, who is chosen from the faculty of either Cornell, Michigan or Pennsylvania. The special courses normally include history of art and architecture, Spanish composition and syntax, and modern Spanish history. In Seville students live with selected families. Cornell-Michigan-Pennsylvania also maintains a center in Seville, which is used by students for special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have at least completed Spanish 204 prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. Students interested in the study abroad program should consult with the Cornell Abroad office for further information (474 Uris Hall, 255-6224).

**Fees.** Depending on the course, a small fee may be charged for photocopied texts for course work.

**Important information about registration for Spanish classes**

The Spanish Program offers a number of elementary and intermediate courses to satisfy the needs of students with a variety of backgrounds; students are urged to register for the appropriate level so as to start the semester in the right class. Students with 2 or more years in the language are required to take the placement test before taking any Spanish course.

**Background**

<table>
<thead>
<tr>
<th>Score*</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 37</td>
<td>Spanish 121</td>
</tr>
<tr>
<td>or SAT II below 70</td>
<td>Spanish 121</td>
</tr>
<tr>
<td>37–44</td>
<td>Spanish 112, 122</td>
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<tr>
<td>or SAT II 370–450</td>
<td>Spanish 123</td>
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<tr>
<td>45–55</td>
<td>Spanish 112, 122</td>
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<tr>
<td>SAT II 460–580</td>
<td>Spanish 123</td>
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<tr>
<td>56 or more</td>
<td>Spanish 200, 203, 213</td>
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<tr>
<td>or SAT II 590</td>
<td>Spanish 200, 203, 213</td>
</tr>
<tr>
<td>and above</td>
<td>Spanish 200, 203, 213</td>
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</tbody>
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*the placement score can be from an achievement test, the CPT, or the LPS.

**SPAND 101 Basic Course I**
Summer only. 6 credits. Prerequisite: no Spanish.

This course is intended for students with absolutely no experience in Spanish. (Spanish 123 and 205 are usually offered in the summer concurrently with 101 for students with prior experience.) Spanish 101 provides a thorough grounding in all language skills. Language practice in small groups. Lectures cover grammar, reading, and cultural information.

**SPAND 112 Elementary Spanish: Review and Continuation**
Fall. 4 credits. Prerequisite: LPS score 37–44, M. Rice.

This course is designed for students who have taken some Spanish and who have a placement score of 37–44 or SAT II 370–450.

It provides a basic review and then moves on to cover new material for the remainder of the term. Students who have taken Spanish 121 may enroll for this course. As part of the final exam, students take the LPS and, according to their score, may place into Spanish 123 (score below 50) or receive qualification (56 or above), and placement into the 200-level courses. Evening prelim.

**SPAND 121–122 Elementary Spanish**
121, fall; 122, spring. 4 credits each term. Prerequisite: For Spanish 122, Spanish 121.

Z. Iguina and staff.

This course is intended for students with no experience in Spanish. (Students who have previously studied 2 or more years of Spanish are not eligible for 121 unless they have an LPS score lower than 50 or SAT II lower than 376.) The course provides a thorough grounding in all language skills. Language practice in small groups. Lectures cover grammar, reading, and cultural information. Evening prelim.

**SPAND 123 Continuing Spanish**
Fall, spring, or summer. 4 credits. Prerequisite: Spanish 112, Spanish 122, or an LPS score 45–55 or SAT II 460–580.

L. Morató-Pénta, M. K. Redmond, J. Routier-Pucci, A Tio and staff.

An all-skills course designed to prepare students for study at the 200 level. Satisfactory completion of Spanish 123 fulfills the qualification portion of the language requirement. Evening prelim.

**SPAND 200 Spanish for English/Spanish Bilinguals**
Fall or spring. 3 credits. Prerequisite: LPS score 56–64, SAT II 590–680. Not available to students who have taken Spanish 123. D. Cruz de Jesús.

A course designed to expand bilingual students' knowledge of Spanish by providing them with ample opportunities to develop and improve each of the basic language skills. Not available to students who have taken Spanish 203 or 213.

**SPAND 203 Intermediate Composition and Conversation**
Fall, spring, or summer. 3 credits. Prerequisite: qualification in Spanish (Spanish 123, LPS score 56–64, or SAT II 590–680). Not available to students who have taken Spanish 213. D. Cruz de Jesús, M. Rice, J. Routier-Pucci and staff.

Convensional grammar review with special attention to the development of accurate and idiomatic oral expression. Includes readings in contemporary Spanish prose and practice in writing.

**SPAND 204 Intermediate Composition and Conversation**
Fall or spring. 3 credits. Prerequisite: Spanish 203 or permission of instructor. E. Dozier and staff.

Practice in conversation with emphasis on improving oral and written command of Spanish. Includes treatment of specific problems in grammar, expository writing, and readings in contemporary prose.

**SPAND 212 Intermediate Spanish for the Medical and Health Professions**
Fall or spring. 3 credits. Prerequisite: qualification in Spanish (Spanish 123, LPS score 56–64, or SAT II 590–680) or permission of instructor. Students who have taken Spanish 203 or 200 should speak to the instructor. A. Tio.
 Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**SPAN D 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.

**SPAN D 310 Advanced Conversation and Pronunciation**

Spring. 3 credits. Prerequisite: Spanish 204 or equivalent. Z. Iguina.

A conversation course with intensive oral practice obtained through the production of video programs. Study of the fundamental aspects of communication in the standard spoken and written Spanish, with some focus on dialectal variations. Weekly pronunciation labs.

**Swahili**

See listings under Africana Studies and Research Center.

**Swedish**

**Fees.** A small fee may be charged for photocopied texts for course work.

**SWED 121–122 Elementary Swedish**

121, fall; 122, spring. 4 credits each term. Prerequisite: for Swedish 122, Swedish 121 or equivalent. L. Tranvik.

The aim of this course is to develop skills in listening, speaking, reading and writing within Sweden’s cultural context. Interactive computer programs are used in these courses.

**SWED 123 Continuing Swedish**

Fall. 4 credits. Prerequisite: Swedish 122 or equivalent. L. Tranvik.

Developments of skills in spoken and written Swedish within Sweden’s cultural context.

**SWED 203 Intermediate Swedish**

Spring. 3 credits. Prerequisite: Swedish 123 or permission of instructor. L. Tranvik.

Intermediate to advanced level instruction utilizing audio-visual material and text to enhance language comprehension.

**SWED 204 Advanced Swedish**

Fall. 3 credits. Prerequisite: Swedish 203 or permission of instructor. Taught in Swedish. L. Tranvik.

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. Tranvik.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**TAGalog**

**Fees.** A small fee may be charged for photocopied texts for course work.

**TAG 121–122 Elementary Tagalog**

121, fall; 122, spring. 4 credits each term. Prerequisite: for Tagalog 122, Tagalog 121. J. Wolff and staff.

A thorough grounding is given in basic speaking and listening skills with an introduction to reading.

**TAG 123 Continuing Tagalog**

Fall. 4 credits. Prerequisite: Tagalog 122 or equivalent. Satisfactory completion of Tagalog 123 fulfills the proficiency portion of the language requirement. J. Wolff and staff.

Improves speaking skills, such as fluency and pronunciation, focusing on verbal communication skills; offers a wide range of readings; and sharpens listening skills.

**TAG 205–206 Intermediate Tagalog @**

205, fall; 206, spring. 3 credits each term. Prerequisites: for Tagalog 205, Tagalog 123 or equivalent; for Tagalog 206, Tagalog 205 or equivalent. Satisfactory completion of Tagalog 205 fulfills the proficiency portion of the language requirement. J. Wolff and staff.

This course develops all four skills: reading, writing, speaking, and comprehension.

**TAG 300 Directed Studies**

Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. G. Wolff.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**Tamil**

**Fees.** A small fee may be charged for photocopied texts for course work.

**[TAMIL 101–102 Elementary Tamil]**

101, fall; 102, spring. 6 credits each term. Prerequisites: for Tamil 102, Tamil 101 or equivalent. Not offered 1997–98. Staff.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

**[TAMIL 201–202 Intermediate Tamil Conversation]**

201, fall; 202, spring. 3 credits each term. Prerequisites: for Tamil 201, Tamil 102 or permission of instructor; for 202, Tamil 201 or permission of instructor. Not offered 1997–98. Staff.

Intermediate instruction in spoken grammar and verbal comprehension skills with special attention to developing technical vocabularies and other verbal skills appropriate to the students’ professional fields.

**[TAMIL 203–204 Intermediate Tamil Composition]**

203, fall; 204, spring. 3 credits each term. Prerequisites: for Tamil 203, Tamil 202 or permission of instructor; for 204, Tamil 203 or permission of instructor. Not offered 1997–98. Staff.

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.

**Thai**

**Fees.** A small fee may be charged for photocopied texts for course work.

**[THAI 101–102 Elementary Thai]**

101, fall; 102, spring. 6 credits each term. 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. Prerequisites: for Thai 201, Thai 102; for Thai 202, Thai 201 or equivalent. N. Jagacinski.

**[THAI 203–204 Intermediate Composition and Conversation]**

203, fall; 204, spring. 3 credits each term. Prerequisites: for Thai 203, Thai 102; for Thai 204, Thai 203. N. Jagacinski.

Selected readings in Thai writings in various fields.

**[THAI 300 Directed Studies]**

Fall or spring. 1–4 credits variable. Prerequisite: permission of instructor. N. Jagacinski.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor.

**[THAI 303–304 Thai Literature]**

303, fall; 304, spring. 4 credits each term. Prerequisite: Thai 302 or equivalent. N. Jagacinski.

Reading of significant novels, short stories, and poetry written since 1850.

**[THAI 401–402 Directed Individual Study]**

401, fall; 402, spring. 4 credits each term. For advanced students or students with special problems or interests. Prerequisite: permission of instructor. N. Jagacinski.

**Ukrainian**

**Fees.** A small fee may be charged for photocopied texts for course work.

**[UKRAN 131–132 Elementary Ukrainian]**

131, fall; 132, spring. 3 credits each term. Prerequisite: for Ukrainian 132, Ukrainian 131 or equivalent. This language series cannot be used to satisfy the language requirement. Not offered 1997–98. Covers all language skills: speaking, listening, comprehension, reading, and writing.

**[UKRAN 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.

**Urdu**

See listings under Hindi.

**Languages and Linguistics 459**
Vietnamese

Fees. A small fee may be charged for photocopied texts for course work.

**VIET 101-102** Elementary Vietnamese
101, fall; 102, spring. 6 credits each term. Prerequisites: for Vietnamese 101, Vietnamese 102 or equivalent. Intended for beginners or students placed by examination. Satisfactory completion of Vietnamese 102 fulfills the qualification portion of the language requirement. T. Tran Viet.

**VIET 201-202** Intermediate Vietnamese
201, fall; 202, spring. 3 credits each term. Prerequisites: for Vietnamese 201, Vietnamese 102 or equivalent. For Vietnamese 202, Vietnamese 201. T. Tran Viet.

Continuing instruction in spoken and written Vietnamese. T. Tran Viet.

**VIET 203-204** Intermediate Vietnamese Composition and Reading
203, fall; 204, spring. 3 credits each term. Prerequisite: permission of instructor only. T. Tran Viet.

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. T. Tran Viet.

**VIET 300** Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. T. Tran Viet.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor. T. Tran Viet.

**VIET 301-302** Advanced Vietnamese
301, fall or spring; 302, fall or spring. 4 credits each term. Prerequisites: for Vietnamese 301, Vietnamese 202 or permission of instructor; for Vietnamese 302, Vietnamese 301. T. Tran Viet.

Continuing instruction in spoken and written Vietnamese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose. T. Tran Viet.

**VIET 401-402** Directed Individual Study
401, fall; 402, spring. 2-4 credits variable each term. Prerequisite: permission of instructor. Intended for advanced students. T. Tran Viet.

Various topics according to need. T. Tran Viet.

Welsh

Fees. A small fee may be charged for photocopied texts for course work.

**WELSH 411** Readings in Modern Welsh
Fall. 3 credits. Prerequisite: permission of instructor. W. Harbert.

Topics are selected on the basis of student needs.

**WELSH 300** Directed Studies
Fall or spring. 1-4 credits variable. Prerequisite: permission of instructor. W. Harbert.

Taught on a specialized basis to address particular student needs. Times will be arranged with instructor. W. Harbert.

Yoruba

Fees. A small fee may be charged for photocopied texts for course work.

**[YORUB 121-122** Elementary Yoruba (also Africana Studies and Research Center 121-122)
Not offered 1997-98.

For description, see ASRC 121-122, sec. 01.

**[YORUB 123-203** Continuing Yoruba (also Africana Studies and Research Center 123-203)
Not offered 1997-98.

For description, see ASRC 123-203, sec. 01.

**Mathematics**


Mathematics is the language of modern science; basic training in the discipline is essential for those who want to understand, as well as for those who want to take part in, the important scientific developments of our time. Acquaintance with mathematics is also extremely useful for students in the social sciences who are 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, 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:

- 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; 5, 6, topology and geometry; 7, 8, probability and statistics; 9, logic; 9, other.

Midterm grades, when required, will be S or U only, except in special circumstances. In all 700-level courses, all grades will be S-U only, with the exception of 790. In courses with numbers below 700, students will receive letter grades, with the exception of non-mathematics 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. 5.

**The Major**

The mathematics major adapts to a number of purposes. It can emphasize the theoretical or the applied. It can be appropriate for professionals and nonprofessionals alike. It can be broad or narrow. Questions concerning the major should be brought to a departmental representative.

Prerequisites. The traditional prerequisites are Mathematics 221-222 or 293-294. A unit on infinite series is required. Such a unit is offered in Mathematics 112, 122, and 192. Normally students will be admitted to the major only when they have grades of B- or better in all sophomore-level mathematics courses they have taken. Alternative prerequisites are Mathematics 213, 231, normally with grades of B+ or better.

**Requirements**

There are five requirements for the major:

1) Computer Science 100. Students are urged to take this course before the end of the sophomore year.

2) Two courses in algebra. Eligible courses are Mathematics 431 or 433, 432 or 434 or 332, 336.

3) Two courses in analysis. Eligible courses are Mathematics 321, 411 or 413, 414, 418, 420, 422, 423, 427, 428.

4) Further high-level mathematical courses. Any one of the following is sufficient:
   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 310 or above.
EDUC 115**
junior year.
director during the second semester of their
major advisers and the Mathematics major
Thesis, and present it orally to the department.
usually will be expected to write a Senior
To be considered for high honors, a student
honors should consult their major advisers
particularly in challenging courses at the
excellent performance in mathematics courses,
or independent study at a high performance
Honors Seminar (Math 401) for one semester,
requirement for honors is participation in the
graduating mathematics majors who have
cum laude and summa cum laude) to
honors (cum laude) and high honors (magna
Requirements 4).
what is stated here, particularly in respect to
high honors should consult their major advisers
before July 1, 1994 are slightly different from
requirements for Mathematics majors declared
Mathematics with serious mathematical
models. Any course from outside
mathematics after EDUC 115 may take MATH
105 or if they need more calculus, MATH 111.

5) One course dealing with mathematical
models. Any course from outside
mathematics with serious mathematical content and dealing with scientific
matters, provided the course has not been used toward satisfying the previous
requirement, e.g., Physics 208, 213, or 217 (but not 112 or 207), or Computer Science
211 (if Computer Science option not used above). Students may consider courses
from biology, chemistry, economics, and
other fields; they should consult their
adviser.
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 of an advisee, provided the
intent of the requirements is met. The
requirements for Mathematics majors declared
before July 1, 1994 are slightly different from
what is stated here, particularly in respect to
Requirement 4).

Honors Program
The Department of Mathematics awards
honors (cum laude) and high honors (magna
laude and summa cum laude) to
graduating mathematics majors who have
demonstrated outstanding ability in the major
program.
The awards are determined by the Mathemati-
cs Major Committee in the latter part of the
semester prior to graduation. Normally, one
requirement for honors is participation in the
Honors Seminar (Math 401) for one semester,
or independent study at a high performance
level. The committee will also be looking for
excellent performance in mathematics courses, particularly in challenging courses at the
400-level or beyond. Students interested in
honors should consult their major advisers
concerning suitable courses.
To be considered for high honors, a student
usually will be expected to write a Senior
Thesis, and present it orally to the department.
This project is carried out during the senior
year under the supervision of a member of the
Mathematics department faculty. Students
interested in high honors should consult their
major advisers and the Mathematics major
director during the second semester of their
junior year.

Teacher Education in Science and
Mathematics (TESM)
Students at Cornell may pursue teaching
credentials in biology, chemistry, earth
science, general science, mathematics, and
physics. TESM is a university program jointly
conducted by the Departments of Education
and Mathematics. Although TESM offers
options for undergraduate and graduate study,
most 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 who complete their
undergraduate studies and their student
teaching are eligible for provisional teaching
certification from the State Education
Department, effective for five years. Students
completing the graduate program can earn the
master's degree required for permanent
certification.
For more information, contact the TESM
Student Support Specialist at 255-9255 or the
program coordinator, D. Trumbull (Education)
255–3108 or, in Mathematics, A. Solomon
255–3894.

Distribution Requirement

Virtually all mathematics courses can be used
to satisfy the Quantitative and Formal
Reasoning part of the Distribution Require-
ments. Explicit exceptions are noted in the
beginning of the Arts and Sciences section of
the Courses of Study.

Basic Sequences

Precalculus

Course Description Course Numbers

1) Algebra and trigonometry to prepare students for calculus MATH 109* or EDUC 005*
2) Algebra, analytic geometry, elements of calculus EDUC 115**

**Students who want a second semester of mathematics after EDUC 115 may take MATH 105 or if they need more calculus, MATH 111.

Calculus

Course Description Course Numbers

1) Standard three-semester sequence for students who do not expect to take advanced courses in mathematics MATH 191–193–224
2) Calculus for engineers (also taken by some physical science majors) 293–294
3) Prospective mathematics majors and others who expect to take advanced courses in mathematics: many sequences are possible. For example, 111–112–221–222; or 121–122–221–222; or the engineering sequence 191(193)–192–293–294; or a mix of the above. There is no specifically "approved" basic sequence for mathematics majors. Students should consult with their advisers for each individual case.

Mathematics 191 or 193 may be substituted for 111 in sequences 1 and 3. Sequences 2 and 3 are two-year sequences that include some linear algebra.

Students who take sequence 1 may learn some linear algebra by taking Mathematics 231. A student whose performance in 112 is exceptional may switch to sequence 3 and take 221.

Special-Purpose Sequences

Mathematics Course Numbers

1) Finite mathematics and calculus for biology majors 105–106
2) Other possible finite mathematics and calculus sequence 105–111

Students who want to take two semesters of calculus are advised to take the first two
semesters of one of the three calculus sequences. It is also possible to follow
Mathematics 106 with 112 or 122.

Switching between calculus sequences is often difficult, especially at the 200 level. Students
should not attempt such a switch without consulting the associate chair.

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, 191, 193
112, 122, 192
213, 222, 224, 293
221, 223, 231, 294
321 and 432
336 and 436
321 and 420

Fees

In some courses there may be a small fee for computer lab use or for photocopying
materials to be handed out to students.

Undergraduate Course Offerings

Foundation courses: 105, 106, 109, 111, 112,
121, 122, 123, 191, 192, 193, 213, 221, 222,
223, 224, 293, 294

Mathematics Education: 405, 408, 451

History of Mathematics: 101, 403

General and Liberal Arts Courses: 103, 150,
171, 181, 401, 405, 408, 490

Analysis: 411, 413, 414, 418

Algebra and Number Theory: 231, 332, 336,
431, 432, 433, 434, 436

Combinatorics: 441, 442

Geometry and Topology: 150, 356, 451, 452,
453, 454, 455

Probability and Statistics: 171, 471, 472, 474

Mathematical Logic: 181, 481, 482, 483, 486

MATH 101 History of Mathematics
- Summer. 4 credits. Prerequisite: three years of high school mathematics.
- The history of the main ideas of mathematics from Babylonian, Egyptian, and Greek times to the present day.

MATH 103 Mathematical Explorations
- Fall, spring, or summer. 3 credits. This course may be used to satisfy the distribution requirement in mathematics.
- This course is for students who wish to experience how mathematical ideas naturally evolve.
- The homework will consist of writing assignments.
- Topics will vary depending on the instructor. Some assessment will be done through writing assignments.

MATH 105 Finite Mathematics for Biologists
- Fall or summer. 3 credits. Prerequisite: three years of high school mathematics, including trigonometry and logarithms.
- Probability (with some applications to genetics), Markov chains.
- Examples from biology are used.

MATH 106 Calculus for Biologists
- Spring or summer. 3 credits. Prerequisite: Mathematics 105 or 109 or EDUC 115 or permission of instructor. (A strong background in functions is required.)
- Mathematics 111, rather than 106, is recommended for those planning to take 112.*
- Introduction to differential and integral calculus, partial derivatives, elementary differential equations.
- Examples from biology are used.

MATH 109 Precalculus Mathematics
- Summer. 3 credits. Prerequisite: three years of high school mathematics, including trigonometry and logarithms.
- The course will emphasize ideas and imagination as opposed to techniques and calculations.

MATH 111 Calculus
- Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 109 or three years of high school mathematics, including trigonometry.*
- 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, applications to the sciences.
- The mean value theorem. Antiderivatives, definite and indefinite integrals, the fundamental theorem of calculus, substitution in integration, the area under a curve. Graphing calculators will be used, and their pitfalls will be discussed, as applicable to the above topics.

MATH 112 Calculus
- Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 106 or 111 with a grade of C or better. Those who do well in Mathematics 111 should take 122 instead of 112, unless they plan to continue with 213.*
- 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). Infinite sequences and series; definition and tests for convergence, power series, Taylor series with remainder.
- Parametric equations.

MATH 121 Honors Calculus
- Fall. 4 credits. Prerequisite: Three years of high school mathematics, including calculus or permission of the department.
- This is a first-semester honors course in calculus intended for students who have had calculus in high school. The course material will be the same as that in Mathematics 111, but it will be covered in greater depth.

MATH 122 Honors Calculus
- Fall or spring. 4 credits. Prerequisite: one semester of calculus with a high performance or permission of the department.
- Students planning to continue with Mathematics 213 are advised to take 112 instead of this course.*
- Differentiation and integration of elementary transcendental functions, the techniques of integration, applications, polar coordinates, infinite series, and complex numbers, as well as an introduction to proving theorems. The approach is more theoretical than in Mathematics 112.

MATH 123 Analytic Geometry and Calculus
- Summer. 4 credits. Prerequisite: High school mathematics through trigonometry and plane analytic geometry.
- The honors section of Mathematics 111. Covers the same topics more deeply (at the level of Apostol's Calculus).

MATH 150 From Space to Geometry
- Spring. 3 credits.
- The course is restricted to engineering students who have no previous successful experience with calculus. Students who have had such experience but wish a first-semester calculus course should take MATH 193.

MATH 181 Elementary Logic and Formal Proof
- Fall. 3 credits. Prerequisite: high school mathematics.
- The course will explore, from an elementary viewpoint, several topics selected by the instructor from the following list: sets and relations, mathematical induction, cardinal numbers and the notion of infinity, formal and informal proofs and their roles in mathematics and computer science, introduction to mathematical logic, applications of formal logic to world problems and puzzles. The course is designed for liberal arts students, including those who may be "math-averse." Rather than providing a systematic treatment of formal logic, it attempts to instill an appreciation for mathematics and its uses, as well as some understanding of the process by which intuitive notions are developed into precise mathematical statements.

MATH 191 Calculus for Engineers
- Fall. 4 credits. Prerequisite: three years of high school mathematics, including trigonometry.*
- Plane analytic geometry, differential and integral calculus, and applications. This course is restricted to engineering students who have had no previous successful experience with calculus. Students who have had such experience but wish a first-semester calculus course should take MATH 193.

MATH 192 Calculus for Engineers
- Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 191 or 193.*
- Methods of integration, polar coordinates,
complex numbers, infinite series. Introduction to physical vectors and calculus of functions of several variables.

MATH 193 Calculus for Engineers
Fall, spring, or summer. 4 credits. Prerequisite: three years of high school mathematics including trigonometry, plus some knowledge of calculus.*
Plane analytic geometry, differential and integral calculus, and applications. Mathematics 193 covers essentially the same topics as 191, but is designed for students with some previous successful experience with calculus.

MATH 213 Calculus
Fall or spring. 4 credits. Prerequisite: Mathematics 112, 122, or 192.*
Vectors, vector-valued functions, line integrals. Multivariable calculus, multiple integrals. First- and second-order differential equations with applications. Introduction to numerical methods, series solutions, systems of differential equations, elementary partial differential equations. The 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.

MATH 221 Linear Algebra and Calculus
Fall, spring, or summer. 4 credits. Prerequisite: two semesters of calculus with a grade of B or better, or permission of instructor.*
Linear algebra and differential equations. Topics include vector algebra, linear transformations, matrices, and differential equations, as well as an introduction to proving theorems. This course is especially recommended for students who plan to major in mathematics or in a strongly mathematics-related field.

MATH 222 Calculus
Fall or spring. 4 credits. Prerequisite: Mathematics 221.*
Vector differential calculus, calculus of functions of several variables, multiple integrals. This course is especially recommended for students who plan to major in mathematics or in a strongly mathematics-related field.

MATH 223 Honors Linear Algebra and Calculus
Fall. 4 credits. Prerequisites: Two semesters of calculus with a grade of A- or better, or permission of instructor.*
Vectors, matrices and linear transformations; differential calculus of functions of several variables; inverse and implicit function theorems; quadratic forms, extrema, and manifolds; multiple and iterated integrals. Mathematics 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.

MATH 224 Honors Linear Algebra and Calculus
Spring. 4 credits. Prerequisites: Mathematics 223.*
Vector fields; line integrals; differential forms and exterior derivative; work, flux, and density forms; integration of forms over parametrized domains; Green's, Stoke's, and divergence theorems.

*See the list of courses with overlapping content at the end of the introduction.

MATH 231 Linear Algebra
Spring. 3 credits. Prerequisite: Mathematics 111 or equivalent.*
Vectors, matrices, and linear transformations, affine and Euclidean spaces, transformation of matrices, and eigenvalues.

MATH 281 Formal Logic (also Philosophy 331)
Fall. 4 credits.
For description, see PHIL 331.

MATH 293 Engineering Mathematics
Fall, spring, or summer. 4 credits. Prerequisites: Mathematics 192 plus a knowledge of computer programming equivalent to that taught in Computer Science 100.*

MATH 294 Engineering Mathematics
Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 293.*

MATH 321 Applicable Analysis
Fall. 4 credits. Prerequisites: Mathematics 294, or 221 and 222, or 213 and 231.
Graduate students who need mathematics extensively in their work and who have had solid courses in calculus and complex variables should take Mathematics 615-616. With less preparation they should take Mathematics 420 (or 521-422-423).*
(This course was formerly MATH 421 and has a substantial overlap with MATH 420.)
A survey of some of the mathematical techniques that are of primary use in applications to the physical sciences and engineering. The primary mathematical tool explored in harmonic analysis, including Fourier Series, Fourier Integral, Laplace Transform. The applications will be principally to boundary value problems for ordinary and partial differential equations. Moderately advanced mathematical ideas will be used but explained as the course progresses at an elementary level. Much of the formal mathematical material missing in applied courses (e.g., uniform convergence, dominated convergence, complete orthonormal sets) will be thoroughly explained in the course and at the working level.

MATH 332 Algebra and Number Theory
Fall. 4 credits. Prerequisites: Mathematics 221, 231, or 294.*
Various topics from number theory and modern algebra, usually including most of the following: Primes and factorization, Diophantine equations, congruences, quadratic reciprocity, continued fractions, rings and fields, finite groups, introduction to 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
Spring. 4 credits. Prerequisites: Mathematics 293-294, or 221, 222, or Mathematics 293-294.
An introduction to concepts and methods of abstract algebra and number theory that are of importance in science and engineering. Applications of the theory to concrete problems will be stressed. The course treats mathematical topics usually selected from the following list: Elementary number theory and congruences, groups, fields, partially ordered sets, lattices, graph theory, Boolean algebras, finite machines and languages. Applications discussed usually include at least some of the following: Cryptography, primality testing, elementary coding theory, enumeration problems, fast Fourier transform, difference equations. Additional topics and applications may be chosen by the instructor.

MATH 356 Groups and Geometry
Spring. 4 credits. Prerequisites: Mathematics 291-292, or Mathematics 293-294.
Groups were introduced in the nineteenth century as the set of symmetries of an algebraic or geometric object, and this viewpoint is a central one in modern mathematics. This course studies Euclidean and non-Euclidean (especially hyperbolic) geometry in terms of the groups of symmetries of the relevant spaces. Prior knowledge of groups is not a prerequisite. One aim is to give students experience in modern algebra and geometry (including the geometry of complex numbers) and a sense of the unity of mathematics before they take the 400-level courses. Special care is taken in learning to write proofs. Groups of transformations. Subgroups and cosets. Homomorphisms and isomorphisms. Orbit-stabilizer theorem. Friere groups and wallpaper groups and associated tessellations of the Euclidean plane. Geometry and trigonometry of the hyperbolic plane. Tessellations of the hyperbolic plane.

MATH 401 Honors Seminar: Topics in Modern Mathematics
Spring. 4 credits.
This course is a participatory seminar primarily aimed at introducing senior and junior mathematics majors to some of the challenging problems and areas of modem mathematics. The seminar will help 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 will vary from year to year.

MATH 403 History of Mathematics
Spring. 4 credits.
Prerequisites: Two courses in mathematics above 300, or permission of instructor.
Survey of the development of mathematics from antiquity to the present, with an emphasis on the achievements, problems, and mathematical viewpoints of each historical period and the evolution of such basic concepts as number, geometry, construction, and proof. Readings from original sources in translation. Students will be required to give oral and written reports.

*See the list of courses with overlapping content at the end of the introduction.
MATH 405 Mathematical Exposition
Fall. 3 credits. A seminar in mathematics and its applications to other fields. Students are asked to have had at least two years of college-level mathematics. Course work will consist of discussions, written projects, and student talks. The content of these discussions, projects, and talks will vary, to be determined by the instructor in consultation with the students.

MATH 408 Mathematics in Perspective
Spring. 4 credits. Prerequisite: consent of instructor (intended for senior mathematics majors and other students with strong mathematics backgrounds). The purpose of this course is for students to step back and to form an overview of the mathematics they have learned.

MATH 411 Introduction to Analysis
Fall. 4 credits. Prerequisite: Mathematics 222 or 295-294. Students who need to measure their Lebesgue integration for advanced probability courses should take Mathematics 413-414 or audit the first few weeks of Mathematics 621. Undergraduates who plan to attend graduate school in mathematics should take 413-414.

MATH 413-414 Introduction to Analysis
413, fall; 414, spring. 4 credits each. Prerequisite for 413: Mathematics 222 or 293-294. Prerequisite for Mathematics 414: Mathematics 413. This sequence, designed for honors students, provides an introduction to the theory of functions of real variables, stressing concepts and a logical development of the subject rather than applications. Topics include Euclidean spaces, the real number system, continuous and differentiable functions, uniform convergence and approximation theorems, and the Riemann integral. Students who wish to continue study of theoretical analysis upon completion of Mathematics 411 may take, for example, Mathematics 418.

MATH 418 Introduction to the Theory of Functions of One Complex Variable
Spring. 4 credits. Prerequisite: Mathematics 222 or 294 or 213. May be offered only in alternate years. A rigorous introduction to complex variable theory. 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.

MATH 420 Applicable Analysis
Fall or spring. 4 credits. Prerequisites: high level of performance in Mathematics 294; or 221 and 222; or permission of instructor. Graduate students who need mathematics extensively in their work and who have had solid courses in calculus and complex variables should take Mathematics 615-616. With less preparation they should take Mathematics 420 or 321-422-423.* Ordinary differential equations in one and higher dimensions: qualitative, analytic, and numerical methods, with physical applications. Some important partial differential equations (heat equation, wave equation, and vibrating membrane) and their connections with Fourier series and the Laplacian. Vector calculus and Stokes Theorem, with applications to electromagnetics. Mathematics 420 has substantial overlapping content with Mathematics 321, but more strongly emphasizes the mathematical properties of solutions of ordinary differential equations and the approximation to such solutions by numerical and computer methods.

MATH 422 Applicable Analysis
Fall or spring. 4 credits. Prerequisite: Mathematics 420 or 521. Complex variables, Fourier transforms, Laplace transforms. Additional topics may include: An introduction to generalized functions. Applications to partial differential equations.

MATH 423 Applicable Analysis

MATH 425 Numerical Solutions of Differential Equations
Spring. 4 credits. Prerequisites: Mathematics 222 or 294, one course numbered 300 or higher in mathematics, or permission of instructor. Not offered 1997-98. Expected to be offered 1998-99. Methods and basic theory for the numerical solution of ordinary differential equations. Linear multistep methods, Runge-Kutta methods, and the problem of stiffness for ordinary differential equations. Finite difference methods and Galerkin finite element methods for partial differential equations. Homework will involve use of a computer.

MATH 427 Introduction to Ordinary Differential Equations
Fall. 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor. 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
Spring. 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor. Topics selected from first-order quasilinear equations, classification of second-order equations, maximum principles, existence, uniqueness, stability, Fourier series methods, approximation methods.

MATH 431-432 Introduction to Algebra
431, fall; 432, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Prerequisite for Mathematics 432: Mathematics 431 or 433. Undergraduates who plan to attend graduate school in mathematics should take 433-434.* An introduction to linear algebra, including the study of vector spaces, linear transformations, matrices, and systems of linear equations; quadratic forms and inner product spaces; canonical forms for various classes of matrices and linear transformations; determinants. 431: an introduction to various topics in abstract algebra, including groups, rings, fields, factorization of polynomials and integers, congruences, and the structure of finitely generated modules over Euclidean domains with application to canonical forms of matrices.

MATH 433-434 Introduction to Algebra
433, fall; 434, spring. 4 credits each. Prerequisite: Mathematics 221 or 231. Prerequisite for Mathematics 434: Mathematics 433. Honors version of Mathematics 431-432. Mathematics 433-434 will be more theoretical and rigorous than 431-432 and will include additional material such as multilinear and exterior algebra.

MATH 436 Applications of Abstract Algebra
Fall. 4 credits. Prerequisites: Linear algebra (MATH 231 or higher). Familiarity with elementary algebra or number theory such as MATH 352 would also be helpful.* The course is intended for students who would like to learn modern algebra and its applications outside of mathematics. There will be at least as much emphasis on applications as the relevant modern algebra. Frequently, the applications involve or were made possible by the advent of computers. Students who already know the modern algebra covered in the course may still find the applications to be of interest. Specific topics will be chosen by the instructor. The algebra typically includes items drawn from elementary number theory, polynomials and ring theory, monoids and group theory, real closed fields, algebraic combinatorics, Groebner bases, and other algebraic field theory. The applications and related topics typically include items drawn from: complexity theory, coding theory, encryption, discrete and fast Fourier transform, primality testing, factoring integers and polynomials, root counting and isolation, solving systems of polynomial equations, formal language theory and automata.

MATH 336 and 436 may overlap in choice of material. Where they overlap, the coverage in MATH 436 will be of greater depth appropriate to a 400-level course. Students cannot get credit for both MATH 336 and MATH 436.

MATH 441 Introduction to Combinatorics
Fall. 4 credits. Prerequisites: Mathematics 221, 231, or 294. Enumerative Combinatorics: Permutation enumeration, Stirling and Bell numbers, generating functions, exponential formula, Lagrange inversion, basic and asymptotic methods, rational generating functions. Basic Graph Theory: Trees and Cayley's theorem, chromatic polynomial.

*See the list of courses with overlapping content at the end of the introduction.

MATH 442 Introduction to Combinatorics

MATH 451 Euclidean and Spherical Geometry
Fall. 4 credits. Prerequisite: Mathematics 221 or 231 or permission of instructor. Topics from Euclidean and spherical (non-Euclidean) geometry. A non-lecture, seminar-style course organized around student participation.

MATH 452 Classical Geometries
Spring. 4 credits. Prerequisites: Mathematics 221 or its equivalent. This is an introduction to hyperbolic, spherical, and projective geometry—the classical geometries that developed as Euclidean geometry was better understood. For example, the historical problem of the independence of Euclid's fifth postulate is understood when the existence of the hyperbolic plane is realized. Straightedge (and compass) constructions and stereographic projection in Euclidean geometry can be understood within the structure of projective geometry. Topics in hyperbolic geometry include models of the hyperbolic plane and relations to spherical geometry. Topics in projective geometry include homogeneous coordinates and the classical theorems about conics and configurations of points and lines. Optional topics include principles of perspective drawing, finite projective planes, orthogonal Latin squares, and the cross ratio.

MATH 453 Introduction to Topology
Fall. 4 credits. Prerequisites: Mathematics 411 and 221, or permission of instructor. Basic point set topology, connectedness, compactness, metric spaces, fundamental groups. Application of these concepts to surfaces such as the torus, the Klein bottle, the Moebius band.

MATH 454 Introduction to Differential Geometry
Spring. 4 credits. Prerequisites: Mathematics 222 or 294, plus at least one mathematics course numbered 300 or above. Mathematics 453 is not a prerequisite. Differential geometry of curves and surfaces. Curvature, geodesics, differential forms. Introduction to two-dimensional Riemannian manifolds. This material provides some background for the study of general relativity; connections with the latter will be indicated.

MATH 455 Applicable Geometry
Fall. 4 credits. Prerequisite: Mathematics 221-222 or equivalent, or permission of instructor. In general, this course will cover various applicable topics to be chosen from among the geometry of convex bodies, polyhedra, algebraic curves and surfaces, rigid polyhedra, crystallographic patterns, projections and similar topics. Computational aspects of geometry will be included where appropriate.

MATH 471 Basic Probability
Fall. 4 credits. Prerequisite: Mathematics 221. May be used as a terminal course in basic probability. Intended primarily for those who will continue with Mathematics 472. Topics include combinations, important probability laws, expectations, moments, moment-generating functions, limit theorems. Emphasis is on diverse applications and on development of use in statistical applications. See also the description of Mathematics 671.

MATH 472 Statistics
Spring. 4 credits. Prerequisite: Mathematics 471 and knowledge of linear algebra such as taught in Mathematics 221. Some knowledge of multivariate calculus helpful but not necessary.* Classical and recently developed statistical procedures are presented in a framework that emphasizes the basic principles of statistical inference and the rationale underlying the choice of these procedures in various settings. These settings include problems of estimation, hypothesis testing, large sample theory.

MATH 474 Basic Stochastic Processes
Spring. 4 credits. Prerequisites: Mathematics 471 or equivalent and knowledge of linear algebra such as taught in Mathematics 221. This is a second-semester undergraduate course on probability. It covers topics from renewal theory, martingales, discrete and continuous time Markov chains, Brownian motion and related diffusion processes, and applications to queuing theory and finance. Theoretical as well as applied aspects of the subject will be emphasized.

MATH 481 Deductive Logic (also Philosophy 442)

MATH 482 Topics in Logic (also Philosophy 432)
Spring. 4 credits. Prerequisites: One logic course from the Mathematics Department at the 200 level or higher, one logic course from the Philosophy Department at the 300 level or higher, or permission of the instructor. For description, see PHIL 432.

MATH 483 Intensional Logic (also Philosophy 436)
Fall. 4 credits. Prerequisites: One logic course at the 200 level or higher from the Philosophy Department or the Mathematics Department, or permission of instructor. For description, see PHIL 436.

*MAY 486 Applied Logic (also Computer Science 486)
Spring. 4 credits. Prerequisites: Mathematics 222 or 294; Computer Science 280 or equivalent (such as Mathematics 532, 432, 434, or 481); and some additional course in mathematics or theoretical computer science. Propositional and predicate logic; compactness and completeness by tableaux, natural deduction, and resolution. Equational logic. Herbrand Universes and unification. Rewrite rules and equational logic. Knuth-Bendix method and the congruence-closure algorithm and lambda-calculus reduction strategies. Topics in Prolog, LISP, ML, or Nuprl. Applications to expert systems and program verification.

MATH 490 Supervised Reading and Research
Fall, spring, or summer. 1–6 credits. Supervised reading and research by arrangement with individual professors. Not applicable for material currently available in regularly scheduled courses.

Professional Level and Mathematics Education Courses
MATH 500 College Teaching
Fall. 1 credit. 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 508 Mathematics for Secondary School Teachers
Spring. 1–6 credits. Prerequisites: secondary school mathematics teacher, graduate standing, or permission of instructor. An examination of the principles underlying the content of the secondary school mathematics curriculum, including connections with the history of mathematics and current mathematics research.

Graduate Courses
Graduate-level mathematics courses (formerly 500 and 600 level) have been renumbered to conform to university guidelines regarding course level numbers. p. 5. The level numbers (first digit of the course number) have been raised by one, effective in the fall of 1997. Course content and level of difficulty remain unchanged. Students interested in taking graduate courses in mathematics should consult the department for further details, times, and possible changes in courses as described below.

MATH 611–612 Real and Complex Analysis
611, fall; 612, spring. 4 credits each. 611: measure and integration, functional analysis. 612: complex analysis, Fourier analysis, and distribution theory.

MATH 613–614 Topics in Analysis
613, fall; 614, spring. 4 credits each.

MATH 615–[616] Mathematical Methods In Physics
615, fall; 616, spring. 4 credits each. 616 not offered 1997–98. Expected to be offered 1998–99. Intended for graduate students in physics or related fields who...
have had a strong advanced calculus course and at least two 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 will be assumed. The course overlaps with parts of Mathematics 420 (or 521)-422-425. Undergraduates will be admitted only with permission of instructor. Mathematics 615 is a prerequisite for 616.

Topics designed to give a working knowledge of the principal mathematical methods used in advanced physics. A brief discussion of some basic notions: metric space, vector space, linearity, continuity, integration. Generalized functions (Schwartz distributions). Fourier series and Fourier integrals. Saddle point method. Linear operators. Differential operators and integral operators, the equations and eigenvalue problems connected with them and the special functions arising from them. Elements of group theory. The rotation group and its representations.

MATH 617 Dynamical Systems
Fall. 4 credits.

MATH 618 Smooth Ergodic Theory
Spring. 4 credits.

MATH 619-620 Partial Differential Equations

MATH 621 Measure Theory and Lebesgue Integration
Fall. 4 credits.
Measure theory, integration, and Lp spaces.

MATH 622 Applied Functional Analysis
Spring. 4 credits.
Basic theory of Hilbert and Banach spaces and operations on them. Applications.

MATH 631-632-634 Algebra
631, fall; 632, spring; 634, spring. 4 credits each. Not offered 1997-98. Expected to be offered 1998-99. Topics: finite groups, field extensions, Galois theory, rings and algebras, tensor and exterior algebra. 632: Wedderburn structure theorem, Brauer group, group cohomology. 634: Dedekind domains, primary decomposition, Hilbert basis theorem, local rings.

MATH 637 Analytic Number Theory

MATH 649 Lie Algebras

MATH 650 Lie Groups
Spring. 4 credits.

MATH 651 Introductory Algebraic Topology
Spring. 4 credits.
Fundamental group and covering spaces. Homology theories for complexes and spaces.

MATH 652 Lie Groups
Spring. 4 credits.
Differentiable Manifolds
652, fall, 653, spring. 4 credits each. Prerequisites: advanced calculus, linear algebra (Mathematics 431), point set topology (Mathematics 451). Not offered 1997-98. Expected to be offered 1998-99. This is an introduction to differential geometry and differential topology at the level of the beginning graduate student.


MATH 661 Geometric Topology
Fall. 4 credits.

MATH 662 Riemannian Geometry
Spring. 4 credits.
Linear connections, Riemannian metrics and parallel translation. Covariant differentiation and curvature tensors. The exponential map, the Gauss Lemma and completeness of the metric. Isometries and space forms, the space forms, the Gauss Lemma and completeness of the metric. Isometries and space forms, the space forms. Sjafrid theme. The exponential map, the Gauss Lemma and completeness of the metric. Isometries and space forms, the space forms. Sjafrid theme. The exponential map, the Gauss Lemma and completeness of the metric. Isometries and space forms, the space forms. Sjafrid theme. The exponential map, the Gauss Lemma and completeness of the metric. Isometries and space forms, the space forms. Sjafrid theme. The exponential map, the Gauss Lemma and completeness of the metric. Isometries and space forms, the space forms.
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 Algorithmic Number Theory
Fall. 4 credits.

MATH 739 Topics in Algebra II
Spring. 4 credits.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

[MATH 740 Homological Algebra
Spring. 4 credits. Not offered 1997-98. Expected to be offered 1998-99.]

MATH 751-752 Seminar in Topology
751, fall; 752, spring. 4 credits each.

MATH 753-754 Algebraic Topology
753, fall; 754, spring. 4 credits. 754 not offered 1997-98. Expected to be offered 1998-99. The continuation of 651. Cohomology, cup products, Poincare duality, higher homotopy groups, fibrations, vector bundles, characteristic classes, K-theory, spectral sequences, cohomology operations.

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.

[MATH 767 Algebraic Geometry
Fall. 4 credits. Not offered 1997-98. Expected to be offered 1998-99.]

MATH 771-772 Seminar in Probability and Statistics
771, fall; 772, spring. 4 credits each.

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. Not offered 1997-98. Expected to be offered 1998-99.]

MATH 784 Recursion Theory
Spring. 4 credits.

MATH 785 Automata Theory
Fall. 4 credits. Prerequisite: Mathematics 481 or similar mathematical logic course at 400-level or higher. Basic results in finite and tree automata, including the algebraic approach to these topics. Pushi automata, with applications to computability theory and decidability problems. Rabin automata and their applications to decidability problems, boolean algebras, linear orderings, topology. Applications of automata theory to theoretical computer science in modal and temporal logic and concurrency.

[MATH 786 Proof Theory
Fall. 4 credits. Not offered 1997-98. Expected to be offered 1998-99. This course will cover basic ideas and methods of proof theory along with major recent developments motivated by computer science and knowledge presentation theory. The topics will include Gentzen style and "natural" derivations, normalization theorems for classical and constructive logics, connections with the typed lambda calculus, Curry-Howard isomorphism, and realizability of proof theory, incompleteness theorems, Lob's theorem, modal logic of formal provability, models of arithmetic, consistency proofs and normalization theorems in typed lambda calculus.

[MATH 787 Set Theory

MATH 788 Topics in Applied Logic
Fall. 4 credits. 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), non-standard analysis. The student is expected to be familiar with the standard results in graduate level mathematical logic.

MATH 790 Supervised Reading and Research
Variable credit (maximum 6 each term).

MATH 901-902 Oliver Club Seminar
Fall. 4 credits.

MATH 903-904 Olivetti Club Seminar
Fall. 4 credits.

MATH 905-906 Occasional Seminar on Undergraduate Education
Fall. 4 credits.

MATH 911-912 Seminar in Analysis
Fall. 4 credits. The student is expected to be familiar with the standard results in standard analysis. The student is expected to be familiar with the standard results in standard analysis.

MATH 912-914 Seminar in Dynamics and Geometry
Fall. 4 credits.

MATH 949-950 Seminar in Lie Groups
Fall. 4 credits.

MATH 951-952 Topics in Topology and Geometry
Fall. 4 credits.

MATH 967-968 Seminar in Combinatorial and Algebraic Geometry
Fall. 4 credits.

MUSIC

MUSIC 467

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
Cornell Chamber Singers
Cornell Choirale
Cornell University Chorus
Cornell University Glee Club
Sage Chapel Choir

Instrumental ensembles
Chamber Music Ensembles
Cornell Chamber Orchestra
Cornell Experimental Lab Ensemble
Cornell Gamelan
Cornell Jazz Ensembles
Cornell Symphony Orchestra
Cornell University Chamber Winds
Cornell University Symphonic Band
Cornell University Wind Ensemble
Cornell University Wind Symphony

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, 104 Lincoln Hall (255-4097). The Department of Music and the Faculty Committee on Music sponsor more than one hundred formal and informal concerts each year by Cornell's ensembles, faculty, and students and by distinguished visiting artists. The great majority of concerts are free and open to the public. Lectures and concerts are listed on the World Wide Web (http://www.arts.cornell.edu/music/).

More 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 apply to the department office, 104 Lincoln Hall (255-4097), or to the director of undergraduate studies.

THE MAJOR
Two options are available to the student planning to major in music. Each carries the study of music to an advanced level through the integration of performance, music theory, and music history. Option I is a more general course, not necessarily oriented toward eventual graduate or professional work in music. Option II is a more specialized and concentrated program, suitable for students who want to prepare for graduate or professional work in music.
All students contemplating a major in music under either option should arrange for placement examinations and advising in the department as early as possible, usually during the freshman orientation period. Information is available from the director of undergraduate studies. All students are expected to have chosen an adviser from among the department faculty at the time of application for major status.

**Option I** presupposes some musical background before entering Cornell. Prerequisites for admission into the Option II program are the 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. For further information, apply to the director of undergraduate studies.

The requirements for the Bachelor of Arts degree with a major in music under Option I comprise the following:

1. in music theory: Music 251, 252, 253, 254, 351, 353, and one of the following: Music 451, 452, 453, 454, 455, 456.
2. in music credit courses numbered 381 or above listed under Music History Courses for Majors. At least three of these courses must be drawn from the four-course sequence Music 381–384.
3. in performance: four semesters of participation in a musical organization or ensemble sponsored by the Department of Music (Music 331 through 346 and 421 through 446).

**Option II** presupposes considerable musical study before entering Cornell. Prerequisites for admission into the Option II program are previous acceptance as an Option I major and satisfactory completion of Music 252 and 254, normally by the end of the sophomore year. Students must apply to the department for formal acceptance as an Option II major. An Option II major concentrates in one of the three areas listed below. For Option II in performance, exceptional promise must be demonstrated, in part by a successful solo recital before the end of the sophomore year.

The requirements for the Bachelor of Arts degree with a major in music under Option II are:

1. completion of all the requirements for Option I, except as noted below, and
2. in addition:
   a) in performance:
      1) the requirement for four semesters of participation in a musical organization or ensemble is waived (but such majors are expected to participate actively in chamber and other ensembles sponsored by the department);
      2) sixteen credits in individual instruction in the student’s major instrument or voice, earned by taking Music 391–392 throughout the junior and senior years.
   b) in theory or composition or in history: twelve additional credits in this area of concentration at the 300 level or above, of which either four may be in either Music 301 or 302 or taken when once for four credits, or eight may be earned in Music 401–402.

**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 the senior year the candidate enrolls in Music 401–402 with the chair of the honors committee as instructor. Candidates will be encouraged to formulate programs that allow them to demonstrate their musical and scholarly abilities, resulting 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 Group 4 (humanities and the arts). Neither freshman seminars nor advanced placement credit count toward this requirement.

If one music course is counted for distribution, it must carry at least 3 credits, and it may not be in music courses numbered 321–322, 391–392 or in organizations and ensembles (Music 331 through 346 and 421 through 446).

If two music courses are counted for distribution, they must total at least 6 credits, and at least one of the courses must be academic, not performance-oriented. The second "course," however, may comprise either up to 4 credits earned in performance (Music 321–322, 391–392) or up to 4 credits earned in organizations and ensembles (Music 331 through 346 and 421 through 446), but not both.

**Facilities**

**Music Library.** The Music Library, in Lincoln Hall, has an excellent collection of standard research tools. Its holdings consist of approximately one hundred-twenty thousand books, periodicals, and scores and forty-five thousand sound and video recordings. Particularly noteworthy are the collections of opera from all periods; twentieth-century scores and recordings; a large microfilm collection of Renaissance sources; both theoretical and musical; and a collection of eighteenth-century chamber music. In addition, the Rare Books section is available in the rare books area of the library.

**Concert Halls.** The Department of Music sponsors more than one hundred concerts annually. Cornell's principal concert halls are Bailey Hall Auditorium (about 2,000), Alice Statler Auditorium (about 900), Sage Chapel (about 800) and Barnes Hall Auditorium (about 400).

**Rehearsal Spaces.** The orchestras and bands rehearse in Bailey Hall, Barnes Hall, and Barton Hall; the Jazz Ensembles, Gamelan, and Chamber Ensembles rehearse in Lincoln Hall; and the choral ensembles are quartered in Sage Chapel. Eleven practice studios in Lincoln Hall are available for individual practice by pianists, vocalists, and instrumentalists.

Throughout the department, there are two concert grand pianos (Steinway and Mason & Hamlin), two eighteenth-century fortepiano replicas (copies of Johann Andreas Stein and Anton Walter), an original Broadwood grand piano from 1827, a Bösendorfer grand piano from 1842, one Dowd and one Hubbard harpsichord, and a Challis clavichord. Barnes Hall houses a chamber organ and an organ. A large Aeolian Skinner Organ is located in Sage Chapel, and there is a Helmuth Wolff tracker organ in Anabel Taylor Chapel.

**Digital/Electronic Equipment.** A Macintosh Master studio is available for graduate student use (hours to be arranged) and occasional independent study use. The software used is Performer, Mosaic, Finale, and several Opcode patch editor/librarians. The instruments include a Yamaha KX88 MIDI Controller keyboard, a Yamaha TX802 FM synthesizer, an E-Mu Proteus XR, a Casio FS 10M sampler, and various other synthesizers. In addition, there are two MIDI work stations with additional instruments, including a Korg M1 synthesizer and an Akai 5900 sampler.

**Freshman Seminars**

**MUSIC 111 Sound, Sense, and Ideas**

Section I—"High" and "Low": The Valuing of Music in Western Society. Fall and spring. 3 credits. J. Scheinbaum.

Implicit and explicit value judgments about genres, styles, and individual pieces of music are often made without an examination of the reasoning and ideologies behind them. This seminar will explore various contexts of conventional divisions into "high" and "low" music. We will investigate and write about various repertoires that challenge the boundaries between these categories, thereby questioning the weight of the usual kinds of value judgments. Composers and repertoires to be studied include the 20th-century avant garde, the songs of the Beatles, and progressive rock.

Section II—Love Songs from the Middle Ages to the Millennium. Fall. 3 credits. J. Peraino.

In Western culture, the emotion of love and the act of singing have a long history of association. Consequently, love songs encode much about the cultural beliefs and values of their time. This course examines various conceptions of love (romantic, platonic, homoerotic), the construction of gender, and the expressions of these concepts in music over many centuries, beginning with the courtly love songs of the troubadours and ending with present-day rock genres.

**MUSIC 115 Popular Musics Today**

Fall. 3 credits. Not offered 1997–98.
INTRODUCTORY 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.

MUSIC 100 Elements of Musical Notation
Fall or spring. 1 credit. Prerequisite: concurrent enrollment in any three-credit course in music and permission of instructor. D. Conn.
This four-week course, given at the beginning of each term, will fulfill the requirement of basic pitch and rhythm and reading skills needed for introductory courses (except 101 and 103) and 200-level courses with prerequisites. The material covered in this course is no longer part of Music 105.

MUSIC 101 The Art of Music
Fall. 3 credits. M W 11:15-12:05. 1-hour disc to be arranged. M. Hatch.

MUSIC 102 Introduction to the Musics of the World
Spring. 3 credits. No previous training in music required. J. Peraino.
Exploration of musical genres from selected regions of the world. The course examines both the elements of musical styles and the features of society that influence music. Listening assignments and projects that investigate the cultural context of music are major components of the course.

MUSIC 105 Introduction to Music Theory
Fall or summer, spring. 3 credits. Fall, T R 10:10-11:00 plus two hours to be arranged. Experience in reading music is highly recommended. Fall, W. Cowdery; spring, D. Yearsley.
An elementary, self-contained introduction to music theory 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, Haydn and Beethoven.

MUSIC 106 Introduction to Music Theory
3 credits. Prerequisite: Music 105 with grade of B- or better. Limited to 50 students. Not offered 1997-98.

MUSIC 107 Medieval to Mozart
Fall. 3 credits. Prerequisite: ability to read music or concurrent enrollment in Music 100. Not offered 1997-98.

MUSIC 108 Beethoven to Bernstein
Spring. 3 credits. Prerequisite: ability to read music or concurrent enrollment in Music 100. N. Zaskaw
A survey of Western art music in all genres from the beginning of the 19th century to the present.

MUSIC 120 Learning Music through Digital Technology
Fall or spring. 3 credits. Enrollment limited. Prerequisite: permission of instructor. D. Bos. A computer music course that explores various aspects of music and technology. 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 201 Diction for Oral Presentation
(Fall) or spring. 1 credit. Prerequisite: permission of instructor. Not offered fall 1997. J. Kellock.
Introduction to the use of the International Phonetic Alphabet for pronunciation of English, French, German, and Italian. Open to singers and non-singers. Assignments will vary according to musical experience. Singing students will be expected to perform their assignments. Students taking voice lessons for credit (321a-322a) must take Music 201 by the end of the third semester of lessons.

MUSIC 205 The Art of Music #
Fall. 3 credits. Nonmajors. Not offered 1997-98.
A course designed to give non-music majors a broad introduction to Western music as an art form. The course will emphasize the role of music in society and the way various musical styles have developed from historical, social and cultural factors.

MUSIC 210 Introduction to Music Theory
Fall or spring. 3 credits. Fall, T R 10:15-11:05. 1-hour disc to be arranged. M. Hatch.
Detailed study of the fundamental elements of tonal music: rhythm, scales, intervals, triads, melodic principles and 2-part counterpoint; diatonic harmony and 4-part voice leading in root position and first inversion; analysis of phrase and period structure.

MUSIC 220 Learning Counterpoint through Digital Technology
Spring. 3 credits. Enrollment limited. Prerequisite: 152 or permission of instructor. T R 2:55-4:10. D. Borden.
This course is a study of traditional contrapuntal techniques from the fourteenth century to the present, with emphasis on invention and fugue. Synthesizers, samplers, MIDI, and music software will be covered. There are three classroom concerts, some analysis and a final public concert.

MUSIC 225 Learning Counterpoint through Digital Technology
Spring. 3 credits. Enrollment limited. 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. 3 hrs. TBA. E. Murray.
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.

MUSIC 401 Introduction to Improvisational Theory
Fall. 2 credits. Prerequisite: permiss­ion of instructor. Intended for performers in "jazz" and related styles. Not offered 1997-98. E. Hester.
Tonal, modal, and blues harmonic resources, and the formal structures in which they are embodied. Development of improvisational skills and creation of spontaneous compositions.

MUSIC 403 Tonal Theory II
Spring. 3 credits. Prerequisites: Music 152, or equivalent. 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. 3 hrs. TBA. E. Murray.

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. 3 hrs. TBA. E. Murray.
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.

MUSIC 404 Tonal Theory IV
Spring. 3 credits. Prerequisites: Music 251 and 253 or equivalent, and concurrent enrollment in Music 254. M W F 10:10-11:00. J. Webster.
Continuation of diatonic and introduction to harmonic harmony; species counterpoint; introduction to counterpoint in the style of Bach; composition in small forms.

MUSIC 251 Tonal Theory III
Fall. 3 credits. Prerequisites: Music 152 and 154 or equivalent, and concurrent enrollment in Music 253. M W F 10:10-11:00. J. Webster.
Study of and composition in larger forms, including sonata form. Study of harmonic harmony, voice-leading, and modulation; composition in chromatic style.

MUSIC 253 Musicianship III
Fall. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 251. 2 hours TBA. J. Webster.
MUSIC 254 Musicanship IV
Spring. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 252. 2 hours TBA. J. Webster. Sight singing; melodies in 4 clefs, including modal 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 351 Materials of Twentieth-Century Music
Fall. 3 credits. Prerequisite: Music 252 and 254 or equivalent, and concurrent enrollment in Music 353. MWF 10:10–11:00. R. Sierra. Introduction to some techniques of twentieth-century music, including extended tonality, modes, twelve-tone technique, set theory and new approaches to melody and rhythm. Analysis of representative works by Debussy, Bartók, Webern, Hindemith, Schoenberg, Stravinsky, and others.

MUSIC 353 Musicanship V
Fall. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 351. 2 hours TBA. R. Sierra. Sight singing: advanced chromatic, twelve-tone, and atonal melodies in 4 clefs. Keyboard: continued chromatic harmony; improvised chromatic modulations. Dictation: continued chromatic harmony, atonal sets and melodies; 2-part counterpoint. Score reading: 4 clefs, transpositions. Music terms: twentieth-century terms.

[MUSIC 451 Counterpoint
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. Not offered 1997–98. S. Stucky. Composition in the polyphonic vocal style of the late Renaissance.

[MUSIC 452 Topics in Music Analysis
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. Not offered 1997–98. J. Webster. A survey of important analytical approaches to tonal music, including thematic-motivic relations, phrase-rhythm, large-scale paragraph construction, structural-tonal voice-leading, and relations among the movements in a multiview movement.

[MUSIC 453 Introduction to Improvisational Theory
Fall. 4 credits. Prerequisite: Music 251 or permission of instructor. Not offered 1997–98. K. Hester. Study and performance of modal, modal, and blues harmonic resources; introduction to the formal structures in which these resources are embodied. Includes ear training, work at the keyboard, composing short pieces, and analyzing selected representative works of popular music and African-American art music from 1940 to 1970.

MUSIC 454 Composition
Fall. 4 credits. Prerequisite: Music 251 or permission of instructor. W 1:25–4:25. D. Borden. Using MIDI and Digital Audio, non-linear methods of musical composition are explored. In addition, interdisciplinary projects are carried out in conjunction with students from the Film Program, Dance Program, and Computer Animation Projects in other departments. The collaboration receive public performances. Live performances can use corporate instruments as well as electronic ones.

MUSIC 455 Conducting
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. S. Tucker. Fundamentals of score reading, score analysis, rehearsal procedures and conducting technique; instrumental and choral contexts.

[MUSIC 458 Orchestration
Spring. 4 credits. Prerequisite: Music 251 or permission of instructor. Not offered 1997–98. R. Sierra. Orchestration based on nineteenth- and twentieth-century models.

Music in History and Culture

MUSIC 221 History of Rock Music
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 to present-day genres of alternative rock and hip hop.

MUSIC 222 A Survey of Jazz
Spring. 3 credits. Enrollment limited. K. Hester. This course will trace the evolution of jazz historically from its African roots to the current diverse spectrum of improvisational styles that form popular, Neoclassic, and innovative contemporary jazz music.

MUSIC 245 Gamelan in Indonesian History and Culture
Fall or spring. 3 credits. Permission of instructor. No previous knowledge of musical notation or performance experience necessary. MWF 1:25–2:15. M. Hatch, fall; J. Mrázek, spring. A survey of Indonesian music through the art. Elementary techniques of performance on the gamelan will be integrated with local concert offerings and local concert offerings.

MUSIC 251 Bach and Handel #
Fall. 3 credits. Prerequisite: any 3-credit course in music or permission of instructor. Not offered 1997–98. W. Kennedy and C. Kaske. The music of, and the social structures supporting, large instrumental ensembles in the Western world, including Italian court festivals of the 16th century, string bands of the 17th century, Lully's ascendency at Paris and Versailles, and music of Purcell, Corelli, Vivaldi, Bach, Handel, Haydn, Mozart, Beethoven, Schubert, Schumann, Mendelssohn, Berlioz, Liszt, Wagner, Brahms, Tchaikovsky, Bruckner, Mahler, Strauss, Stravinsky, Schoenberg, Webern, Bartók, Shostakovitch, Messiaen, Copland, Carter, Tower, Stucky, Sierra, and others.

MUSIC 390 Culture of Renaissance II
(also Comp. Lit. 362, Eng. 325, Hist. 364, Art H. 351)

Music History Courses for Majors and Qualified Non-Majors

Prerequisite: Music 152 or permission of instructor. Intended primarily for music majors, these courses investigate selected topics and repertories from each period in some detail. Each course includes lectures, readings, oral and written papers, and analyses.
MUSIC 374 Opera and Culture (also Gerst 374 and Itala 374)
Spring. 4 credits. Prerequisite: any three-credit music course or proficiency in German or Italian. A. Groos.
This course is designed to explore interrelationships between opera and cultural practice, using examples principally from the German and Italian repertories (e.g., Mozart, Wagner, Verdi, Puccini, Strauss). Lectures and discussion will examine operatic representations of central issues in the emergence of modern culture in the late eighteenth and nineteenth centuries: politics and national identity, issues of gender and sexuality, orientalism, representations of madness and disease. Depending on student interest, the final segment of the semester may extend our focus into twentieth-century opera or other media such as film and theatre.
MUSIC 381 Music in Western Europe to 1700
Fall. 4 credits. T R 10:10-11:25. R. Harris-Warrick.
Western European music from the Middle Ages to the early Baroque, including Gregorian chant, secular monophony, the development of polyphony, the birth of opera, and the rise of independent instrumental practice.

MUSIC 382 Music of the Eighteenth Century
Spring. 4 credits. J. Webster.
Music in Western and Central Europe and North America from Bach, Handel and Vivaldi to Haydn and Mozart, including comic and serious opera, church music, concert music, and social music.

MUSIC 383 Music of the Nineteenth Century
A chronological survey of nineteenth-century music from Beethoven through Puccini including reference to its cultural and historical context.

MUSIC 384 Music of the Twentieth Century
A systematic study of music from the turn of the century to the present. Historical context will be an integral part of the course.

MUSIC 388 Historical Performance Practicum
The study of 18th- and 19th-century instrumental performance practices, with special emphasis on the string quartets of Haydn and the piano trios of Schubert. Open to qualified performers.

MUSIC 398-399 Independent Study in Music History
398, fall; 399, spring. 4 credits. Prerequisite: Music 152 and permission of instructor. Staff.
Advanced study of various topics in music history. Students enrolling in Music 398-399 participate in, but do not register for, an approved 200-level music history course and, in addition, pursue independent research and writing projects.

MUSIC 489 African American Music Innovators (also ASARC 489)
Fall. 4 credits. Permission of instructor. K. Hester.
This course examines and experiments with methods of analyzing, appreciating, and understanding innovative art forms. Students will write three reports (with transcribed music examples or some form of accurate analytical charting, where appropriate), utilizing three different perspectives on African American Music.

MUSIC 490 American Musical Theatre
(also English 454)
Spring. 4 credits. S. McMillin.
See English 454 for description.

MUSIC 492 Music and Queer Identity
Spring. 4 credits. Prerequisite: Music 152 or permission of instructor. J. Peraino.
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 examines how and why music encodes "queerness" by focusing on various musical genres (such as opera, disco, women's music, country) and composer/musicians (such as Franz Schubert, Judy Garland, David Bowie) that have become significant for various lesbian and gay communities. The course will also examine the reasons behind the general popularity of queer-coded but "straight-identified" performers such as Elvis Presley, Prince, and Michael Jackson.

Independent Study

MUSIC 301-302 Independent Study in Music
301, fall; 302, spring. Credit to be arranged. 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.

Musical Performance

Cornell faculty members offer individual instruction in voice, organ, harpsichord, piano and fortepiano, and some brass and woodwind instruments to those students advanced enough to do college-level work in these instruments. Lessons are available by audition only. They may be taken either without credit or, through Music 321-322, 331 through 340, 391-392, or 421 through 448. These 3 credits must be earned prior to, or simultaneously with the first 2 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.

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, usually scheduled during the first week of classes, and will receive credit only as described under "Earning credit," above. Students may register for this course in successive years. Students, at the sole discretion of the instructor, earn 2 credits each term for a one-hour lesson (or two half-hour lessons) weekly accompanied by an appropriate practice schedule.

MUSIC 321a-322a Individual Instruction in Voice
321a, fall; 322a, spring. 2 credits each term. Prerequisite: successful audition during registration. Music 201 must be taken by the end of the third semester of lessons. Limited enrollment. Fall. H. Boatwright; spring, J. Kellock.
The Vocal Coaching Program offers noncredit lessons to members of the choral ensembles.
MUSIC 321b-322b Individual Instruction in Organ
321b, fall; 322b, spring. 2 credits each term. Prerequisite: successful audition. Fall, staff; spring, A. Richards.

MUSIC 321c-322c Individual Instruction in Piano
321c fall; 322c, spring. 2 credits each term. Prerequisite: successful audition. M. Bilson, X. Bjerken and staff.

MUSIC 321d-322d Individual Instruction in Harpsichord
321d, fall; 322d, spring. 2 credits each term. Prerequisite: successful audition. Fall, staff; spring, D. Yearsley.

[MUSIC 321e-322e Individual Instruction in Violin or Viola
321e, fall; 322e, spring. 2 credits each term. Prerequisite: successful audition. Not offered 1997-98.]

[MUSIC 321f-322f Individual Instruction in Violin or Viola
321f, fall; 322f, spring. 2 credits each term. Prerequisite: successful audition. Not offered 1997-98.]

MUSIC 321g-322g Individual Instruction in Brass
321g, fall; 322g, spring. 2 credits each term. Prerequisite: successful audition. Not offered 1997-98.

MUSIC 321h-322h Individual Instruction outside Cornell
321h, fall; 322h, spring. 2 credits each term. Prerequisite: successful audition. Coordinator: D. Conn.

MUSIC 321i-322i Individual Instruction in Windwinds
321i, fall; 322i, spring. 2 credits each term. Prerequisite: successful audition. D. Conn.

MUSIC 391-392 Advanced Individual Instruction
391, fall; 392, spring. 4 credits each term. Open only to juniors and seniors majoring in music under Option II with concentration in performance and to graduate students. Option II majors whose lessons must be taken outside Cornell may apply to the department for financial assistance toward the cost of lessons; $225 per semester will normally be awarded to such students and a larger amount may be awarded under certain circumstances. Music 391 is not a prerequisite to 392.

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, 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 8 credits in these courses. Membership in these musical organizations and ensembles is also open to qualified students who wish to participate without earning credit.

MUSIC 331-332 Sage Chapel Choir
331, fall or summer; 332, spring. 1 credit. No audition for admission. M 7–9. T. Folan.

MUSIC 333-334 Cornell Chorus or Glee Club
333, fall; 334, spring. 1 credit. Prerequisite: permission of instructor. Chorus (treble voices): W 5:15–7:15 p.m. plus 2 hours to be arranged. Glee Club (mens voices): W 7:30–9:30 p.m., plus 2 hours to be arranged. S. Tucker.

MUSIC 335-336 Cornell Symphony Orchestra
335, fall; 336, spring. 1 credit. Prerequisite: permission of instructor. W 7:30–16:00 p.m. E. Murray.

MUSIC 337 Wind Symphony
Fall. 1 credit. Prerequisite: permission of instructor. M W 4:45–6:30. M. Scatterday and D. Conn.

MUSIC 338 Symphonic Band
Spring. 1 credit. Prerequisite: permission of instructor. M W 4:45–6:30. D. Conn.

MUSIC 339-340 Cornell Jazz Ensembles
339, fall; 340, spring. 1 credit. Prerequisite: permission of instructor. W 6–8 p.m. K. Hester.

MUSIC 342 Wind Ensemble
Spring. 1 credit. Prerequisite: permission of instructor. M 7:30–9:30 and R 4:45–6:30. M. Scatterday.

[MUSIC 345-346 Introduction to the Gamelan @
345 fall. 346 spring. 1 credit. Enrollment limited. Prerequisite: permission of instructor. M W 2:30–3:20. Not offered 1997-98. Concentrated instruction for beginning students in elementary techniques of performance on the Indonesian gamelan. Music 245 is a 3-credit course that complements the instruction in gamelan by an introduction to Indonesian history and cultures.]

MUSIC 421-422 Cornell Chamber Orchestra
421, fall; 422 spring. 1 credit. Prerequisite: permission of instructor. R 5–6:30 p.m. J. Hsu.

Study and performance of the chamber symphonies of Haydn, Mozart, and their contemporaries. For strings, woodwinds, and horns. More recent music may also be included in the spring.

MUSIC 437-438 Chamber Winds
437, fall; 438, spring. 1 credit each term. Prerequisites: enrollment in Symphonic Band, Wind Symphony or Wind Ensemble in the same semester as this course AND permission of instructor only. Fall, T R 4:45–6:30 p.m. Spring, T F 4:45–6:30 p.m. M. Scatterday, D. Conn.

A flexible instrumentation ensemble performing original woodwind, brass, and percussion music from Gabrieli brass choirs and Mozart serenades through more contemporary works such as Stravinsky’s Octet or premiers of works. The ensemble will perform on wind symphony, symphonic band and wind ensemble concerts in addition to several chamber concerts throughout the year.

MUSIC 439-440 Experimental Lab Ensemble
439 fall; 440 spring. 1 credit each term. Permission of instructor. W 8:30–10:30 p.m. K. Hester.

MUSIC 441-442 Chamber Music Ensemble
441, fall; 442, spring. 1 credit. Prerequisite: permission of instructor. J. Hsu.

Study and perform chamber music works from duos to octets for pianists, string and wind players.

MUSIC 443-444 Chorale
443 fall; 444 spring. 1 credit each term. Prerequisite: permission of instructor. F 4:30–6:15 p.m. R. Riley.

Study and performance of selected choral music for mixed voices.

MUSIC 445-446 Cornell Gamelan Ensemble
445 fall; 446 spring. 1 credit each term. Enrollment limited. Prerequisite: Music 245 or 345–346, or permission of instructor. R 7:30–10:00 p.m. Fall, M. Hatch; spring, J. Mrázek.

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: permission of instructor. F 4:15–6:15. Plus 2 hours to be arranged. S. Tucker.

GRADUATE COURSES

Open to qualified undergraduates with permission of instructor.

MUSIC 601 Introduction to Bibliography and Research
Fall. 4 credits. M 1:25–4. 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
Spring. 4 credits. Not offered 1997-98. J. Webster.

A critical survey of various analytical methods in current use. Frequent analytical assignments and class presentations.]

[MUSIC 603 Editorial Practice
Spring. 4 credits. Not offered 1997-98.]

[MUSIC 604 Ethnomusicology: Areas of Study and Methods of Analysis
Spring. 4 credits. Open to graduate students in anthropology, linguistics, psychology, sociology, and other cognate fields with permission of instructor. Not offered 1997–98. M. Hatch.

Major aspects of research into musical cultures of the world. Problems, theories, and methods, especially those affecting analytical terminology, transcription and analysis of sound events, and fieldwork.]
MUSIC 605 Graduate Seminar in European Cultural and Intellectual History (also History 605) Fall. 4 credits. M. Steinberg. See History 605 for description.

MUSIC 620 Introduction to MIDI Techniques Spring. 4 credits. Permission of instructor. Directions. Borden. This course is an introduction to MIDI for students who are already at an advanced level in music composition.

[MUSIC 622 Historical Performance Practicum Spring. 4 credits. Not offered 1997-98. M. Bilson. The study of 18th- and 19th-century instrumental performance practices, with special emphasis on the string quartets of Haydn and the piano trios of Schubert. Open to qualified performers.]

[MUSIC 653 Topics in Tonal Theory and Analysis Spring. 4 credits. Not offered 1997-98.]

[MUSIC 654 Topics in Post-tonal Theory and Analysis Spring. 4 credits. Not offered 1997-98.]

MUSIC 657-658 Composition 657, fall; 658, spring. 4 credits each term. F 1:25-4:00 p.m. plus 1 hour to be arranged. R. Sierra.

[MUSIC 674 German Opera (also German Studies 672) Fall. 4 credits. Not offered 1997-98. A. Groos. See German Studies for description.]

[MUSIC 677 Mozart: His Life, Works, and Times (also German 757) Fall. 4 credits. Not offered 1997-98.]

[MUSIC 680 Topics in Ethnomusicology Spring. 4 credits. M. Hatch. Not offered 1997-98.]

[MUSIC 681 Seminar in Medieval Music Fall. 4 credits. M. Hatch. Not offered 1997-98.]


MUSIC 686 Seminar in Baroque Music Fall. 4 credits. N. Zaslav. Topic: the music of J. S. Bach. Recent controversies over Bach's career and music, including conflicting approaches to his biography, dating his works, the meaning of The Musical Offering, the size and make-up of his performing forces, harpsichord vs. piano, anti-Semites in the Passion. According to St. John, and the status of The Brandenburg Concertos as absolute or program music.

MUSIC 688 Seminar in Classical Music Fall. 4 credits. J. Webster. Topic: the music of Haydn.


MUSIC 690 Seminar in Music of the Twentieth Century Spring. 4 credits. R. Sierra. Topic: the music of Gyorgy Ligeti.

MUSIC 691-692 Historical Performance 691, fall; 692, spring. 4 credits each term. Prerequisite: permission of instructor. Hours to be arranged. M. Bilson. Lessons on the major instrument with supplementary study and research on related subjects.

[MUSIC 693 Seminar in Performance Practice Fall or spring. 4 credits. Not offered 1997-98.]

MUSIC 697-698 Independent Study and Research 697, fall; 698, spring. Credit to be arranged. Staff.

[MUSIC 785-786 History of Music Theory 785, fall; 786, spring. 4 credits each term. Not offered 1997-98.]

MUSIC 787 History and Criticism Spring. 4 credits. A. Richards. Topic for 1998: Crossing the Classic/Romantic Divide. An introduction to late 18th- and early 19th-century German aesthetics and music criticism, considering the impact of English thought and literature to Germany, and questioning notions of periodization and the canon, specifically the problematic division between 'classical' and 'romantic' as it has been applied to the repertory from this period. Topics include the sublime and the beautiful, the picturesque and the grotesque, landscape aesthetics and the English garden, Witz and the fragment, fantasy, constructions of gender, and Gothic horror.

[MUSIC 789 Liturgical Chant in the West Spring. 4 credits. Not offered 1997-98.]

MUSIC 901-902 Thesis Research 901, fall; 902, spring. Up to 6 credits each term, to be arranged. Offered for S-U only. Limited to doctoral students in music who have passed the Admission-to-Candidacy Exam.

Near Eastern Studies: General Information

Near Eastern Studies 473

NEAR EASTERN STUDIES

R. Brann, chair; C. Baker, A. Gade, M. Litvak, D. Owen, J. Webster. (director of Undergraduate Studies) A. Gade, J. Webster, M. Litvak, D. Powers, D. I. Owen, (director of the Program of Jewish Studies); D. Powers, (director of undergraduate studies). All 200 or 300-level offerings treat the Near East from the dawn of human history to the present and emphasize methods in the social sciences/history. 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, 198 or a 200-level survey course 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, 198 (or a 200-level survey course). All 200 or 300-level language courses may fulfill the humanities requirement.

The Major

The precise sequence and combination of courses chosen to fulfill the major is selected in consultation with the student's adviser. All majors must satisfy the following requirements (no course may be used to satisfy two requirements; S-U options not permitted):

A. Qualification in two Near Eastern languages or Proficiency in one.

B. Nine three- or four-credit NES courses, which must include the following:

1. NES 197 or 198 (when NES 197-198 are not offered, students may substitute a 200-level survey course with the approval of the director of undergraduate studies).

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 Bible
NES 263, Introduction to Biblical History and Archaeology
NES 248, Introduction to Classical Jewish History

600 C.E. to the present

NES 233, The Lyrics of Love and Death: Medieval Hebrew and Arabic Poetry in Translation
NES 257, Islamic History 600-1258
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 for the appropriate major study and enroll in the honors course, NES 499, in the fall and spring semesters of their senior year. For admission to the honors program, candidates must have a cumulative average of B+ or better and have demonstrated superior performance overall in Near Eastern Studies courses. After consulting their major adviser, candidates should submit...
an outline of their proposed honors work to
the department during the second semester of
their junior year.

Study abroad. Near Eastern Studies majors
may choose to study in the Near East during
during their junior year. There are various academic
programs in the countries of the Near East that
are recognized by the Department of Near
Eastern Studies and that allow for the transfer
of credit. Archaeological field work on
Cornell-sponsored projects in the Near East
may also qualify for course credit.

Freshman Seminar

NES 108 At the Crossroads of History:
Readings in Modern Hebrew
Literature
Fall. 3 credits. Enrollment limited to 17
students. A. Brener.
The events that gave rise to modern Israel and
continue to shape it today have been only
announced by several decades. Literature, however,
unique in its ability to
create its own special meanings and to convey
truths of the present through writing. In this course we
will explore writings by six major Hebrew
novelists in an attempt to see how significant
moments in modern Jewish history have been
reflected in Hebrew literature of the twentieth
century. Through a specially keyed sequence
of writing assignments, we will focus on the
literary aspects of these works. Students will also
be introduced to the ways in which
library resources can be utilized for research.
All readings in English.

NES 143 Jewish Travelers Through
the Ages
Fall. 3 credits. Enrollment limited to 17

NES 154 Harems, Houris, and Hashshash:
Western Perceptions of the
Middle East
Spring. 3 credits. Enrollment limited to 17
students. D. Powers.
Societies acquire their identities, in part, by
defining themselves in relation to foreigners,
strangers, aliens, or enemies; we divide the
world into the familiar (Europe, the West,
"us") and the strange (the Orient, the East,
"them"). In this course we will explore how
contemporary Western perceptions of the
Middle East have been shaped by the imperial
and colonial experience of the past 150 years.

Language Courses

NES 101-102 Elementary Modern
Hebrew I and II (also Jewish
Studies 105-106)
101, fall; 102, spring. 6 credits each term.
Prerequisite for NES 102: 101 or
permission of instructor. Satisfactory completion
of NES 102 fulfills the qualification portion
of the language requirement. 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 will be
able to function in basic situations in a
Hebrew-speaking environment.

NES 111-112 Elementary Arabic I and II
111, fall; 112, spring. Enrollment limited to
15 in each session. 6 credits each term.
Prerequisite for Arabic 112: Arabic 111 or
permission of instructor. M. Younes and
L. White.
The course provides a thorough grounding in
all language skills: listening, speaking,
reading, and writing. Students, with
spoken Arabic and gradually integrates Modern
Standard Arabic in the form of listening and
reading texts. Emphasis will be on learning
the language through using it in meaningful
contexts. The student who successfully
completes the two-semester sequence will be 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.
It is an important objective of the course
is to familiarize students with basic facts about the
geography, history, and culture of the
Arab world.

NES 201-202 Intermediate Modern
Hebrew I and II (also Jewish
Studies 201-202)
201, fall; 202, spring. Enrollment limited to
15 students in each section. 4 credits each
term. Prerequisites for NES 201, 202 or
permission of instructor; for NES 202, 201 or
permission of instructor. N. Scharf.
A sequel to NES 101-102. Continued
development of reading, writing, grammar,
oral comprehension, and speaking skills. The
course introduces Hebrew literature and
Israeli culture through the use of texts and
audio-visual materials.

NES 211-212 Intermediate Arabic
I and II
211, fall; 212, spring. Enrollment limited to
15 students in each section. 4 credits each
term. Prerequisites: for NES 211, one year
of Arabic or permission of instructor; for
NES 212, 211 or permission of instructor.
M. Younes. L. White.
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. Increasing attention
will be given to developing native-like
pronunciation and to grammatical accuracy,
but the main focus will be on developing
communication skills. The student who
successfully completes 212 will be 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
will be sought through the use of authentic
materials.

NES 301-302 Advanced Modern
Hebrew I and II (also Jewish
Studies 301-302)
301, fall; 302, spring. Limited to 15
students. 4 credits each term. Prerequisite for
NES 301: 302 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.
Limited to 15 students. N. Scharf.

Advanced study of Hebrew through the
analysis of literary texts and expository prose.
This course employs a double perspective:
language is viewed through literature and
literature through language. Students will
develop composition skills by studying
language structures, idioms, and various
registers of style.

NES 311 Advanced Arabic I
Fall. 4 credits. Prerequisite: NES 212 or
permission of instructor. Limited to 15
students. M. Younes, L. White.
Students will be 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 will be
on developing fluency in oral expression
through discussions of issues presented in the
reading selections. A primary objective of the
course is the development of writing skills
through free composition exercises in topics
of interest to individual students.

NES 312 Advanced Arabic II
Spring. 4 credits. Prerequisite: NES 311, or permission
of instructor. M. Younes and L. White.
This course is a continuation of NES 311 using
similar but more challenging materials. There
will be more focus on the writing skills,
development of native-like pronunciation,
and accurate use of grammatical structures than in
NES 311. Each student will be required to
make an oral presentation in Arabic on a topic
of his/her choice and submit a written version
of the presentation.

NES 330-331 Hieroglyphic Egyptian I
and II
330, fall; 331, spring. 4 credits. Not

NES 332-334 Elementary Akkadian
I and II (also NES 633-634)
332, fall; 333, spring. 4 credits. Prerequi­
tive for NES 334: 333 or permission of
instructor. D. I. Owen.

An introduction to the cuneiform 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 readings in the
Code of Hammurapi, the Descent of Ishtar,
and the Annals of Sennacherib. Secondary
readings on the history and culture of
Mesopotamia provide the background for the
study of the language. Knowledge of another
Semitic language helpful but not essential.

NES 335-336 Readings in Akkadian
Texts (also NES 635-636)
335, fall; 336, spring. 4 credits. Prerequi­
tive for NES 336: 335-334. Prerequisite for
D. I. Owen.

NES 337-338 Ugaritic I and II
337, fall; 338, spring. 4 credits. Prerequi­
tive: Knowledge of another Semitic
language (preferably Hebrew). Not

NES 416 Structure of the Arabic
Language (also LING 416)
Spring. 4 credits. Prerequisite: NES 112 or
one year of Arabic. M. Younes.

The course deals with the history of the
Arabic and its place in the Semitic language family,
the sociolinguistic situation in the Arab world
(diglossia), Arabic phonology (sounds,
emphasize, syllable structure, and related processes), morphology (verb forms and derivational patterns), and syntax (basic sentence structures, cases, and moods).

[NES 420 Readings in Biblical Hebrew Prose (also JWST 420 and RELST 420) @ #]
Fall. 4 credits. Prerequisite: one year of Hebrew, Biblical or modern. Course may be repeated for credit. Not offered 1997–98. G. Rendsburg]

[NES 433 Introductory Sumerian I (also NES 631) @ #]
Spring. 4 credits each semester. Prerequisite: knowledge of Sumerian. Not offered 1997–98. D. Owen.

[NES 434 Introductory Sumerian II (also NES 632) @ #]

[NES 435-436 Aramaic I-II (also JWST 435-436) @ #]
455, fall; 436, spring. 4 credits each term. Prerequisite: knowledge of Hebrew. Enrollment limited to 15 students. Not offered 1997–98. G. Rendsburg.

[NES 631 Introductory Sumerian I (also NES 433)]
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1997–98. D. Owen.

[NES 632 Introductory Sumerian II (also NES 434)]

[NES 633-634 Elementary Akkadian I and II (also NES 233-234) @ #]
633, fall; 634, spring. 4 credits. Prerequisite: NES 634: 633 or permission of instructor. D. I. Owen.
For description, see NES 333 under Near Eastern Languages.

[NES 635-636 Readings in Akkadian Texts (also NES 635) @ #]
635, fall; 636, spring. 4 credits. Not offered 1997–98. G. Rendsburg.

[NES 637-638 Ugaritic I and II (also NES 337-338) @ #]
337, fall; 338, spring. 4 credits. Prerequisite: Knowledge of another semitic language (preferably Hebrew). Not offered 1997–98. G. Rendsburg.

Archaeology

[NES 261 Ancient Seafaring (also Archaeology 275) @ #]

[NES 263 Introduction to Biblical History and Archaeology (also ARKEO 263, JWST 263, and RELST 264) @ #]
Fall. 3 credits. Enrollment limited to 50 students. J. Zorn.
A survey of the principal archaeological developments in Canaan/Palestine from the Neolithic period (ca. 9000 B.C.E.) to the Babylonian Exile (586 B.C.E.). Includes an introduction to archaeological methodology utilized in the reconstruction of ancient cultures in the area, as well as the basic bibliography of the field. Emphasis will be placed on the use of archaeological data for the understanding of some 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. Recommended for student planning to participate in excavations in Israel.

[NES 264 Agriculture and Society in the Ancient Near East @ #]

[NES 361 Interconnections in the Eastern Mediterranean World in Antiquity @ #]

[NES 366 The History and Archaeology of the Ancient Near East (also Archaeology 310) @ #]

[NES 367 The History and Archaeology of Ancient Egypt @ #]

Civilization

[NES 197 Introduction to Near Eastern Civilization (also Jewish Studies 197 and Religious Studies 197) @ #]
Fall. 3 credits each term. Required for all NES department majors. NES 197 and any other NES course will constitute a sequence to fulfill the distribution requirement in either the social sciences or humanities, depending on the second course used in combination with NES 197. D. I. Owen.
This course is designed to provide a basic introductory overview of the various civilizations of the ancient Near Eastern/Biblical world from the advent of writing, ca. 3000 B.C.E. to the conquest of Alexander the Great. Lectures and discussions will focus on four major geographical areas: Mesopotamia, Iraq, Anatolia/Turkey, Syria/Canaan/Syria, Lebanon, Israel, and Egypt. For each area we will consider the development of major religious ideas, social and political institutions, economic structures and literary forms common or unique to each of the peoples who inhabited those areas—Sumerians, Babylonians, Canaanites, Hittites, Phoenicians, Israelis and Egyptians. Readings will be chosen from primary sources in translation and archaeological evidence, and secondary studies. In addition, presentation of slides, videos, and recordings will be integrated into the course.

[NES 234 Arabs and Jews: Cultures in Confluence and Conflict (also JWST 234, RELST 234, and COM L 234) @ #]
Fall. 3 credits. Not offered 1997–98. R. Brann.

[NES 25 Introduction to Islam: Religion, Politics, and Society (also RELST 252) @ #]
Spring. 3 credits. A. Gade.
In this course we shall examine the Islamic religious tradition from its inception to the present. The first part of the course will focus on the message and style of the Qur'an, the life and experience of the Prophet Muhammad, and the major beliefs and practices of Islam. We shall then turn to

political, religious, and legal developments in the early centuries of Islam. The third part of the course will deal with theological, philosophical, and mystical movements in the Islamic empire. Finally we will examine a few specific modern social issues and political movements, such as feminism and Islam, the rise of fundamentalism, and African-American Muslim movements.

[NES 281 Gender and Society in the Muslim Middle East (also Religious Studies 281, Women's Studies 281) @ #]

[NES 339 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also JWST 339, COM L 334, RELST 334, NES 639, SPANL 339/369) @ #]
Spring. 4 credits. Enrollment limited to 25 students. R. Brann.

Islamic Spain was a frontier society comprising six distinct ethnic-religious communities: Arabs, musulmadan (native descendants of Iberian converts to Islam), Berbers, musta'riban (Arabicized Christians), Jews and "Slaves" (European slave soldiers and their descendants). This first part of the course will focus on the literature, culture, and society of al-Andalus (Islamic Spain) from the Umayyad emirate until the close of the Reconquista (711-1248). The development of Arabic (and Hebrew) poetry will be surveyed, with focus on style, genres, and motifs. Conflicting theories of the origin and identity of Hispano-Arabic poetry and culture will also be considered.

[NES 344 Seminar on Jewish Mysticism (also RELST 344 and JWST 342) @ #]
Fall. 4 credits. Enrollment limited to 20 students. Not offered 1997–98. Staff.

[NES 345 Gender and Judaism (WOMNS 347, RELST 343 and JWST 347) @ #]
Spring. 4 credits. Enrollment limited to 25 students. Not offered 1997–98. Staff.

[NES 357 Islamic Law and Society (also NES 651, RELST 350, HIST 372/652) @ #]
Fall. 4 credits. Enrollment limited to 25 students. D. Powers.
After surveying the historical development of Islamic law, the seminar will focus on the structure and function of the Islamic legal system in the fourteenth and fifteenth centuries, using legal documents, judicial opinions, and court cases (all in English translation!) to elicit major themes and issues.

[NES 357 Islamic Law and Society @ #]

[NES 639 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also COM L 334, SPANL 339/369, RELST 334, NES 339, and JWST 339) @ #]
Spring. 4 credits. R. Brann.
For description, see NES 339 under Near Eastern Civilization.

[NES 651 Introduction to Islamic Law (also NES 351, RELST 350, HIST 372/652) @ #]
Fall. 4 credits. Limited to 25 students. D. Powers.
For description, see NES 351 under Near Eastern Civilization.
ARTS AND SCIENCES - 1997-1998

History

NES 239 Cultural History of the Jews of Spain (also JWST 239, COMP LIT 239, RELST 239, SPAN LIT 239) @ #
Fall. 3 credits. R. Brann.
A survey of the cultural history of the Jews in Spain from the late Visigothic period until the converso crisis of the fourteenth and fifteenth centuries and the Expulsion, focusing on the interaction of Jewish with Muslim and Christian cultures, and the stable yet evolving sense of a "Sefardi" identity. The course will establish historical and literary-critical frames for reading primary sources in translation, including secular and synagogal poetry, philosophy and kabbalah, biblical hermeneutics, historiography, polemics, and other genres.

[NES 244 Introduction to Ancient Judaism (also JWST 244 and RELST 244) @ #]
Spring. 3 credits. Enrollment limited to 140 students. Not offered 1997-98.
G. Rendsburg.

NES 248 Introduction to Classical Jewish History (RELST 240 and JWST 248) @ #
Fall. 3 credits. C. Baker.
A survey of the major developments in Jewish history between the destruction of the first temple in 586 B.C.E. to the rise of Islam. Topics will include the return under Ezra and Nehemiah; the encounter with Hellenism; the Antiochene persecutions; the growth of Roman influence; the rebellion of 70 C.E.; the rise of such Jewish groups as the Saducees, Pharisees, and Essenes; the conflict with early Christianity; and the nature of rabbinic Judaism.

[NES 249 Introduction to Modern Jewish History (also JWST 245) #]
Spring. 3 credits. Not offered 1997-98.
Staff.

NES 257 Islamic History: 600-1258 (also HIST 254 and RELST 257) @ #
Fall. 3 credits. D. Powers.
A survey of the Islamic history from the lifetime of the Prophet to the Mongol conquest of Baghdad. Topics to be covered will include the emergence of Islam as a major world religion; the impact of the Arab conquests on the Mediterranean world; political, military, and cultural contacts between the Islamic Near East and western Europe.

[NES 258 History of the Near East 1250-1914 (also HIST 248 and RELST 258) @ #]
Fall. 3 credits. Not offered 1997-98.
L. Peirce.

[NES 261 Ancient Near East (also Archaeology 275) @ #]
Spring. 3 credits. Not offered 1997-98.
D. Owen.

NES 263 Introduction to Biblical History and Archaeology (also ARKEO 263, JWST 263, RELST 264) @ #
Fall. 3 credits. Enrollment limited to 50 students. J. Zorn.
For description, see NES 263 under Near Eastern Archaeology.

NES 294 Modern History of the Near East: Changing Politics, Society, and Ideas (also Government 356 and JWST 394) @ #
Fall. 4 credits. Fulfills the college distribution requirement in history or the social sciences. M. Litvak.
This introductory course is designed to acquaint students with the main political, social, and cultural trends that have shaped the modern and contemporary history of the Near East. While discussing developments in the region during the nineteenth and twentieth centuries, the lectures will focus on such themes as modernization, nationalism, Islamic response, and Arab politics in global and regional contexts. The course does not presuppose any knowledge of Near Eastern languages.

NES 324 The History of Early Christianity (also JWST 344, RELST 325) @ #
Fall. 4 credits. C. Baker.
History of Christianity in the Roman Empire from its beginning in the New Testament period to the Council of Chalcedon. Emphasizing primary sources (both textual and archaeological/iconographic), the course treats the socio-cultural changes in Christian communities, as well as developments in Christian "orthodoxy" and "heretical" movements (e.g., Gnostics); the role of Greek philosophy in shaping Christian thought; martyrdom and persecution; asceticism, monasticism, and holy persons; Christian views of political and social responsibility.

NES 358 Ottoman History: 1300-1600 (also HIST 446/446 and NES 658) @ #
Fall. 4 credits. L. Peirce.
The Ottoman empire at its height included much of southwestern Europe, the Middle East, and North Africa; its poopoulation was made up of peoples of a variety of ethnic and religious identities. This course studies the history and culture of the Ottoman empire from 1300 to 1600 (the period from 1600 through 1923 is studied in NES 359). Among the topics to be covered are: conflicting interpretations of the rise of the Ottomans; the empire's multi-ethnic (ethnico-national) nature; religious currents and institutions; social and economic classes; modes of dissent and resistance; and Ottoman relations with Europe and Asia. Throughout we will be concerned with questions of identity and of the nature of political and social changes. We will also examine one or two communities in detail to get a sense of the rhythm of daily life.

NES 359 Ottoman History: 1600-1923 (also HIST 441/461 and NES 659) @ #
Spring. 4 credits. L. Peirce.
This course studies the history and culture of the diverse regions an dpeoples making up the Ottoman empire in the period 1600 to 1923. Developments in the seventeenth and eighteenth centuries (cultural, social, military) are examined as essential preliminaries to understanding the dominant features of the nineteenth and early twentieth centuries: rapid political and social transformations, proliferation of ideological positions, and territorial dissolution. We will examine current debates around the questions of nineteenth-century modernization vs. decline, the economic and cultural impact of Europe, and the emergence of nationalism. Each student will select an area of the empire to trace in depth.

NES 374 Seminar on 19th-Century Jewish Intellectual History (also RELST 346 and JWST 346)
Spring. 4 credits. Enrollment limited to 20 students. Not offered 1997-98.

NES 351 Introduction to Islamic Law (also NES 651, RELST 350, HIST 372/652) @ #
Fall. 4 credits. Enrollment limited to 25 students. D. Powers.
For description, see NES 351 under Near Eastern Civilization.

NES 351 Introduction to Islamic Law (also NES 651, RELST 350, HIST 372/652) @ #
Fall. 4 credits. Enrollment limited to 25 students. D. Powers.
For description, see NES 351 under Near Eastern Civilization.

NES 361 Interconnections in the Eastern Mediterranean World in Antiquity @ #
Fall. 4 credits. Not offered 1997-98.
D. Owen.

NES 365 The History and Archaeology of the Ancient Near East (also Archaeology 310) @ #
Fall. 4 credits. Not offered 1997-98.
D. Owen.

NES 367 The History and Archaeology of Ancient Egypt @ #
Fall. 4 credits. Not offered 1997-98.
D. Owen.

NES 391 International Relations of the Ancient Near East, 3500-500 BCE (also GOVT 358)
Spring. 4 credits. Not offered 1997-98.
M. Bernal.

NES 393 Religion and Politics in the Middle East (also RELST 393)
Fall. 4 credits. Enrollment limited to 25 students. M. Litvak.
The seminar will discuss key issues in the relationships between Islam and politics from the early Islamic period to the present with a special emphasis on modern fundamentalist movements. It will examine the differences between Sunni Shi movements as well as the relationships between nationalism and Islam and the social bases of modern Islamic movements.

NES 395 International Relations of the Middle East (also GOVT 392) @ #
Fall. 4 credits. S. Telhami.
This course will examine patterns of international relations in the Middle East in the 20th century, with special reference to the Arab-Israeli and Iran-Iraq conflicts. These conflicts will be treated as part of a Middle East system, whose other main elements are the interaction between domestic and external politics, inter-Arab relations, and the involvement of extra-regional powers.

NES 418 Seminar in Islamic History: Muhammad and the Rise of Islam (also HIST 460/660, NES 618, and RELST 419) @ #
Fall. 4 credits. Enrollment limited to 20 students. Prerequisite: NES 257 or 258, or permission of instructor. Not offered 1997-98.
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 will read primary sources in English translation, especially *The History of Tabari*. 

**NES 456** Sexuality, Society and the State in the Near East (also History 457 and Women's Studies 455) @ Spring. 4 credits. Prerequisites: Previous course in Islamic Studies helpful but not essential. Enrollment limited to 20 students. L. Peirce.

This course examines relations between women and men by focusing on the manner in which one 16th-century community in the Muslim Middle East functioned through its court. By analyzing actual court cases, we will explore issues such as marriage and divorce, property rights, sexuality and its regulation, access to communal and domestic space and the control of knowledge. We will be particularly interested in the question of whether normative codes of law (religious, state) were compatible with the individual's sense of moral worth and self-interest; hence we will also be concerned with relations between the individual and the community, and between the community and the state.

**NES 618** Seminar in Islamic History: Muhammad and the Rise of Islam (also HIST 480/660, NES 418, and RELST 475/675) @ Fall. 4 credits. Prerequisites: Previous courses in Islamic Studies helpful but not essential. Enrollment limited to 20 students. Not offered 1997-98. D. Powers.

**NES 650** Seminar in Islamic History: 600-750 (also HIST 461/671, NES 451, and RELST 451) @ Spring. 4 credit. D. Powers. For description, see NES 451 under Near Eastern History.

**NES 651** Introduction to Islamic Law (also NES 351, RELST 350, HIST 372/652) Fall. 4 credits. Enrollment limited to 25 students. D. Powers. For description, see NES 351 under Near Eastern Civilization.

**NES 655** Women, Men and the Law in Muslim Court (also WOMNS 458, RELST 459, HIST 457/657 and NES 455/459) Fall. 3 credits. Prerequisites: previous course in Islamic Studies helpful but not essential. Enrollment limited to 20 students. L. Peirce. For description, see NES 459 under Near Eastern History.

**NES 662** International Relations of the Middle East (also GOVT 652) Fall. 4 credits. Graduate seminar. Undergrad seniors only with permission of instructor. S. Telhami.

The focus of this seminar will be the contemporary international relations of the Middle East, with special attention paid to patterns of relations among states of the Middle East, and to the international and domestic variables that could account for these patterns. In Part I of the seminar, we will study a) the ways in which superpower competition and changing objectives affect the relations of states in the Middle East; b) the extent to which a change in the distribution of political, military, and economic power in the Middle East alters political, economic and cultural patterns in the region, and c) the impact of domestic variables on the foreign policies of states in the Middle East. In Part II, we will examine three major international crises in the Middle East: the Arab-Israeli conflict, the Iran-Iraq conflict, and the crisis in Lebanon.

**Literature**

**NES 213** Introduction to the Qur'an (also RELST 213) @ Spring. 3 credits. A. Gade. This course examines the sacred book of the Muslims, the Qur'an, and for the purpose of contextualization the life of their Prophet Muhammad. The Qur'an's transmission and form, as well as its major themes, such as God, humanity, prophethood, and the hereafter will be explored. The course will then deal with the theological and mystical interpretations of the Qur'an and the life of Muhammad. The Qur'an's role in art, politics and personal piety of Muslims will also be examined. Finally, the course will discuss some of the recent theories about the origin of the Qur'an and the life of Muhammad, such as those by R. Bell, J. Burton, and J. Wansbrough.

**NES 220** The Greek New Testament (also CLASS 202 and RELST 202) @ Spring. 3 credits. Prerequisite: at least one year of ancient Greek (Classics 101-103) or permission of instructor. Not offered 1997-98. Staff.

**NES 223** Introduction to the Bible (also JWST 223 and RELST 223) @ Spring. 3 credits. C. Baker. This course is intended to introduce students to the literature of the Hebrew Bible, with particular attention paid to the material in Genesis through 1 Kings. Emphasis is placed on literary, historical, and theological matters. Special use is made of the numerous archaeological discoveries that have advanced our knowledge of ancient Israel. As such, the Bible is studied against the backdrop of ancient Near Eastern literature, history, religion, mythology, law and culture.

**NES 230** The Quest for the Historical Jesus (also RELST 231) Spring. 3 credits. C. Baker. Who was Jesus? What did he really say and do? In this course we are concerned with the ways in which scholars approach these questions and the often startling answers they obtain. We examine the social, political, economic and religious environments in which Jesus operated to provide a context for critical readings of the Gospels of Mark, Matthew, Luke, John, and Thomas and other early Christian texts. We then reconstruct the essential features of the original Jesus movement, which we compare and contrast with Cynic philosophy, the Greco-Roman gender system, the belief and practices of the early Church, and the social patterns and religious philosophies of small-scale societies.

**NES 339** Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also JWST 339, COMP LIT 334, RELST 334, NES 639, SPAN LIT 339/699) @ Spring. 4 credits. Enrollment limited to 25 students. R. Brahm. For description, see NES 339 under Near Eastern History.

**NES 356** Readings in Ottoman Turkish @ Fall. 3 credits. C. Baker. For description, see NES 356 under Near Eastern Studies Civilization.

**NES 500** Seminar in Advanced Hebrew (also JWST 400) Spring and fall. 4 credits. Prerequisite: NES 302/JWST 302 or permission of instructor. Enrollment limited to 15 students. N. Scharf.

Continuation of work done in NES/JWST 302, with less emphasis on the study of grammar. We will read and discuss texts of cultural relevance, using articles published in Israeli newspapers and works by authors in each of the three principal genres: poetry, theater and
Section 478

The Program of Jewish Studies

The Program of Jewish Studies encompasses a broad spectrum of disciplines that includes civilization, history, language, literature, philology, and religion. The program offers students the opportunity to take a wide variety of courses in Jewish Studies whose subjects are not represented in the Department of Near Eastern Studies. Students interested in planning a program in Jewish Studies should consult with the director, Professor David A. Owen, 360 Rockefeller Hall. For complete listings and descriptions, see Program of Jewish Studies under "Special Programs and Interdisciplinary Studies."

Related Courses in Other Departments

African Studies
Archaeology
Classics
Comparative Literature
Economics
English
German Studies
Government
History
History of Art
Medieval Studies
Modern Languages and Linguistics
Philosophy
Religious Studies
Romance Studies
Russian Literature
Society for the Humanities
Sociology
Women's Studies

NEPALI

See Language Courses under Languages and Linguistics.

PALI

See Language Courses under Languages and Linguistics.
The study of philosophy provides students with an opportunity to become familiar with some of the ideas and texts 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 students. Sections of Philosophy 100 are part of the freshman writing seminar program; they are taught by various members of the staff on a variety of philosophical topics, and because of their small size (seven to ten students each), they provide ample opportunity for discussion. Students 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 freshmen.

The Major

Students expecting to major in philosophy should begin their study of it in their freshman year. Admission to the major is granted by the director of undergraduate studies of the department on the basis of a student's work during the first two years. Normally the student must have completed two philosophy courses with grades of B or better. Eight philosophy courses are required for the major. They must include at least one course in ancient philosophy (Philosophy 210 or 211), or a course with a large component on Plato or Aristotle (one course in classical modern metaphysics and epistemology (Philosophy 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 1996 will be 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. A course in formal logic (e.g., Philosophy 231), while not required, is especially recommended for majors or prospective majors. Courses numbered 191–199 do not count toward the major.

Philosophy majors must also complete at least 8 credits of course work in related subjects approved by their major advisors. Occasionally majors may serve as teaching or research aids, working with faculty members familiar with their work.

Honors. A candidate for honors in philosophy must be a philosophy major with an average of B- or better for all work in the College of Arts and Sciences and an average of B+ or better for all work in philosophy. In either or both terms of the senior year a candidate for honors enrols in Philosophy 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 Philosophy 490 both terms of their senior year in order to write a satisfactory honors essay. Philosophy 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.

Introductory Courses

These courses have no prerequisites; all are open to freshmen.

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.

PHIL 100 Freshman Writing Seminars in Philosophy
Fall. 3 credits. Consult the brochure listing freshman writing seminars prepared by the John S. Knight Writing Program.

PHIL 101 Introduction to Philosophy

As the title suggests, this is an introductory course. It has an opening unit, a closing unit, and four units in-between. The opening and closing units are devoted to questions concerning the nature and purpose of philosophy, while in each of the four main units a philosophical problem is discussed. The problems belong to four principal areas of philosophy: epistemology, philosophy of mind, ethics, and metaphysics. (If you don't know what some of these terms mean, you can be sure that you will learn something here.) The topics are loosely connected, but each is understandable on its own.

Our first topic is illusions and dreams. We will discuss what, if anything, distinguishes them from experiences we regard as reliable guides to how things are around us. The second topic is minds and minds. We will look at the suggestion that the human brain is a computer and that the mind is its program. Next, we will discuss the relationship between self-interest and morality. We will focus on the strengths and weaknesses of rational egoism. Our final topic is determinism and free will. We will see whether there is a genuine conflict between the theses that all events are causally determined and that some of our actions are free.

PHIL 131 Logic, Evidence, and Argument
Fall. 3 credits. M W F 10:10-11:00.

Logic, Evidence, and Argument is designed as an introduction to the concepts and skills central to critical reading and thinking. The course aims at providing a general understanding of the principles of reasoning and developing skills for identifying, analyzing, and evaluating the sorts of reasoning we encounter everyday in ordinary discourse. Students will be expected to attain facility with two different formal systems for representing and evaluating arguments—propositional logic and traditional syllogistic logic—and to acquire the ability to apply these systems in the analysis and evaluation of various kinds of ordinary reasoning.

PHIL 145 Contemporary Moral Issues
Fall. 3 credits. M W 2:30-3:20. R. Miller.

An examination of central moral issues in American politics today. 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 will analyze the answers and arguments of moral philosophers, political leaders and judges, through both lectures and discussion sections.

PHIL 191 Introduction to Cognitive Science (see Cognitive Studies 101)
Fall. 3 credits. T R 11:40-12:55. M. Spivey-Knowlton.

For description, see Cognitive Studies 101. Does not count toward the Philosophy major or toward the Humanities Distribution Requirement in Philosophy.

PHIL 201 Philosophical Problems
Fall. 3 credits. T R 11:40-12:55. C. Britain.

This course explores the origin and development of Western philosophy in Ancient Greece and Rome. We will explore some of the central ideas of the Pre-Socratics, Socrates, Plato, Aristotle, and the Hellenistic philosophers (Epicsurus, Stoics, and Sceptics). Questions to be considered include: What are the nature and limits of knowledge? 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? This course has no prerequisites.

PHIL 212 Modern Philosophy
Spring. 4 credits. T R 1:25-2:40. Z. Szabo.

This course is an introduction to early modern philosophy (roughly, the period between 1640 and 1790). We will read and interpret five complete works which played a central role in the development of philosophical thought during this time. These works are: Descartes's Meditations, Berkeley's Principles, Leibniz's Monadology, Hume's Enquiry, and Kant's Prolegomena. We will focus on questions concerning the nature, justification, and limits of human knowledge.

The aim of the course is twofold. First, we will analyze and evaluate the arguments these philosophers offer in support of their respective positions. This will make it possible to understand what philosophical problems are, and how philosophical debates might illuminate them. Second, in exploring
the arguments we will also learn about interpretation, about ways of approaching texts that were written centuries ago. This will help to see what changes and what remains the same in our understanding of philosophical problems.

PHIL 213 Existentialism and Literature (also Comparative Literature 213) 4 credits. Not offered 1997-98.


PHIL 231 Introduction to Formal Logic Spring. 4 credits. M W F 10:10-11:00. C. Ginet.
The logic of truth-functional connectives and the universal and existential quantifiers: analysis of English statements in terms of a formal language; evaluation of deductive reasoning in terms of such an analysis. And more. The Macintosh programs, Tarski's World and Hyperproof, will be used.

PHIL 241 Ethics (by petition for breadth requirement) Spring. 4 credits. TR 2:55-4:10. R. Miller.
Introduction to the philosophical study of major moral questions—for example: Are all values relative, or are there some objective moral values? Have we ever any good reason to care about the interests of other people? Do people have rights with which governments should not interfere, even to advance the general welfare? What inequalities are unjust? The course discusses general issues in moral philosophy, together with some of their implications for particular current moral controversies, such as the debates over abortion, reverse discrimination, and policies reducing economic inequality. Readings from major philosophers of the past, as well as contemporary sources.


PHIL 244 Philosophy and Literature 4 credits. Not offered 1997-98.

PHIL 245 Ethics and Health Care Fall. 4 credits. Normally offered also in the six-week summer session. M W F 11:15-12:05. K. Jones.
This course is an introduction to the ethical issues surrounding health care. Topic include: (1) the professional-patient relationship, (2) justice and access to health care, (3) autonomy, quality of life, personhood and their relation to issues such as abortion and euthanasia.

PHIL 246 Ethics and the World Environment Spring. 4 credits. Open to all undergraduates. Permission of instructor required for graduate students. M W F 11:15-12:05. N. Sturgeon.
Critical philosophical analysis of the conceptual frameworks in which policies affecting the environment are formulated and judged. Topics include the nature of ethics and the possibility of ethics; the nature and extent of individual and social obligations to distant people, future generations, non-human animals and non-sentient things (e.g., the ecosystem); the origin of environmental problems and the range of options for their solution.

PHIL 247 Ethics and Public Life Spring. 4 credits. Not offered 1997-98.

PHIL 249 Feminism and Philosophy Fall. 4 credits. M W F 10:10-11:00. J. Whiting.
An historical introduction, using literary as well as philosophical texts, to views about the nature of women and their position in society—from the ancient debate (between Plato and Aristotle) about whether men and women are by nature suited to different activities, to contemporary debates between “sameness” and “difference” feminists. Texts will include Aeschylus, Plato, Aristotle, Rousseau, Wollstonecraft, Engels, and various twentieth-century authors (such as Virginia Woolf, Carol Gilligan, Catherine MacKinnon, and Sarah Hoagland).

PHIL 251 Knowledge and Reality Spring. 4 credits. M W F 2:30-3:20. H. Hodes.
An introduction to philosophical issues concerning knowledge, belief, perception, truth, probability, meaning, causation and necessity.

PHIL 252 Philosophy of Mind Fall. 4 credits. M W F 10:10-11:00. S. Shoemaker.
A study of philosophical issues concerning the place of mind in the physical world, including the mind-body problem (are thoughts and experiences physical entities?), the problem of knowledge of other minds (how can we know that others have minds and are not mere automatons?), the possibility of artificial intelligence (can computers think?), and the problem of personal identity (what makes you the same person you were ten years ago?). Readings from classic and contemporary sources.

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? Religion and Reason 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.

In this course, with the use of classic papers in the philosophy of language and linguistics, we will motivate and introduce the basic concepts behind the project of giving a rigorous theory of meaning for natural language. Our goal will be to understand how philosophers and linguists have used concepts such as reference and truth to explain linguistic content. We will also discuss how issues of learnability and language processing raise constraints for this project.

PHIL 286 Science and Human Nature (also Science and Technology Studies 286) Spring. 4 credits. M W F 10:10-11:00. R. Boyd.
An examination of attempts in the biological and social sciences to offer scientific theories of human nature and human potential and to apply such theories to explain important social and psychological phenomena.

PHIL 294 Global Thinking (also Government 294) Fall. 4 credits. No prerequisites; intended for freshmen and sophomores. TR 1:25-2:40, plus disc. Satisfies geographical distribution requirement. H. Shue.
The analysis taught in this course is global in two different respects: international subjects and interdisciplinary methods. We look in detail at questions raised by one of the most important and most difficult issues facing international society: when, if ever, should other nations unilaterally or multilaterally intervene militarily into ethnic conflicts like those in Bosnia and Rwanda in this decade? Both of these recent events, and one in Europe and one in Africa, raise fundamental questions about the kind of world we are constructing for the 21st century.

To what extent is the system of nation-states we now have either desirable or unavoidable? Does every ethnic group have a right to a self-determining and sovereign state? When is the use of military force morally justified? Should trials for war crimes or crimes against humanity be routinely held after military conflicts? These and other ethical questions need to be answered in light of the best available knowledge about the political dynamics of foreign intervention and the changing international legal regime, bringing together political science, law, and ethics. The course is team-taught by leading faculty researchers from the three fields involved.

Intermediate or Advanced Courses

Some of these courses have prerequisites.

PHIL 309 The Philosophy of Plato Fall. 4 credits. TR 10:10-11:25. C. Shields.
This course offers an in-depth introduction to Plato's philosophy. We will read full dialogues from each of Plato's major periods, with a special emphasis on the most philosophically mature writings in metaphysics and epistemology. Part One of the course will be given over to Plato's earliest works, which mostly try to recount the ethical investigations of Socrates, Plato's teacher. Part Two takes up Plato's own early metaphysical and epistemological developments, including most importantly his introduction of the theory of Forms. Part Three charts Plato's final thoughts on the theory of Forms. In his most challenging works, he raises some formidable objections to that theory. We will consider whether these objections are compelling. Throughout the semester our aim will be to analyze and assess Plato's arguments in an effort to determine whether we should accept them ourselves.
PHIL 310 Aristotle
Spring. 4 credits. T R 10:10–11:25.
J. Whiting.
A general introduction to Aristotle's works—from the logical and biological through the ethical and political—organized around the differences, and relations, between his theoretical or scientific works and his practical or ethical works. Other topics will include: the extent to which his ethical and political views are based on his metaphysical and psychological views; and the contrast between the universality and exactness of mathematics and other sciences and the alleged particularity and inexactness of ethics.

PHIL 311 Modern Rationalism

PHIL 312 Modern Empiricism
Fall. 4 credits. M W F 1:25–2:15.
S. Shoemaker.
An examination of the epistemological and metaphysical views of Bishop Berkeley and David Hume. Readings will include Berkeley's Principles of Human Knowledge and Three Dialogues Between Hylas and Philonous, and Hume's Treatise of Human Nature, Bk. I, and Enquiry Concerning Human Understanding. Topics will include the nature of perceptual knowledge, the origin of ideas and the nature of "abstract ideas," the nature of sensible things, the nature of empirical reasoning, the nature of causation, and the nature of the self.

PHIL 314 Ancient Philosophy: The World of Theory and the World of Ordinary Life

PHIL 315 Medieval Philosophy

PHIL 316 Kant

PHIL 317 Hegel

PHIL 318 Twentieth-Century Philosophy
A survey of philosophical writings from the late 19th to early 20th century including G. Frege, B. Russell, L. Wittgenstein, on language, foundations of mathematics, topics in metaphysics (and perhaps epistemology).

PHIL 319 Philosophy of Marx

PHIL 321 Formal Logic (also Mathematics 281)
Fall. 4 credits. M W F 2:30–3:20.
H. Hodges.
Review of derivations and truth-in-a-model; functions, constants and identity; truth in non-finally-distinguished models; very basic set-theory; sets as the only mathematical objects; mathematical induction; soundness; completeness.

PHIL 332 Philosophy of Language
Fall. 4 credits. T R 11:40–12:55. Z. Szabo.
This course is an introduction to contemporary philosophy of language. Its main focus is the notion of singular reference. The course has four parts. In the first, we will read texts by Frege, Russell, Strawson and Quine which frame the basic problems. In the remaining three parts we will examine questions concerning the three main types of singular terms: descriptions, names and demonstratives. Reading will include papers by Saul Kripke, Keith Donnellan, John Searle, Gareth Evans, David Kaplan, and Irene Heim. The aim of this course is threefold. First, we will read classic papers which will help you to orient yourself in the literature. Second, we will try to connect some of the linguistic data with theories that are largely motivated by philosophical considerations. Finally, we will discuss the larger philosophical significance (within metaphysics, epistemology and the philosophy of mind) of problems of singular reference.

PHIL 341 Ethical Theory

PHIL 342 Law, Society, and Morality (also Law 666)

PHIL 343 Resistance and Responsibility (also Law 676)

PHIL 344 History of Ethics: Ancient and Medieval

PHIL 345 History of Ethics: Modern

PHIL 346 Modern Political Philosophy (also Government 462)
Fall. 4 credits. T R 2:55–4:10. R. Miller.
A study of the leading contemporary theories of justice, including the work of Rawls, Nozick, Gauthier and Scanlon. We will discuss rival views of the moral significance of economic inequality, the kinds of freedom that governments ought to protect, the kinds of values and convictions that are a proper basis for laws (as opposed to being private matters), the tension between unequal political influence and democratic rights, and the roles of community, virtue and group-loyalty in political justification. We will largely be concerned with the conceptions of freedom, equality, obligation and community underlying competing theories. We will also consider implications for specific political controversies, e.g., over abortion, welfare programs and pornography.

PHIL 361 Metaphysics and Epistemology
Topics in epistemology. Attention to both a priori and a posteriori knowledge.

PHIL 362 Philosophy of Mind

PHIL 363 Topics in the Philosophy of Religion

PHIL 368 Global Climate and Global Justice (also Government 368)

PHIL 369 Limiting War: The Morality of Modern State Violence (also Government 469)

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also Science and Technology Studies 381)
Fall. 4 credits. W 7:30–10:00 p.m. R. Boyd.
An examination of central epistemological and methodological issues raised by scientific theorizing: the nature of evidence, scientific objectivity; the nature of theories, models, and paradigms; and the character of scientific revolutions.

PHIL 382 Philosophy and Psychology

PHIL 383 Choice, Chance and Reason
Fall. 4 credits. M W F 1:25–2:15.
H. Hodes.
Orderings and choice functions; plausible constraints on rational choice; decision under strict uncertainty; value functions, multi-attribute value theory, probability, utility and Bayesian analysis; decision trees; social choice. We'll attend to the mathematical ideas and the philosophical issues they raise. Students should have some familiarity with mathematical proofs, recommended background: one year of calculus.

PHIL 384 Philosophy of Physics

PHIL 387 Philosophy of Mathematics

PHIL 389 Philosophy of Science: Evidence and Explanation

PHIL 390 Informal Study
Fall or spring. Credit to be arranged. 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 395 Majors Seminar

PHIL 409 German Philosophical Texts (also Classics 311)
Fall and spring. Variable credit. Prerequisites: knowledge of Latin and permission of instructor. Hours to be arranged. S. MacDonald.
Reading of philosophical texts in the original Latin.

PHIL 411 Greek Philosophical Texts
Fall and spring. Variable credit. Prerequisites: knowledge of Greek and permission of instructor. Hours to be arranged. C. Shields; spring, C. Brittain.
Reading of philosophical texts in the original Greek.

PHIL 410 Latin Philosophical Texts (also Classics 311)
Fall and spring. Variable credit. Prerequisites: knowledge of Latin and permission of instructor. Hours to be arranged. S. MacDonald.
Reading of philosophical texts in the original Latin.

PHIL 412 Medieval Philosophy
Not offered 1997–98.

PHIL 413 Aristotle's Theory of Substance: Beings and Living Beings
Fall. 4 credits. T R 1:25–2:40.
C. Shields.
Aristotle offers an account of substance in which living beings figure prominently. Our aim in this class is to determine and assess Aristotle's mature theory of substance, first by focusing on the criteria he develops for what living beings satisfy so well. This will require understanding how Aristotle conceives of the nature of life and living beings; it will
Accordingly require an investigation into Aristotle's conception of soul as form. Our main texts will be the *Metaphysics* and *De Anima*. Fairly clearly, the *De Anima* draws upon the technical machinery of the *Metaphysics*. It is less clear, however, whether the theory of soul adumbrated in the *De Anima* shapes the account of substance advanced in the *Metaphysics*.

**PHIL 414 German Philosophy after Kant**
Not offered 1997-98.

**PHIL 415 Special Topics in the History of Philosophy**
Fall. Not offered 1997-98.

**PHIL 416 Modern Philosophy**
Not offered 1997-98.

**PHIL 431 Deductive Logic (also Mathematics 481)**
4 credits. Not offered 1997-98.

**PHIL 432 Topics in Logic (also Math 482)**
Spring. 4 credits. Prerequisites: One logic course either from the Mathematics Department or from the Philosophy Department at least at the 300-level, or permission of the instructor. T R 10:25-11:40. H. Hodes.

**PHIL 433 Philosophy of Logic**
4 credits. Not offered 1997-98.

**PHIL 434 Intensional Logic (also Math 48B)**
Fall. 4 credits. Prerequisite: Philosophy 231 or the equivalent and permission of the instructor. T R 4:30-5:45. J. Stanley.

The central focus of this class will be the model theory of propositional modal logics (and, in particular, completeness proofs for various different modal systems). We will also cover basic issues in the model theory of quantified modal logic. Time permitting, we may also discuss the basic concepts of free logic and tense logic.

**PHIL 437 Topics in the Philosophy of Language**
4 credits. Not offered 1997-98.

**PHIL 441 Contemporary Ethical Theory**
4 credits. Not offered 1997-98.

**PHIL 442 Ethics and Value Theory (also Society for Humanities 404)**
Fall. 4 credits. Not offered 1997-98.

**PHIL 444 Contemporary Legal Theory**
(also Law 710)
4 credits. Not offered 1997-98.

**PHIL 446 Topics in Social and Political Philosophy (also Government 474)**

Topic for 1998: Community, Nation and Morality. Although the moral point of view is often taken to transcend ties to particular groups, actual political choices often express the choosers' ties to a nationality, state, community, religion or racial or ethnic group. To what extent are such choices morally legitimate? Do such choices, expressing particular loyalties, conflict with universalist moral principles, e.g., principles requiring equal respect for all? Our discussions will include such topics as: the role of community in liberalism and in critiques of liberal individualism; nationality and political community and their roles in individual identity, moral obligation and justice; multiculturalism, separatism, and group rights, including, for example, those of race, gender and sexuality; the moral status of patriotism; justice and international inequality; the impact on individuals and minority groups of collective goals and shared convictions of the majority. Readings will include work by Taylor, Kymlicka, Waldron, David Miller, MacIntyre, Nagel, Guinier, Walzer and Nussbaum. The course will have a seminar format. It is intended for both advanced undergraduates and graduate students.

**Philosophy 461 Feminist Epistemology**
(also Women's Studies 461)
Fall. 4 credits. T R 10:10-11:25. K. Jones.

Topic for 1997: Recent feminist work in epistemology and metaphysics. Many feminists recognize that the concepts of reason and objectivity have served the ideological function of maintaining oppressive social structures by, among other things, delegitimizing knowledge claims on the part of the oppressed. At the same time, radical critiques of reason and objectivity threaten to self-undermining, casting into doubt the status of the critique itself. The course begins with this problem. We also examine feminist work on the social construction of gender and the role that "experience" has played in discussions of whether women are a social group.

**PHIL 481 Problems in the Philosophy of Science**
Spring. 4 credits. W 7:30-10:00. R. Boyd.
Topic to be announced.

**PHIL 490 Special Studies in Philosophy**
Fall and spring. 4 credits. Open only to honors students in their senior year. See Honors description at front of Philosophy section.

**PHIL 601 Ancient Philosophy**
4 credits. Not offered 1997-98.

**PHIL 602 Medieval Philosophy**
Spring. 4 credits. T 4:30-6:30. S. MacDonald.
Topic to be announced.

**PHIL 611 Modern Philosophers**
4 credits. Not offered 1997-98.

**PHIL 612 Philosophy of Language**
4 credits. Not offered 1997-98.

**PHIL 621 History of Philosophy**
4 credits. Not offered 1997-98.

**PHIL 633 Philosophy of Language**
4 credits. Not offered 1997-98.

**PHIL 641 Ethics and Value Theory**
Fall. 4 credits. M 4:30-6:30. N. Sturgeon. Spring. 4 credits. M 4:30-6:30. J. Whiting.


**PHIL 661 Theory of Knowledge**
4 credits. Not offered 1997-98.

**PHIL 662 Philosophy of Mind**
4 credits. Not offered 1997-98.

**PHIL 663 Philosophy of Religion**
4 credits. Not offered 1997-98.

**PHIL 664 Metaphysics**
4 credits. Not offered 1997-98.

**PHIL 665 Metaphysics**
4 credits. Not offered 1997-98.

**PHIL 668 Philosophy of Science**
4 credits. Not offered 1997-98.

**PHIL 669 Philosophy of Social Science**
4 credits. Not offered 1997-98.

**PHIL 770 Informal Study**
Fall or spring. Credit to be arranged. To be taken by graduate students only in exceptional circumstances and by arrangement made by the student with his or her Special Committee as well as the faculty member who has agreed to direct the study.

**PHIL 773 Proseminar in Cognitive Studies (also cognitive Studies 773, Linguistics 773, and Computer Science 773)**
Fall. 2 credits. Fall. R grade.
For description, see COGST 773.

**PHIL 774 Proseminar in Cognitive Studies (also Linguistics 774)**
For description, see COGST 774.

**Related Courses in other departments**
German Studies 378. German Aesthetic Theory from Kant to Hegel. P. Gilgen.

**PHYSICS**

The Department of Physics offers a full range of university-level work in physics, from general education courses for nonscientists to doctoral-level independent research. Major research facilities are operated by two component organizations, the Laboratory of Atomic and Solid State Physics (LASSP) and the Laboratory of Nuclear Studies (LNS). LASSP carries out extensive research efforts in condensed-matter physics and in low-temperature physics. LNS 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. Junior and senior 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 honors version 116-217-218. In addition, there is a group of general-education courses, Physics 200 through 206, 209, 210. Physics 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. Physics 112 and 207 both require calculus (Mathematics 191 or
PHYSICS 483

111), and additional mathematics is required for subsequent courses in the sequence. Physics 101-102 or 207-208 may be taken as terminal physics courses. The three-term sequence 112–213–214 or its honors version, 116–217–218, is recommended for engineers and physics majors. Physics 214 and 218 are placing an increasing emphasis on use of the computer for homework, laboratory exercises, and projects; some knowledge about computing, perhaps at the level of Computer Science 99 or 101, is desirable.

Courses beyond the introductory level that might of be interest to nonmajors include:

Physics 316, (Modern Physics I); Physics 330, (Modern Experimental Optics); and Physics 360, (Electronic Circuits).

Advanced placement and credit are offered as outlined in "Advanced Placement of Freshmen," or students may consult Professor Galik, 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 major program in the field of physics but have other post-graduation goals. Students who wish to major in physics are advised to start the physics sequence in the first term of their freshman year. (Note that students who have had contact with introductory calculus may take Physics 112 with registration in Mathematics 191.) The major program can still be completed with a second-term start, but flexibility in future course scheduling is reduced.

Prospective majors are urged to make an early appointment at the physics office for advice in program planning. Acceptance into the major program is normally granted upon completion of a year of physics and mathematics courses at Cornell with all course grades at the B-level or higher. The department office will give advice in the matter of selecting a major faculty adviser. Details of the major course program are worked out in consultation between the student and major faculty adviser.

Physics Core

Common to all major programs is a requirement to complete a core of physics courses. In addition to the three-term introductory sequence (Physics 112–213–214 or Physics 116–217–218), the core includes five upper-level courses—(a) the two-course sequence in modern physics (Physics 316–317), (b) at least three semester hours of laboratory work selected from Physics 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 Mathematics 294 or 222. Students following the professional/graduate school channel are expected to complete at least one additional year of applicable mathematics (Applied and Engineering Physics 321–322 or Mathematics 321/420–422).

In addition to the core, each physics major must complete 15 semester hours of credit in an area of concentration which has been agreed upon 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 Physics 116–217–218 is encouraged. Core courses in mechanics and electromagnetism will normally be Physics 318 and Physics 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 Physics 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 upon between student and major faculty adviser.

Concentration outside Physics

The 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 8 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 bio-physics. Students interested in a career in the teaching of science should consider the Teacher Education in Science and Mathematics (TESM) program, which is administered by the Department of Education and is described in detail in the College of Agriculture and Life Sciences section of this catalog. A concentration in "science education" would then typically include Education 402 and 403, both part of TESM, and two or more courses designed to broaden the student's background in general science and mathematics.

For students with concentrations outside physics, the core requirements in mechanics and electromagnetism can be appropriately met with Physics 314 and Physics 325, respectively.

Students with an astronomy concentration who might continue in that field in graduate school should use Astronomy 410, 431, 432 as part of the concentration; they are encouraged to use Physics 318 and 327 to satisfy the core requirements in mechanics and electromagnetism.

Foreign Language Requirement

Students interested in eventual graduate work in physics are advised to meet this College of Arts and Sciences requirement with work in French, German, or Russian.

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 if a student wishes to complete a major in physics as well as a major in one or more other subjects, any course used to satisfy

Typical Physics Course Sequences (other sequences are also possible)

<table>
<thead>
<tr>
<th>Semester</th>
<th>No AP math 1 year AP calculus and good HS physics</th>
<th>Outside concentrators</th>
<th>Outside concentrators (alternate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st - Fall</td>
<td>112</td>
<td>116</td>
<td>112</td>
</tr>
<tr>
<td>2nd - Spring</td>
<td>213</td>
<td>217</td>
<td>213</td>
</tr>
<tr>
<td>3rd - Fall</td>
<td>214</td>
<td>218</td>
<td>214</td>
</tr>
<tr>
<td>4th - Spring</td>
<td>316, 3x0</td>
<td>316, 3x0</td>
<td>3x0</td>
</tr>
<tr>
<td>5th - Fall</td>
<td>317, 327, 3x0</td>
<td>317, 327, 3x0</td>
<td>3x0</td>
</tr>
<tr>
<td>6th - Spring</td>
<td>314/318, 443</td>
<td>314, 443</td>
<td>314</td>
</tr>
<tr>
<td>7th - Fall</td>
<td>341, 410</td>
<td>341, 410</td>
<td>317, 325</td>
</tr>
<tr>
<td>8th - Spring</td>
<td>Elective(s)</td>
<td>Elective(s)</td>
<td>317, 323</td>
</tr>
</tbody>
</table>

• 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. Physics 207 may be substituted for Physics 112. Students taking 217 after 112 must register for 216.

• Exceptionally well-prepared students may be able to begin work at Cornell with Physics 217. Such students should come to the department office for advice in planning a course program.

• Physics electives include 360, 444, 454, 455, 480, 525, 553, 561, 572, the senior seminars 481-483, Astronomy 332 or 431-432, and A&EP 434, 436.

• One semester of intermediate laboratory, listed here as 3x0, is required.

• Well-prepared sophomores wishing to take Physics 318 should consult the instructor before registering.
a requirement of the second major may not be used also in satisfaction of any physics major requirement.

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

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 urged to discuss their preparation and background with a physics adviser or with the instructor in the course. In many cases an appropriate individual program can be worked out without exact adherence to the stated prerequisites.

Courses
Listed days and times are not definite but are unlikely to change. Days and times will not be listed for 600-level courses.

PHYS 101-102 General Physics
101. fall, 102; spring: 101, 102, summer 4-week or 8-week session. 4 credits each term. General introductory physics for non-physics for non-physics majors. Prerequisites: Three years of high school mathematics, including some trigonometry. A student without high school physics should allow extra time for Physics 101. Prerequisite for Physics 102: Physics 101 or 112 or 207. Includes less mathematical analysis than Physics 101 and 207-208 but more than Physics 200-206, 209, 210. Enrollment may be limited. Fall introductorylec. R Aug. 28 or M Sept. 1, 7:30 p.m. Spring introductorylec. M Jan. 19, 7:30 p.m. 101, D. Fitchen; 102, D. Cassel.

Physics 101-102 emphasizes quantitative and conceptual understanding of the topics of introductory physics developed without use of calculus. The course is mostly self-paced in a mastery-oriented format including eight subject units and a final retention (review) unit each term. Most instruction occurs in the learning center utilizing video-taped lectures, personal tutoring by staff, assigned laboratory exercises, and programmed solutions of sample test questions. Unit testing is designed to measure mastery with a limit of three test tries taken at times of the student’s choice. Major topics for 101: kinematics, forces and dynamics, momentum, energy, fluid mechanics, waves and sound, thermal physics, kinetics, thermodynamics. For 102: electricity and magnetism, optics, relativity, atomic, quantum, and nuclear physics. At the level of Physics by Cutnell and Johnson.

PHYS 103 General Physics
Summer. 4 credits. Prerequisite: Three years of high school mathematics, including some trigonometry. Primarily for students majoring in the life sciences. Lectures and discussions. M-F 10:00-11:15; laboratories M W 2:00-5:00. Basic principles treated quantitatively but without calculus. Kinematics, forces and fields, momentum, angular momentum and energy, thermal physics, fluid mechanics, and sound waves. Text at the level of Physics, 3rd edition, by Cutnell and Johnson.

PHYS 112 Physics I: Mechanics
Fall, spring, summer 6-week session. 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisite: coregistration in Mathematics 192 or 194 or 112 or substantial previous contact with introductory calculus combined with coregistration in Mathematics 191 or 111. Lec. M W F 10:10-11:00 or 12:20-1:10. Two rec. and one lab/cooperative learning session each week. Evening exams. Fall. P. Krasiycky; spring, R. Galik.


PHYS 116 Physics I: Mechanics and Special Relativity
Fall, spring. 4 credits. More analytic than Physics 207-208 but more rigorous version of Physics 112, intended for students who will be comfortable with a deeper, somewhat more abstract approach. Intended mainly but not exclusively for prospective physics majors. Prerequisites: a good secchology physics course and familiarity with basic calculus. Corrective transfers between Physics 116 and Physics 112 (in either direction) are encouraged during the first few weeks of instruction. Lec. M W F 10:10-11:00. Fall, H. Tye; spring, R. Patterson.

A more rigorous version of Physics 112, covering similar topics at the level of An Introduction to Mechanics, by Kleppner and Kolenkow.

PHYS 190 Supplemental Introductory Laboratory
Fall, spring. 1 credit. Times by arrangement with instructor. S-U only. (first offered spring 1996) Enrollment limited to students who have all of the following; (i) three transfer credits for introductory physics lecture material; (ii) a degree requirement of the laboratory component of that introductory course; (iii) approval of the director of undergraduate studies; (iv) permission of the lecturer of that course at Cornell. Enrollment limited. A Physics 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 (Physics 112, 213, 214) to complement the lecture and 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 director of undergraduate studies.

PHYS 200 Art, Archaeology, and Analytical Toolbox Engineering 185, MS&E 285, Archaeology 285, and Art 372
For description, see ENGR 185.

PHYS 201 Why the Sky Is Blue: Aspects of the Physical World
Fall. 3 credits. Lec. T R 2:55-4:10, rec. W 2:30-3:20 or W 3:35-4:25. A. Sadoff. This is a descriptive physics course aimed specifically at the non-science 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 for Poets by March.

PHYS 202 The World According to Physics—The Way Things Work
Summer 3-week session. 3 credits. Prerequisite: three years of high school mathematics, including some trigonometry. M T W F 10:00-12:00, L. Maruggi. Two 2 afternoons per week to be arranged. R. Lieberman. Intended to provide students majoring in fields outside the sciences with an appreciation for the familiar physical world surrounding them. Which falls faster, a pound of gold or a pound of feathers? What trajectory does a launched rocket follow? Why are the curves on highways banked? What actually keeps a satellite circling the earth—why doesn’t it just fall down or fly away? Can you build a ship that runs off the heat found in the ocean? With an emphasis on problem solving, the course helps the student to develop skills transferable to other areas. Topics include Newton’s basic laws of motion, trajectories, satellites, space travel, and the concepts of energy.

PHYS 203 Physics of the Heavens and the Earth—A Synthesis

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; 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 the brilliant insights made by fascinating people, offering at the same time a humanistic perspective.

PHYS 204 Physics of Musical Sound
Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra. Lec. M W F 9:05-9:55; rec. R or F 3:35-4:25. E. Cassel.

Many features of the production, propagation, and perception of musical sound may be understood in terms of important concepts in physics. Topics covered will include the mechanism of tone production in musical instruments, distinctions in tone quality, musical scales and tuning, some basic principles of room acoustics and reproduction.
of sound, and aspects of the mechanism of hearing. At the level of \textit{The Science of Sound}, by T. D. Rossing.

**PHYS 205 Reasoning about Luck**  
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. Lec. T R 2:30–4:00; rec. T 2:30–3:20. L. N. Hand.

An attempt to explain how and when natural scientists can cope rationally with chance. The first part is a constructive way with the basic ideas of probability theory and explains why it is that in large systems likely events can become overwhelmingly likely. An introduction to mechanics and to heat as probabilistic mechanics follows. In this way, interested students are given a nontrivial understanding of the second law of thermodynamics, that putative bridge between C. P. Snow's two cultures. Another physical theory, quantum mechanics, in which chance occurs—though in a somewhat mysterious way—is touched on.

**PHYS 206 War and Peace in the Nuclear Age (also Government 384)**  

This course is intended for any student who wishes to understand the following: the evolution and history of military strategy; the development in 20th-century physics that culminated in the development of the "atomic" bomb; the principles, types, and effects of nuclear weapons; the development of arms-control negotiations. The course will also examine the military concepts involved in military strategy and arms control. Much attention will be given to the problem and mechanisms of control of proliferation and weapons of mass destruction. Assignments emphasize critical reasoning skills as well as the technical subject matter.

**PHYS 207-208 Fundamentals of Physics**  
207: Fall, 208: spring. 4 credits each term.  
Prerequisites for Physics 207: high school physics plus Mathematics 111 or 191, or substantial previous contact with introductory calculus, combined with coregistration in a math course approved by instructor.  
Prerequisites for Physics 208: Physics 207 or 112 or 101 and at least coregistration in Mathematics 112 or 192. Physics 207-208 is a two-semester introduction to physics with emphasis on tools generally applicable in the sciences, intended for students majoring in a physical science, mathematics, or an analytically oriented biological science. Lec. M W F 9:05–9:55 or 11:15–12:05. Two rec. each week and one 3-hour lab alternating weeks. Evening exams. Lec. P. Drell; spring, P. Lepage.

Temperature, heat, thermal energy, electrostatics, behavior of matter in electric fields, DC circuits, magnetic fields, Faraday's law, Maxwell's equations, electromagnetic oscillations. At the level of \textit{Physics for Scientists and Engineers}, by Serway. Laboratory covers electrical measurements, circuits, and some aspects of heat transfer.

**PHYS 210 Randomness in Classical and Quantum Physics**  
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. Lec. T R 1:25–2:40; rec. M 2:30–3:20 or M 3:35–4:25. N. D. Mermin.

We will examine two revolutionary fields of classical physics, one venerable and one relatively recent: the special theory of relativity will be developed, with a view to understanding how certain simple but apparently contradictory facts about light lead to extraordinary insights into the nature of time; and the newer subject of "chaos" will be explored, with a view to seeing how extremely simple rules can lead to behavior of breathtaking complexity.

**PHYS 211 Physics II: Heat/ Electromagnetism**  

Temperature, heat, thermal energy, electrostatics, behavior of matter in electric fields, DC circuits, magnetic fields, Faraday's law, Maxwell's equations, electromagnetic oscillations. At the level of \textit{Physics for Scientists and Engineers}, by Serway. Laboratory covers electrical measurements, circuits, and some aspects of heat transfer.

**PHYS 212 Physics II: Optics, Waves, and Particles**  

Physics of wave phenomena, electromagnetic waves, interference and diffraction effects, wave properties of particles and introduction to quantum physics. Course includes computer use in solving problems and labs. At the level of \textit{Physics for Scientists and Engineers}, by Serway.

**PHYS 216 Introduction to Special Relativity**  
Fall, spring. Based upon preregistration. 1 credit. S-U only. Enrollment may be limited. Course will be completed within first four to six weeks of term.  
Registration in this course is a requirement for registration in Physics 217, unless 192 student has taken a relativity course at the level of Physics 116 or Astronomy 106. Prerequisites: Physics 112 or Physics 207 or permission of instructor. Lec. T R 8:00–8:50. Fall, spring, staff.

Introduction to Einstein's Theory of Special Relativity: Galilean and Lorentz transformations, the concept of simultaneity, time dilation and Lorentz contraction, the relativistic transformations of velocity, momentum and energy, and relativistic invariance in the laws of physics. At the level of \textit{An Introduction to Mechanics} by Kleppner and Kolenkow or \textit{Space and Time in Special Relativity} by Mermin.

**PHYS 217 Physics II: Electricity and Magnetism**  
Fall, spring. 4 credits. Enrollment may be limited.  
Intended for students who have done very well in Physics 112 or 116 and in mathematics and who desire a more analytic treatment than that of Physics 213. Prospective physics majors are encouraged to select Physics 217. Prerequisites: approval of student's adviser and permission from the instructor. A placement quiz may be given early in the semester, permitting those students who find Physics 217 too abstract or analytical to transfer into Physics 213, which they can do without difficulty at that time. Vector calculus will be taught in this course, but previous contact, especially with the operations \textit{grad}, \textit{div}, and \textit{curl}, is helpful. It is assumed the student has seen Special Relativity at the level of Physics 116 or is currently enrolled in Physics 216. It is also assumed that the student has covered the material of Mathematics 192 and is coregistered in Mathematics 293 or the equivalent. Lec. M W F 10:10–11:00. Fall, staff; spring, K. Berkelman.

At the level of \textit{Electricity and Magnetism}, by Purcell (Vol. 2, Berkeley Physics Series).

**PHYS 218 Physics III: Waves and Thermodynamics**  
Fall, spring. 4 credits. Enrollment may be limited.  
A more rigorous version of Physics 214. Conditions governing enrollment are similar to those of Physics 217. Lec. M W F 11:15–12:05. Fall, J. Brock; spring, E. Bodenschatz.

Topics covered in recent years have included oscillators, mechanical waves, waves at interfaces, standing waves, electromagnetic waves, guided waves, scattering, interference and diffraction, geometric optics, the doppler effect, and an introduction to water waves. Evening exams may be scheduled. At the level of \textit{Physics of Waves} by Elmore.

**PHYS 310 Intermediate Experimental Physics**  
Spring. 3 credits. Enrollment may be limited. Prerequisite: Physics 208 or 213. Labs T 1:25–4:25.

Students select from a variety of experiments. An individual, independent approach is encouraged. Facilities of the Physics 410 lab are available for some experiments.
PHYS 314 Intermediate Mechanics
Spring. 4 credits. Prerequisites: Physics 208 or 214 (or equivalent) and Math 293 or 294 (or equivalent). This course in Applied and Engineering Physics 322 or coregistration in Mathematics 420 recommended. Intended for physics majors with concentration outside of physics or astronomy; Physics 314 covers similar material at a more analytical level. Lec. M W F 10:10–11:00, rec. F 1:25–2:15. C. Franck.
Includes Newtonian mechanics, Lagrange and Hamilton formulations, central forces, rigid body motion, and planetary motion. At the level of Classical Dynamics by Marion and Thornton.

PHYS 316-317 Modern Physics I and II
3 credits each term. Physics 316, fall; Physics 317, fall. The two courses comprise a two-term sequence and it is assumed that majors registering in Physics 316 will continue with Physics 317.
Introduction to the physics of microscopic phenomena, emphasizing the use of elementary quantum and statistical mechanics. Physics 316: Breakdown of classical concepts in microphysics, quanta and matter waves; Schrödinger equation and solutions in 1 and 3 dimensions; hydrogen atom, exclusion principle, the periodic table at the level of Modern Physics from A to Z by Rohlf. Physics 317: Classical statistical mechanics; molecules; solid state physics; nuclear physics and radioactivity; elementary particle physics at the level of An Introduction to Quantum Physics by French.

PHYS 318 Analytical Mechanics
Spring. 4 credits. Prerequisites: Physics 110 or permission of instructor; Applied and Engineering Physics 321 or Mathematics 420. Intended for junior physics majors concentrating in physics or astronomy. Physics 318 covers similar material at a less demanding level. Lec. M W F 10:10–11:00; rec. T 10:30–11:20. R. M. Clar.
Newtonian mechanics of particles and systems of particles, including rigid bodies; oscillating systems; gravitation and planetary motion; moving coordinate systems; Lagrange and Hamilton formulations; normal modes and small vibrations; introduction to chaos. At the level of Mechanics by Landau and Physics 318 Lecture Notes by Hand and Finch. Supplementary reading will be assigned.

PHYS 323 Intermediate Electricity and Magnetism
Fall. 4 credits. Prerequisites: Physics 208 or 214 (or equivalent) and Math 293 or 294 (or equivalent); coregistration in Applied and Engineering Physics 321 or Math 321 or 420 recommended. Intended for physics majors with concentration outside of physics or astronomy; Physics 323 covers similar material at a more analytical level. Lec. M W F 11:15–12:05, rec. F 2:30–3:20. G. F. Dugan.
Includes electrostatics, magnetostatics, boundary value problems, dielectric and magnetic media, Maxwell's Equations, and electromagnetic waves, and sources of electromagnetic radiation.

PHYS 327 Advanced Electricity and Magnetism
Electro and magnetostatics, vector and scalar potentials, Laplace's Equation and boundary value problems, multipoles, radiation-solutions to Maxwell's Equations, energy-momentum of radiation, electromodynamics in media; special relativistic-transformations, four vectors, particle kinematics and dynamics, relativistic electro-dynamics. At the level of Classical Electromagnetic Radiation, by Heald and Marion.

PHYS 330 Modern Experimental Optics (also A&E&P 330)
A practical laboratory course in basic and modern optics. The seven projects cover a wide range of topics from geometrical optics to classical wave concepts 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. The students will also be introduced to digital imaging and image processing techniques. At the level of Modern Optics by Guenther.

PHYS 341 Thermodynamics and Statistical Physics
Statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Concepts of temperature, laws of thermodynamics, entropy, thermodynamic relations, free energy. Applications to phase equilibrium, multicomponent systems, chemical reactions, and thermodynamic cycles. Application of statistical mechanics to physical systems; 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&E&P 363)
Fall, spring. 4 credits. Prerequisites: Physics 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 is usually less crowded. Lec. M 2:30–4:25; labs, T R or W F 1:35–2:45 (also evening labs M W 7:30–10:30 spring). Fall, E. Kirkland; spring, R. Thorne.
Analyze, design, build and experimentally test circuits used in scientific and engineering instrumentation (with discrete components and integrated circuits). Analyze linear amplifiers with feedback, oscillators, comparators, filters, diodes and transistors. Digital circuits: combinatorial (gates) and sequential (flip-flops, counters, shift registers) logic. Computer interfacing introduced and used to investigate digital to analog (DAC) and analog to digital conversion (ADC) and signal averaging. At the level of Microelectronic Circuits by Sedra.

PHYS 400 Informal Advanced Laboratory
Fall, spring. (Summer, 6 week session). Variable to 3 credits. Prerequisites: two years of physics or permission of instructor. Lab T W 1:25–4:25. Fall, W. Ho; spring, D. Hartill.
Experiments of widely varying difficulty in one or more areas, as listed under Physics 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: Physics 214 (or 310 or 360) plus 318 and 327, or permission of instructor. Lec. M 2:30–3:20, lab T W 1:25–4:25. Fall, W. Ho; spring, D. Hartill.
Selected topics in experimental concepts and techniques. About forty different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, nuclear physics. The student performs three to six diverse 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 Introductory Quantum Mechanics
Spring. 4 credits. Prerequisites: Physics 327 or 323, and Physics 316 and Applied and Engineering Physics 321 or Mathematics 420; coregistration in Physics 320 or 318; permission of instructor. Lec. M W F 9:05–9:55, rec. F 9:05–10:00. Staff.
Introduction to concepts and techniques of quantum mechanics, at the level of Quantum Mechanics, by Cohen-Tannoudji.

PHYS 444 Nuclear and High-Energy Particle Physics
Behavior of high-energy particles and radiation; elementary particles; basic properties of accelerators and detectors; general symmetries and conservation laws. At the level of Concepts of High Energy Physics, by Gottfried and Weisskopf.

PHYS 454 Introductory Solid-State Physics (also A&E&P 450)
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, 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
Spring and summer. Prerequisite: Physics 327 and at least coregistration in Physics 318 or permission of instructor. Usually offered every other spring. Lec. T R 10:10–11:25.

Geometrical methods are an essential tool in modern theoretical physics and also provide deep insights into classical physics—electrodynamics, thermodynamics, mechanics, special and general relativity. This course will introduce basic concepts from topology and differential geometry, emphasize calculation methods and illustrate their utility by drawing examples from these areas of physics. In particular, we shall cover manifolds, differential forms, vector bundles, homotopy, homology and lie groups. At the level of Geometrical Methods of Mathematical Physics by Schutz.

PHYS 480 Computational Physics (also Phys 680 and Astro 690)
Spring. 3 credits. S-U grades only. Prerequisites: The course assumes a good background in the standard "mathematical methods for physics," and the ability to write programs in Fortran or C. No previous knowledge of numerical analysis is assumed. Lec. T R 10:10–11:25.

S. Teukolsky.

A course designed to familiarize students with numerical techniques for solving diverse problems in physics and related fields. The problems will be drawn from many different branches of physics, but the emphasis will be on common techniques of solution. Numerical techniques discussed in the course will include ordinary and partial differential equations, linear algebra and eigenvalue problems, Monte Carlo techniques, solving nonlinear equations, fast Fourier transforms, etc. In contrast to traditional numerical analysis courses, the flavor of the course will be "how-to," rather than theoretical. No theorems will be proved. Students will be expected to solve, both individually and in small teams, assigned numerical exercises. Text: Numerical Recipes: The Art of Scientific Computing, by Press, Teukolsky, Flannery, and Vetterling.

PHYS 481–489 Special Topics Seminar
Offerings are announced each term. 2 and 3 credits. Limited to senior physics majors and those who receive permission of instructor. S-U grades only.

PHYS 490 Independent Study in Physics
Fall or spring. Variable to 4 credits. Ordinarily limited to seniors. Prerequisite: permission required of professor who will direct proposed work. A copy of Request for Independent Study form must be filed with the 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 facility in one or more areas, as listed under Physics 510, may be done to fulfill student's special requirements.

PHYS 510 Advanced Experimental Physics
Fall, spring, summer. 3 credits. Lab. T W 1:25–4:25. Fall, W. Ho; spring, D. Hartill. About sixty different experiments are available in acoustics, optics, spectroscopy, electrical, circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, nuclear physics. Students perform four to eight experiments selected to meet individual needs. Independent work is stressed. An optional lecture associated with Physics 410, M 2:30–4:25 is available. It includes lectures on techniques used in experimental physics 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. Prerequisites: Students must advise department course coordinator of faculty member responsible for their project. Projects: Prerequisite: Physics 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 Physics 510.

PHYS 525 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Astronomy 511)
Spring. 4 credits. D. Chernoff.

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 disk accretion; high-temperature radiation processes. Compact X-ray sources and X-ray bursts. Emphasis will be on the application of fundamental physical principles to compact objects. Topics in diverse areas of physics will be discussed: solid-state physics, nuclear physics, relativity, fluid dynamics, high-energy physics, etc. No astronomy or general relativity prerequisites. Text: Physics of Black Holes, White Dwarfs, and Neutron Stars, by Shapiro and Teukolsky.

PHYS 551 Classical Mechanics

Lagrangian and Hamiltonian formulation of classical mechanics, using modern methods, modern applications in nonlinear dynamics. At the level of Geometric Mechanics, by Talmam.

PHYS 553-554 General Relativity (also Astronomy 509–510)

PHYS 561 Classical Electrodynamics
Fall. 3 credits. Lec. T R 8:30–9:55. Sec. 2:30–5:20. V. Yaffe. Maxwell's equations, electromagnetic potentials, electrodynamics of continuous media (selected topics), special relativity, 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 (at the level of Merzbacher), classical mechanics (at the level of Marion), and statistical mechanics (at the level of Reif). Lec. M W F 9:05–10:10.

N. Ashcroft.

Macroscopic or thermodynamic concepts including the laws of thermodynamics, thermodynamic functions, thermodynamic stability, and the thermodynamics of phase equilibria. Microscopic concepts including 1-, 2-, and N-particle quantum systems, the micro-canonical, canonical and grand-canonical distributions, Bose-Einstein, Fermi-Dirac and Boltzmann statistics, the density-matrix—the microscopic-macroscopic connection. Applications include spin systems—the Ising and related models, strongly correlated fluids, and lattice-gases, including distribution and correlation functions, thermodynamic perturbation theory and introduction to critical phenomena and the renormalization group; dense Fermi- and Bose-systems; linear response of quanlal and classical systems, transport properties and the Boltzmann equation. 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 11:15–12:05.

D. Cassel.

General principles of quantum mechanics, formulated in the language of Dirac. Systems with few degrees of freedom: hydrogen, including fine and hyperfine structure; the deuteron and neutron-proton scattering, helium. Theory of symmetries, perturbations and collisions will be developed to analyze phenomena displayed by these systems. At the level of Quantum Laws and Lifezh. A knowledge of the subject at the level of Phys 443 will be assumed, but the course will be self-contained.

PHYS 574 Quantum Mechanics II

E. Flanagan.

Systems with many degrees of freedom. Quantization of the electromagnetic field; interaction of light with matter. Many electron atoms. Second quantization for fermions. Quantum liquids. Scattering of complex systems. Introduction to the Dirac equation. At the level of Quantum Laws and Lifshitz. A knowledge of the subject at the level of Phys 561 and 572 will be assumed.

PHYS 599 Cosmology (also ASTRO 599)
For description, see ASTRO 599.

PHYS 635 Solid-State Physics I
Fall. 3 credits. Prerequisite: A good undergraduate solid-state physics course, such as Physics 454. D. Raphael.

A survey of the basics of the physics of solids: crystal structure, x-ray diffraction, phonons, and electrons. Selected topics; superconduction, magnetism, disordered materials, dielectric and optical properties and mesoscopic physics. At the level of Solid State Physics by Ashcroft and Mermin.
Note: Only S-U grades will be given in courses numbered 650 or above.

PHYS 651 Relativistic Quantum Field Theory I
Fall. 3 credits. S-U grades only.
H. Tye.
Topics to be 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 Physics 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, phase transitions, and spontaneous symmetry breaking. Applications to the electroweak theory and quantum chromodynamics are emphasized. At the level of An Introduction to Quantum Field Theory by Peskin and Schroeder.

PHYS 653 Statistical Physics
Fall. 3 credits. Normally taken by graduate students in their second or later years. Prerequisites: Competence in the basic principles of quantum mechanics, statistical physics at the level of Physics 562, and thermodynamics. S-U grades only.
C. Henley.
Survey of topics in modern statistical physics: Dynamical statistical physics (kinetic theory, Boltzmann equation, hydrodynamics); theory of simple fluids; scaling theories and the renormalization group; phase transitions in disordered systems; pattern formation in nonlinear systems, percolation theory.

PHYS 654 Theory of Many-Particle Systems
Spring. 3 credits. Prerequisites: Physics 562, 574, 635, 636, and 653. S-U grades only.
C. Henley.
A continuation of Physics 635; magnetism, superconductivity, broken symmetries, elementary excitations, and other topics in quantum condensed matter physics not covered in Solid State Physics by Ashcroft and Mermin, such as topological defects, superfluids, the quantum Hall effect, mesoscopic quantum transport theory, disordered systems, Anderson localization and other metal insulator transitions.

PHYS 661 Advanced Topics in High Energy Particle Theory

This course will present advanced topics of current research interest. Subject matter will vary 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 665 Topics in Theoretical Astrophysics
Not offered 1997-98.
For description, see PHYS 480.

PHYS 670 Instrumentation Seminar
Conception, design, and performance of innovative instrumentation in condensed matter and elementary particle physics.

PHYS 680 Computational Physics (also Physics 480 and Astronomy 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 690 Independent Study in Physics
Fall or spring. Variable to 4 credits.
A student must advise the 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.

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 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 may be obtained from the department office (211 Uris Hall).

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 cover 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.

PSYCHOLOGY

Perceptual and cognitive psychology

Biopsychology

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

Biopsychology

1) Perceptual and cognitive psychology

2) Biopsychology
3) Social, personality, and abnormal psychology: Psychology 128, 265, 275, 277, 280, 325, 327, 328, 380, 402, 404, 450, 481, 489, 491.

4) Other courses: Psychology 101, 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 Psychology 350.

2) Passing an approved course or course sequence in statistics in some other department at Cornell. The approved list of courses and sequences may change. It has usually included Sociology 301, and the sequences Education 352 and 353, and Industrial and Labor Relations 210 and 211. Requests that a particular course be added to this list may be made to Professor Gilovich for approval.

3) Passing a course or course sequence in statistics at some other college, university, or college-level summer school. The course or sequence must be equivalent to at least 12 undergraduate credits. The description of the course from the college catalog and the title and author of the textbook used must be submitted to Professor Gilovich for approval.

4) Passing an exemption examination. This examination can be given at virtually any time during the academic year if the student gives notice at least one week before. Students who have completed a theoretical statistics course in a department of mathematics or engineering and who wish to demonstrate competence in applied statistics usually find this option the easiest. Students planning this option should discuss it in advance with Professor Gilovich.

Concentration in biopsychology. Psychology majors interested in psychology as a biological science can elect to specialize in biopsychology. Students in this concentration must meet all of the general requirements for the major in psychology and must also demonstrate a solid background in biology, the physical sciences (at least introductory chemistry, and mathematics). Students will design with their advisers an integrated program in biopsychology built around courses in physiological, chemical, anatomical, and psychological determinants of human and nonhuman behavior offered by the Department of Psychology.

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. This concentration is offered in cooperation with the Department of Sociology. Psychology majors who wish to specialize in social psychology are expected to meet the general requirements set by their departmental statistics. To ensure a solid interdisciplinary grounding, students in the concentration will be permitted to include some major courses in sociology and related fields. Advisers will assist students in the selection of a coherent set of courses from social organization, cultural anthropology, experimental psychology, social methodology, and several aspects of personality and social psychology. Seniors in the concentration may elect advanced psychology 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 serves as evidence of the student's facility in the two most important skills of an academic psychologist: the capacity to acquire and integrate a substantial body of theoretical and factual material and the ability to engage in creative research activity. All qualified students 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 collaboration 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 Psychology 470 (Undergraduate Research in Psychology). A written report of the research is to be given to the chair of the honors committee (currently Professor Khurana) by the end of the last semester of the student's senior year. A defense of the thesis is then given before a committee of three faculty members, and the student presents his or her work in a public forum. Final honors standing (summa cum laude, magna cum laude, cum laude) is indicated on the student's diploma. The T. A. Ryan Award, accompanied by a cash prize, is awarded to the student who conducts the best honors project in a given year.

A student may formally apply to the honors program at any time during the senior year provided that she or he is actively engaged in independent research. However, students must do so by the second week of November. Applications should be given to Professor Khurana 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 Psychology 123, 290, 307, 322, 324, 326, 332, 350, 361, 390, 410, 420, 422, 424, 425, 429, 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 World Wide Web site, http://comp9.psych.cornell.edu

Courses

PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry
Fall. 3 credits. Students who would like to take a discussion/demonstration seminar should also enroll in Psychology 103. M W F 10:10. J. B. Maas. The study of human behavior. Topics include brain functioning and mind control, psychophysiology of sleep and dreaming, psychological testing, perception, learning, cognition, memory, language, motivation, personality, abnormal behavior, psychotherapy, social psychology, and other aspects of applied psychology. Emphasis is on developing skills to critically evaluate claims made about human behavior.

PSYCH 102 Introduction to Cognitive Science (also Cognitive Studies 101)
Fall. 3 credits. T R 11:40–12:55. M. Spivey-Knowlton. This course surveys the study of how the mind/brain works. We will examine how intelligent information processing can arise from biological and artificial systems. The course draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology, neuroscience, linguistics, and computer science. The first part of the course will introduce the roles played by these disciplines in cognitive science. The second part of the course will focus on how each of these disciplines contributes to the study of the brain. Topics in cognitive science: language, categorization, memory, vision, and action.

PSYCH 103 Introductory Psychology Seminars
Fall. 1 credit. Limited to 300 students.
Prerequisite: concurrent enrollment in Psychology 101. Hours to be arranged. A weekly seminar that may be taken in addition to Psychology 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 will be available at the second lecture of Psychology 101.

PSYCH 123 Introduction to Biopsychology
Fall. 3 credits. No prerequisites. Can be used to satisfy the psychology major breadth requirement and as an alternative prerequisite for upper-level biopsychology courses. Students who would like to take a discussion/demonstration seminar should also enroll in Psych 125, a one hour per week one-credit section. M W F 10:10.
E. A. Regan. An introduction to psychology from a biological perspective, including both evolutionary and physiological approaches to behavior. Topics include the structure,
function, and development of the nervous system, genetic and biochemical bases of behavior, hormones and behavior, biological bases of learning, cognition, communication, and language, and the ecology and evolution of social organization and social development.

**PSYCH 128 Introduction to Psychology: Personality and Social Behavior**  
Summer only. 3 credits. M-F 10:10-11:15.  
Staff.  
Personality: the behavioral similarities and differences among people and how they develop. Freudian, learning, and humanistic theories of personality; research in personality, and personality assessment through testing. Social behavior: how people behave in interactions with others; attitudes, persuasion, attraction, aggression, and conformity. How personality and social behavior influence each other and cause many interesting social and psychological phenomena.

**Introductory courses in cognitive psychology.** Each of the following four courses (205, 209, 214, 215) provides an introduction to a major area of study within cognitive psychology. These courses are independent of one another, and none has 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 201 Exploration of Cognitive Science in Ecological Settings (also Cognitive Studies 201)**  
Fall or spring. 4 credits. Prerequisites: Introduction to Cognitive Science COGST 101 or written permission of the instructor.  
Fall: B. Halpern and staff. Spring: D. Field and staff.  
A laboratory-oriented course designed to teach the theory and techniques 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. Lecture time is used to present laboratory exercise results, to supplement laboratory topics, and for discussion of primary research papers. State of the art computing, display (visual, auditory, and other perceptual/sensory systems), digital communication, and simulation approaches, including virtual reality methods when relevant, are used to apply cognitive science principles and concepts to the analysis, exploration, and direct testing of human-machine interfaces that are intended to permit effective and efficient exchange of information and control of functions or operations. This approach is applied to real life settings such as fixed and mobile offices, libraries, laboratories, point-of-sale locations, Internet and World Wide Web communications, manufacturing, storage and distribution facilities and systems, on-site maintenance and repair procedures, and personal and group transportation, vehicles and systems.

**PSYCH 205 Perception**  
Spring. 3 credits. Open to first-year students. Graduate students, see Psychology 605. T R 11:40-12:55. J. E. Cutting.  
One of four introductory courses in cognitive psychology. Basic perceptual concepts and phenomena are discussed with emphasis on stimulus variables and sensory mechanisms. All sensory modalities are considered. Visual and auditory perception are discussed in detail.

**PSYCH 209 Developmental Psychology**  
Spring. 4 credits. Graduate students, see Psychology 709. T R 10:10-11:25. F. C. Keil.  
One of four introductory courses in cognition and perception. A comprehensive introduction to current thinking and research in developmental psychology that approaches problems primarily from a cognitive perspective. The course focuses on the development of perception, action, cognition, emotion, personality, social understanding, language, and moral reasoning.

**PSYCH 214 Issues in Cognitive Psychology**  
Fall. 3 credits. Sophomore standing required. Limited to 150 students. Graduate students, see Psychology 614. M W F 10:10. B. Khurana.  
Various approaches to the study of cognition will be discussed. Basic concepts in how humans process different kinds of information such as visual, auditory, and symbolic will be introduced. These concepts will then be used to explore topics such as attention and consciousness, concept formation and representation, memory processes and systems, imagery and cognitive maps, problem solving and reasoning, language and language acquisition and comprehension, intelligence and creativity, and social cognition.

**PSYCH 215 Psychology of Language (also Linguistics 215)**  
Spring. 3 or 4 credits (4-credit option involves term paper). Graduate students, see Psychology 715. M W F 11:15. J. Sereno.  
One of four introductory courses in cognitive psychology. Introduction to the psychological study of language. Covers research in spoken language comprehension and production, reading, and language acquisition.

**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 has 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 216 Cognitive Psychology Lab**  
Fall. 1 credit. Limited to 16 students. Prerequisite: concurrent enrollment in Psychology 214. Hours to be arranged. B. Khurana.  
If you've ever wondered how humans manage to represent their visual world, why telephone numbers are seven digits long, why imagery works as a mnemonic device, why certain things are better remembered than others, whether bilinguals are disadvantaged relative to monolinguals, how children acquire language, how people make decisions... this laboratory is for you! A weekly lab meeting that encourages students to discover the scientist in themselves through the study of Cognition. Much of Cognitive research takes place in the laboratory and this course allows students to become familiar with the "how-to" of such research. Students will be given six to eight basic experiments to explore and tinker with. They will be encouraged to pose "what if" questions and eventually test them. The course promotes independent thinking, problem solving in an experimental setting, proposing and testing of one's own hypotheses, relating laboratory cognition to the real world, and communicating scientific ideas through informal and formal writing and oral assignments. Prepared for an interactive learning experience.

**PSYCH 265 Psychology and Law**  
Fall. 3 credits. M W F 1:25. D. A. Dunning.  
This course examines the implications of psychological theories and findings 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), as well as on psychologists as participants in the legal system (e.g., assessing insanity and dangerousness and for expert testimony).

**PSYCH 275 Introduction to Personality Psychology (also HDFS 260)**  
Fall. 3 credits. Prerequisites: Psychology 101, HDFS 115, or permission of instructor. T R 10:10-11:25. D. J. Bem.  
An introduction to personality psychology, with an emphasis on personality development and contemporary research. Covers the major theories of personality, influences on personality development (including genetic, biological, experiential and environmental factors), and methods for assessing personality.

**PSYCH 277 Social Construction of Gender (also Women's Studies 277)**  
Fall. 3 credits. Limited to 240 students. M W 4:40-5:55. S. Field. Psychology/Women's Studies 277 is an interdisciplinary course that addresses two broad questions: 1) how an individual's gender and sexuality are constructed; and 2) how 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 polarisation, 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 neural-looking institutions invisibly transform difference into disadvanta- 

g. 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, egalitarian relationships, gender-liberated child-rearing, and homophobia.

**PSYCH 280 Introduction to Social Psychology**  
Spring. 3 or 4 credits; the optional (or fourth) credit is for participation in a limited enrollment discussion section. T R 1:25-2:40. T. D. Gilovich and D. T. Regan.  
An introduction to research and theory in social psychology. Topics include processing of social information, social influence, persuasion, and attitude change; social interaction and group phenomena.
PSYCH 290 Motivation
The course surveys traditional and contemporary approaches to motivational behavior from Aristotle to Freud to Skinner to Lorenz. It also draws upon field studies, laboratory analyses, clinical cases and developmental stages to establish a scientific basis for motivation analysis. Normal and pathological teachings will serve as a target behavior.

PSYCH 292 Intelligence
Spring. 3 credits. Prerequisites: one 200-level course in psychology. M W 2:55–4:10. 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
Fall. 3 credits. 40–80 students. Prerequisite: Psychology 205 or permission of instructor. M W F 10:10. J. E. Cutting.
A detailed examination of pictures and their comparison to the real world. Linear perspective in Renaissance art, photography, and cinema will be discussed in light of contemporary research in perception and cognition.

PSYCH 307 Chemosensory Perception
Fall. 3 or 4 credits; the optional (or fourth) credit is for an independent laboratory project. Registration for the 4-credit option requires permission of the instructor; students will read, analyze, and discuss difficult original literature in the areas covered. Graduate students, see Psychology 607. Not offered 1997–98. T R 9:05–10:25. B. P. Halpem.
An examination of basic theory, data, and processes for perception of the chemosensory environment. After a very brief (about two weeks) lecture survey of the anatomy and physiology of taste and olfaction, the remainder of the course uses the Socratic method, in which the instructor asks questions of the students, to cover topics such as chemosensory psychophysics, salivary chemosensory bases for the tastes of foods, taste-smell interactions, chemosensory function in neonates and in the aged, temporal aspects of tasting, sweetness, effects of pollution of the chemosensory environment, and interactions between body state and chemosensory stimuli. At the level of Smell and Taste in Health and Disease, edited by T. V. Getchell et al., Sensory Science Theory and Applications in Foods, edited by H. T. Lawless and B. Klein, Sensory Analysis of Foods, 2nd edition, edited by J. R. Piggott.

PSYCH 309 Development of Perception and Representation
Fall. 3 credits. Prerequisite: Psychology 205, 209, 214, or 305, or permission of instructor. Graduate students, see Psychology 609. Not offered 1997–98. T R 2:55–4:10. Staff.
An introduction to theories and research on the origins and development of knowledge of the immediately surrounding world. The course focuses on knowledge of the world as an arrangement in space and time, knowledge of the world as a space that can be encountered through multiple sensory modes, knowledge of the world as a place that can be acted upon, and organization of the world into meaningful objects and events.

PSYCH 311 Introduction to Human Memory
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 Psychology 611. T R 11:40–12:55. Not offered 1997–98. B. Khurana.
This course offers an overview of experimental findings and theoretical issues in the study of human memory. Coverage includes topics such as the nature of memory, various memory systems, coding and retrieval processes, practice and habit acquisition, organization for learning and memory, interference and forgetting, models of memory, memory dysfunction and its relation to normal memory.

PSYCH 316 Auditory Perception
Fall. 3 or 4 credits; the 4-credit option involves an independent project or paper. Prerequisite: Psychology 205, 209, 214, or 215 (other psychology, linguistics, or biology courses could serve as prerequisite with permission of the instructor). Limited to 30 students. Graduate students, see Psychology 716. T R 10:10–11:25. C. L. Krumhansl.
Basic approaches to the perception of auditory information, with special consideration of complex patterns such as speech, music, and environmental sounds.

PSYCH 322 Hormones and Behavior (also BIONB 322)
Spring. 3 or 4 credits; the 4-credit option involves a one-hour section once a week in which students will be expected to read original papers in the field and participate in discussion. Limited to juniors and seniors; open to sophomores only by permission. Prerequisites: BIONB 221 or 222 or one year of introductory biology plus a course in psychology. S-U grades optional. Graduate students, see Psychology 722. T R 12:20–1:10. C. L. Krumhansl.
Following a review of the neural and endocrine systems, this course connects endocrine physiology to specific behaviors observed in various species, including humans. Although the relationship between sexual physiology and behavior is strongly emphasized, the lectures also describe hormonal contributions to parental behavior, aggression, stress, learning and memory, homeostasis, and biological rhythms. Topics for the discussion sections are chosen by the students within the context of hormonal influences on behavior.

PSYCH 324 Biopsychology Laboratory (also BIONB 324)
Fall. 4 credits. Limited to 20 juniors and seniors. Prerequisites: Psychology 123 or BIONB 221 or 222, and permission of instructor. T R 1:25–4:25. Staff.
Experiments designed to provide experience in animal behavior (including learning) and its neural and hormonal components. A variety of techniques, species, and behavior patterns are included.

PSYCH 325 Psychopathology
Fall. 4 credits. Prerequisite: 2 courses in psychology. M W F 11:15. K. L. Lockhart.
This course examines the nature and symptoms of the major forms of psychopathology: schizophrenia, depression, anxiety disorders, dissociative disorders, and personality disorders. Etiological factors are studied from a variety of different perspectives, e.g., psychological, biological and socio-cultural. Weekly discussion sections focus on controversial issues in the field of psychopathology and examine specific disorders in depth.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits. Prerequisite: Psychology 123, or an introductory biology course, or an introductory anthropology course. Graduate students, see Psychology 626. T R 2:55–4:10. R. E. Johnston.
A broad comparative approach to the behavior of animals and humans with special emphasis on the evolution of human behavior. Topics covered will vary but will 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, warfare.

PSYCH 327 Fieldwork in the Helping Relationship
Fall, spring. 4 credits. Prerequisites: Psychology 325, HDFS 370 or concurrent registration in 325 or HDFS 370 and permission of instructor. S-U grades only. Students do not enroll in advance for this course. Field placement assignments are made during the first two weeks of the semester. Students who have already taken Psychology 325 or HDFS 370 must contact the instructor during the first week of the semester. Enrollment is limited by the fieldwork placements available. Fee, $25 each semester. T R 12:20–1:10. K. L. Lockhart and staff.
This is a year-long field study and discussion course. The year-long commitment is mandatory. Psychology 328 will be for students taking the course a second time. An "R" grade will be assigned in the fall semester, and a S-U grade will be assigned in advance for the spring semester. An introductory fieldwork course for students currently enrolled in or who have taken Psychology 325 or HDFS 370. Fieldwork placements include the school system, psychiatric institutions, halfway houses, and other mental health oriented facilities. In addition to fieldwork, weekly supervisory/seminar meetings are held to discuss fieldwork issues and assigned readings.

PSYCH 328 Continuing Fieldwork in the Helping Relationship
Fall, spring. 4 credits. Prerequisites: Psychology 325, 327, or HDFS 370 and permission of instructor. S-U grades only. May not be taken more than twice. Students do not enroll in advance for this course. Fee, $25 each semester. T R 12:20–1:10. K. L. Lockhart and staff.
Designed to allow students who have done fieldwork as part of Psychology 327 to continue their field placements or begin new field placements under supervision this academic year. An "R" grade will be assigned in the fall semester, and a S-U grade will only be assigned in the spring semester.
PSYCH 332 Biopsychology of Learning and Memory (also BIONB 328)
Spring. 3 credits. Prerequisites: one year of biology and either a biopsychology class or BIONB 222. Limited to 60 students. Graduate students, see Psychology 632. M W F 11:15. Staff.
This course will survey the approaches that have been or are currently being used in order to understand the biological bases for learning and memory. Topics will include invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, and human pathology. Many of the readings will be from primary literature.

PSYCH 342 Human Perception: Applications to Computer Graphics, Art and Visual Display
Fall. 3 or 4 credits. The 4-credit option involves a term paper. Prerequisite: Psychology 101 or permission of instructor. Psychology 205 strongly recommended. Graduate students, see Psychology 642. T R 11:40–12:55, D. J. Field.
Our present technology allows us to transmit and display information over a variety of media. To make the most of these media, it is important to consider the limitations and abilities of the human observer. The course will consider a number of applied aspects of human perception with an emphasis on the display of visual information. Topics to be covered include: (1) two-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
Spring. 3 credits. Limited to 15 students. Prerequisite: Psychology 101 and permission of instructor. R 10:10–12:05, J. B. Maas.
An exploration of theories of education, communication, perception, attitude, and behavior, and how they relate to the effectiveness of visual based communication systems. Emphasis is on the use of photography and computer graphics to deliver educational messages.

PSYCH 350 Statistics and Research Design
Acquaints the student with the elements of statistical description (measures of average, variation, correlation, etc.) and more important, develops an understanding of statistical inference. Emphasis is placed on those statistical methods of principal relevance to psychology and related behavioral sciences.

PSYCH 361 Biopsychology of Normal and Abnormal Behavior (also Nutritional Sciences 361)
Fall. 3 credits. 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 9:05–9:55, B. J. Strupp.
A critical evaluation of factors thought to underlie normal and abnormal behavior and/or cognitive functioning. Psychological, biological, and societal influences will be integrated. Topics include: (1) psychiatric disorders (e.g., eating disorders); (2) the biopsychology of attention and memory; (3) nutritional influences on behavior (sugar, food additives, malnutrition, dieting); (4) cognitive dysfunction (e.g., amnesia, Alzheimer's disease), and (5) cognitive effects of developmental exposure to environmental toxins and drugs of abuse.

PSYCH 380 Community Mental Health (also Human Service Studies 380)
Summer only. 3 or 4 credits (3-credit option involves term paper). M-F 10:00–11:15. Staff.
Basic concepts in the field of community mental health. Social models of mental illness, epidemiology of the culture and social class in mental illness, public attitudes, and civil liberties.

PSYCH 396 Introduction to Sensory Systems (also BIONB 396)
Spring. 3 or 4 credits (4 credits with term paper). Registration for the 4-credit option requires permission of instructor. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology or behavior or perception or cognition or biopsychology. Students will be expected to have elementary knowledge of perception, neurophysiology, behavior, and chemistry. No auditors. Offered alternate years. Graduate students, see Psychology 696.
The course will be taught using the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with those characteristics of sensory systems that are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments. Classroom discussion can increase, but not decrease, a student’s final grade. There are two preliminary exams and a final exam. The principles and limitations of major methods used to examine sensory systems will be considered. General principles of sensory systems, and auditory, visual and neuromuscular systems are covered. One aspect of each system (e.g., localization of objects in space by sound, color vision, thermoreception) will be selected for special attention. Two or more textbooks and a course packet of reproduced articles will be used. An Introduction to the Physiology of Hearing, 2nd edition by J. O. Pickles; Hearing: Physiological Acoustics, Neural Coding, and Psychoacoustics, by W. E. Galt; G. A. Gescheider, and R. D. Frisina; The Retina: An Approachable Part of the Brain, by J. F. Dowling. Handbook of Physiology—The Nervous System. III Sensory Processes, edited by J. M. Brookh. and V. B. MounkFORMANCE.

PSYCH 402 Current Research on Psychopathology: Depression
Spring. 4 credits. Limited to 20 students. Prerequisite: Psychology 325 or HDFS 370 and permission of the instructor. M 1:25–4:25, K. Lockhart.
Current research and theory on the nature and etiology of depression. Approaches from various perspectives (biological, psychological, socio-cultural) are considered. Minimal attention to psychotherapy and symptomatology.

PSYCH 404 Psychopathology and the Family
Spring. 4 credits. Limited to 20 students. Prerequisite: Psychology 325 or HDFS 370 and permission of the instructor. Not offered 1997–98. M 1:25–4:25, J. B. Maas.
This course will explore familial influences on the development of abnormal behavior. It will examine how psychological, biological, and cultural factors in a family might contribute to such disorders as anorexia nervosa, depression, sexual abuse, psychopathy, and psychosomatic illnesses. Emphasis will be placed on early childhood experiences in the family and their impact on the development of later psychopathology. The course will also discuss 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 will also be examined.

PSYCH 410 Undergraduate Seminar in Psychology
Fall or spring. 2 credits. Nonmajors may be admitted, but psychology majors are given priority. Hours to be arranged.
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
Spring. 4 credits. Prerequisites: at least one course in human experimental and perception or cognition is recommended. Graduate students, see Psychology 612.
A laboratory course is designed to introduce students to experimental methods in perception and cognitive psychology. Students will take part in a number of classic experiments and develop at least one independent project. Computers will be available and used in many of the experiments although computer literacy is not required. Projects will be selected from the areas of visual perception, pattern recognition, memory, and concept learning.

PSYCH 413 Information Processing: Conscious and Non-conscious
Spring. 4 credits. Prerequisites: at least one course in human experimental and permission of instructor; Psychology 350 or equivalent will be useful for evaluating empirical articles. R 10:10–12:35, B. Khurana.
In the past decade or so, 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” in which patients can respond to visual stimuli without the conscious experience of vision or the “amnesic” syndrome in which patients show normal learning and memory sans the awareness of the learning encounters. This signature of independent mental computations has also been amply demonstrated in normal individuals in laboratory settings. We will critically evaluate the theoretical worth and empirical justification of the distinction between “conscious” and “non-conscious” mental computations in normal and patient populations. Weekly
This course offers a survey of several computational models applied to some aspects of language processing. Students will be required to complete weekly in-class exercises, 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, think analytically, discuss cogently, and write succinctly.

**PSYCH 414 Comparative Cognition**  
Spring. 3 credits. Prerequisites: Psychology 205, 209, 214, or permission of instructor. Graduate students, see Psychology 714. Not offered 1997–98. T R 11:40–12:55. M. Owren.

Students will consider different species of behavior, human development, and human pathology may shed light on the nature of knowledge and reasoning. This seminar will focus on knowledge and reasoning about space, time, number, physical objects, and persons. Questions will include: (1) How do cognitive abilities vary across species? Are there reasons of why are distinctively human? (2) Do humans and/or other animals reason in the same way about entities in different domains (e.g., numbers, physical objects, and persons)? (3) How do knowledge and reasoning change throughout human development: Is knowledge enriched, or more radically restructured, as children grow and gain experience?

**PSYCH 415 Concepts, Categories, and Word Meanings**  
Fall. 4 credits. Prerequisites: Psychology 205, 209, 214, or 215, or permission of instructor. Graduate students, see Psychology 615. M 1:25–4:25. F. C. Keil.

A consideration of what types of categories are psychologically important, of how they are represented and used through concepts, and of how concept structure and semantic structure are interrelated. Different models of concept structure and categorization processes are evaluated, and examples of conceptual change and concept acquisition. Other topics include: relations between concepts and broader knowledge representation systems such as scripts, mental models, and intuitive theories; the representation of psychological categories; the representation of knowledge in terms of neural systems. This course will focus on issues in neuropsychology of everyday acts involving fixed acts. Assigned readings include original articles from the scientific literature, as well as textbooks and graduate-level research monographs.

**PSYCH 418 Psychology of Music**  
Spring. 3 or 4 credits, depending on whether student elects to do an independent project. Prerequisites: junior or senior standing; familiarity with psychology or music and some background in both, or permission of instructor. Graduate students, see Psychology 618. M W 5:25–4:10. C. L. Krumhansl.

Detailed analysis of topics in the psychology of music, including theories of consonance, perception of tonal-harmonic structure, memory for music, and effects of musical training. Emphasis given to experimental methodologies.

**PSYCH 419 Neural Networks Laboratory**  
Spring. 4 credits. Prerequisites: at least one course in biology or biological psychology, one year of calculus, and permission of instructor. Limited to 15 students. Graduate students, see Psychology 619. Not offered 1997–98. T R 2:55–4:10. D. E. Haber.

The course will take a hands-on approach to understanding the limitations and successful applications of neural networks to problems in cognitive and biological psychology. A variety of research methods will be discussed and explored using computer simulations. Applications of networks to perceptual recognition and representation will be emphasized. We will consider the class of problems that different networks can solve and consider the accuracy with which they model real neural systems. Students will 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 Laboratory in Neuroethology (also BIOLB 420-03)**  
Spring. 1 credit. Prerequisite: BIOLB 424 or Psychology 424 or equivalent. Permission of instructor required. Lab: M 12:20–3:00. Not offered 1997–98. C. D. Hopkins. Designed as a laboratory component for BIOLB 424/PSYCH 424, this course will be an introduction to the principles of neuroethology: sensory processing, neuroanatomy, and behavioral analysis. Students will participate in six laboratory exercises scheduled throughout the semester. The laboratory will be open from 12:20 until 5:00 p.m. on Mondays and Wednesdays. Labs will be done in groups of two.

Students in this course will learn the fundamentals of electrophysiology, neuroanatomy, and behavior through a series of six laboratory exercises using electric fish, Drosophila, crayfish and Limulus, bats and moths.

**PSYCH 422 Developmental Biopsychology**  
Fall. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 125 or BIOLB 221). Graduate students, see Psychology 622. M W F 9:05–9:55. B. L. Finlay.

We will discuss the relationship of the development and evolution of the brain to the development of behavior. Topics include: how neurons are generated, find targets, and establish connections; the emergence of reflexive and complex behavior; how experience affects the developing brain; evolutionary perspectives on the development of perception, memory, and communication systems; and abnormal development.

**PSYCH 424 Neuroethology (also BIOLB 424)**  
Spring. 3 credits. Prerequisites: BIOLB 221 and 222. S-U grades optional for graduate students only. T 9:05–11:00, R 9:05–9:55. Classes will be held on T R at 9:05–11:00. Thursday's class will run for one hour. Recitations will be scheduled in class. Not offered 1997–98.

C. D. Hopkins.

In the 1950s-1970s the ethologists attempted to understand the mechanisms of animal behavior through the use of comparative methods, evolutionary analysis, careful observations of animals in their native habitats, and clever experimentation. Now, with the explosion of knowledge and techniques in the neurosciences, many of the ethologist's mechanisms are being explained in terms of neural systems. This course will review the current status of research in neuroethology, including: mechanisms of acoustic communication in insects and in vertebrates; echolocation in bats and sound localization in owls; electroreception and electrololocation; chemical communication; and visual processing. In addition, it will review structural and functional changes in the brain associated with decision making, in initiating action, and in coordinating fixed acts. Assignments will include articles on the scientific literature. A term paper or poster on neuroethology will be required.

**PSYCH 425 Cognitive Neuroscience**  
Fall. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 125 or BIOLB 221). Graduate students, see Psychology 625. Not offered 1997–98. M W F 9:05–9:55. B. L. Finlay.

We will study the relationship between structure and function in the central nervous system. The importance of evolutionary and mechanistic approaches for understanding the human behavior and cognition will be stressed. The course will focus on issues in cognitive neuroscience: 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, and social interaction.
PSYCH 429 Olfaction and Taste: Structure and Function (also BIONB 429)
Spring. 3 or 4 credits (4-credit option requires a term paper or research project. The research, but does not need to, study nonhuman vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Prerequisite: one 300-level course in biology or equivalent. Graduate students, see Psychology 629. T R 9:05. B. P. Halpern.

The structural and functional characteristics of olfaction and taste will be explored by reading and discussing current literature in these areas. Structure will be examined at the light levels of electron microscopes as well as at the molecular level. Function will be primarily neurophysiological and biochemical aspects, especially air-breathing vertebrates in the case of olfaction, but there will be some coverage of invertebrate forms. A textbook and a course packet of reproduced articles will be used. At the level of the nervous system, Smell and Taste in Health and Disease, edited by T. V. Getchell, R. L. Doty, L. M. Bartoshuk, and J. B. Snow, The Neurobiology of Taste and Smell, edited by T. E. Finger and W. L. Silver.

PSYCH 431 Effects of Aging on Sensory and Perceptual Systems (also BIONB 421)
Fall. 3 or 4 credits; the optional (or fourth) credit involves a term paper. Prerequisites: an introductory course in biology or psychology, plus a second course in perception or neurobiology or cognition or psychology. No auditors. Limited to 25 students. Graduate students, see Psychology 631. T R 10:10-11:25. B. P. Halpern.

A literature-based examination of post-maturation changes in the perceptual, structural, and physiological characteristics of somesthetic, chemosensory, visual, and auditory systems. Emphasis will be on human data, with non-human information included when especially relevant. Current developments in the field of somatosensory sciences, and in regeneration of receptor structures, will be examined. Brief written statements (by electronic mail) of questions and problems related to each set of assigned readings will be required at least one day in advance of each class meeting. This course will be taught using the Socratic Method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with the subject matter of the course. Students are expected to come to each class having already done, and thought about, the assigned readings.

Spring. 4 credits. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. Open to undergraduates and graduate students. S-U grades optional. Graduate students will also meet for additional advanced discussion of course content. Graduate students should also enroll under HPDS 700/Linguistics 700 (2 credits). T R 10:45-12:55. L. B. Lust.

This course is a survey of basic issues, methods, and research in the study of first language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental linguistic issues of "universal grammar" and the biological foundations for language 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.

PSYCH 440 The Brain and Sleep
Fall. 4 credits. Prerequisites: At least Psychology 6 or BIONB 221. An additional course in biology, biopsychology or neurobiology is recommended. S-U grades optional. Graduate students, see Psychology 640. W 8:40-9:55. H. S. Porte.

Taking a comparative evolutionary perspective, this course examines the neural events that instigate, maintain, and disturb the states and rhythms of sleep in various species. Emphasizing human data where possible, special topics will include sleep deprivation and the biological functions of sleep; sleep's putative role in learning and memory; biologically interesting deviations from normal sleep. A cognitive neuroscience of sleep will take shape as we look at sleep's psychological correlates—including dreams in REM sleep—in light of what we know about the brain and sleep.

PSYCH 441 Laboratory in Sleep and Dreaming
Spring. 4 credits. Prerequisites: Psychology 440 or comparable preparation, and permission of the instructor during preregistration. Laboratory fee: $50. W 7:30-10:30 p.m. H. S. Porte.

Emphasizing the neurobiology of sleep state, the course introduces the laboratory study of human sleep and dreaming. Serving as both experimenter and subject, each student will learn the rationale and techniques of electroencephalography and other biobehavioral measures of behavioral state. Using computerized data analysis, students will complete weekly laboratory reports and a collaborative term project. Sleep recordings will be done during the day or evening when possible. In addition, overnight recording sessions are required.

PSYCH 450 The Lances of Gender (also Women's Studies 450)
Spring. 4 credits. Permission of instructor. Previous coursework in Women's Studies strongly recommended. Limited to 15 seniors and graduate students. No preregistration; interested students should attend the first class session. Graduate students, see Psychology/Women's Studies 650. F 1:30-3:30. S. L. Bern.

This seminar analyzes the ideological, institutional, and psychological mechanisms that are responsible for the ideological reproduction of male power in Western—and especially American—culture. It is very interdisciplinarily, covering material from biology, history, anthropology, law, sociology, psychology, psychiatry, philosophy, and feminist theory. As much as the central focus of the seminar is on gender, it does not analyze gender in isolation but looks also at its interactions with race and (especially) sexuality. Students must write a final exam, a term paper; plus weekly commentaries on the readings.

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. Hours to be arranged. Practice in planning, conducting, and reporting independent laboratory, field, and/or library research.

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. Hours to be arranged. Advanced experience in planning, conducting, and reporting independent laboratory, field, and/or library research. One, and preferably two, semesters of Psychology 470 is required. The research should be more independent and/or involve more demanding technical skills than that carried out in Psychology 470.

PSYCH 472 Multiple Regression
Spring, weeks 1–7. 2 credits. Prerequisite: one solid semester of introductory statistics. Analysis of variance is helpful but not required. M W F 10:10. R. B. Darlington.

Uses and pitfalls of multiple regression in causal analysis, path analysis, and prediction. Emphasis on analyzing data collected under uncontrolled conditions. Includes collinearity, indicator variables, sets, adjusted and shrunken R^2, suppressors, hierarchical analysis, overcontrol, experimental design. Very little hand computation; uses MYSAT computer program.

PSYCH 473 General Linear Model
Spring, weeks 8–14. 2 credits. Prerequisite: Psychology 472 or equivalent. M W F 10:10. R. B. Darlington.

Includes multivariate statistical models, results of multiple regression, diagnostic methods, nonlinear relationships, interaction, and simple effects. Basic power analysis, Emphasizes MYSAT and SYSTAT, briefly discusses SAS PROC REG and SAS PROC GLM.

PSYCH 475 Multivariate Analysis of Psychological Data
Fall. 2 credits. Prerequisite: Psychology 473 or permission of instructor. R 10:10-12:05. R. B. Darlington.

Students vote on topics to cover, choosing among nonparametric methods, time series, cluster analysis, multidimensional scaling, component analysis, factor analysis, MANOVA, canonical correlation, repeated measures, logistic regression, log-linear models, corrections for unreliability in regression, nesting, power analysis, influence analysis, and other topics. First class sketches all these topics before vote.

PSYCH 478 Psychometric Theory
Fall. 2 credits. Prerequisite: Psychology 472 or permission of instructor. Not offered 1997–98. T R 10:10-12:05. R. B. Darlington.
Statistical methods relevant to the use, construction, and evaluation of psychological tests.

[PSYCH 479 Multisample Secondary Analysis]
Fall, weeks 11–14. 1 credit. Prerequisite: Psychology 350 or equivalent. Not offered 1997-98. TR 10:10–12:05.
B. B. Darlington
Statistical methods for analyzing and integrating the results of many independent studies on related topics.

PSYCH 481 Advanced Social Psychology
Fall. 4 credits. Limited to 20 students, by application. Senior psychology majors have priority. Graduate students, see Psychology 681. TR 10:10–11:25.
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 will be 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 biological perspectives.

PSYCH 489 Seminar: Beliefs, Attitudes, and Ideologies
Spring. 4 credits. Prerequisites: admission is by application during the fall preregistration period. Seniors are given priority. M 2:30–4:30. D. J. Bern.
The seminar examines fundamental properties of beliefs and attitudes: how they are formed and changed, what psychological functions they serve for the individual, and how they coalesce into belief systems or ideologies. Several specific ideologies are examined in detail: for example, the political ideologies of the American public, gender, sexual orientation, the ideological factors that promote anorexia in a society, the contrasting worldviews of "people of color" and "pro-life" activists, the ideologies of psychology and science, and more. Participants write weekly commentaries on the readings in addition to a term paper examining a particular ideology.

PSYCH 491 Research Methods in Psychology
Spring. 4 credits. Enrollment limited to 25 students. Recommended: permission of instructor, Psychology 350, experience in upper-division psychology courses, or graduate standing. Graduate students, see Psychology 691. TR 10:10–11:25.
D. A. Dunning
An intensive examination of the basic research methods used in social, personality, cognitive, and developmental psychology. The course will focus on design 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 will also discuss what makes a research study actually interesting. The course in addition will cover test construction, survey methods, and "quasi experiments." Students will 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)]
Spring. 3 or 4 credits. The 4-credit option involves a one-hour session once a week, in which students are expected to participate in discussion. The 4-credit option is not always offered. Prerequisite: a 300-level course in biopsychology, or BIONB 222 or BIOAP 311, or permission of the instructors. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Offered alternate years. Graduate students, see Psychology 692. Not offered 1997-98. M W F 10:10.
B. F. Halpern and H. C. Howland.
This course covers classical topics in sensory function such as vision, hearing, touch and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, the development of sensory systems, and non-classical topics such as electroreception and internal chemoreceptors. Both human and nonhuman systems are discussed. In all cases the chemical, physical, and neurophysiological bases of sensory information are treated, and the processor of this information is followed into the central nervous system. At the level of The Senses, edited by Barlow and Mollon, and An Introduction to the Physiology of Hearing, 2nd edition, by Pickles.

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 4 credits unless otherwise indicated.

PSYCH 510-511 Perception
PSYCH 512-514 Visual Perception
PSYCH 513 Learning
PSYCH 515 Motivation
PSYCH 518 Topics in Psycholinguistics
PSYCH 519-520 Cognition
PSYCH 521 Psychobiology
PSYCH 522 Topics in Perception and Cognition
PSYCH 523 Hormones and Behavior

[PSYCH 524 Sex Differences in Brain and Behavior (also BIONB 628)]
Spring. 2 credits. Limited to 12 seniors and graduate students. Not offered 1997–98. Hours to be arranged. T. J. DeVoogd.
A survey of the newly discovered animal models for sex differences in the brain. Topics include the role of steroids in brain development, whether hormones can modify the structure of the adult brain, and the consequences of such sex differences in anatomy for behavior.

PSYCH 525 Mathematical Psychology
PSYCH 527 Topics in Biopsychology
PSYCH 535 Animal Behavior

PSYCH 541 Statistics in Current Psychological Research
PSYCH 543 Psychological Tests
PSYCH 544 Topics in Psychopathology and Personality
PSYCH 551 Distinguished Speakers
PSYCH 580 Experimental Social Psychology
PSYCH 600 General Research Seminar
Fall or spring. No credit.

PSYCH 605 Perception (also Psychology 505)
Spring. 4 credits. TR 11:40–12:55.
J. E. Cutting.

PSYCH 607 Chemosensory Perception (also Psychology 307)

PSYCH 609 Development of Perception (also Psychology 309)

PSYCH 611 Introduction to Human Memory (also Psychology 311)

PSYCH 612 Laboratory in Cognition and Perception (also Psychology 412)
D. J. Field.

PSYCH 613 Obesity and the Regulation of Body Weight (also Nutritional Sciences 315)
Spring. 3 credits. Limited to 30 students.
Prerequisites: one course in psychology and one course in nutrition. Undergraduate students may register with permission of instructor. S-U grades optional. Offered alternate years. T 1:30–3:30.
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 Issues in Cognitive Psychology (also Psychology 214)
Fall. 4 credits. M W F 10:10. B. Khurana.

PSYCH 615 Concepts, Categories, and Word Meaning (also Psychology 415)
Fall. 4 credits. M 1:25–4:25.
F. C. Keil.

PSYCH 618 Psychology of Music (also Psychology 418)
C. Krumholz.

PSYCH 619 Neural Networks Laboratory (also Psychology 419)

PSYCH 622 Developmental Biopsychology (also Psychology 422)
Fall. 4 credits. M W F 9:05–9:55. B. L. Finlay.

PSYCH 625 Cognitive Neuroscience (also Psychology 425)
PSYCH 626 Evolution of Human Behavior (also Psychology 326)
Fall. 4 credits. TR 2:55-4:10.
R. E. Johnston.

PSYCH 629 Offence and Taste: Structure and Function (also Psychology 429 and BIONB 429)
Spring. 4 credits. TR 9:05. B. P. Halpern.

PSYCH 631 Effects of Aging on Sensory and Perceptual Systems (also Psychology 431 and BIONB 431)
Fall. 4 credits. TR 10:10-11:25.
B. P. Halpern.

PSYCH 632 Biopsychology of Learning and Memory (also Psychology 332 and BIONB 328)
Spring. 4 credits. M W F 11:15. Staff.

PSYCH 640 The Brain and Sleep (also Psychology 640)
Fall. 4 credits. M W 8:40-9:55.
H. S. Porte.

PSYCH 641 Laboratory in Sleep and Dreaming (also Psychology 441)
Spring. 4 credits. W 7:30-10:30.
H. S. Porte.

PSYCH 642 Human Perception: Applications to Computer Graphics, Art, and Visual Display (also Psychology 342)

PSYCH 650 The Lenses of Gender (also Psychology 450 and Women's Studies 450 and Women's Studies 650)
Spring. 4 credits. F 1:30-3:30. S. L. Bern.

[PSYCH 676] Motivation (also Psychology 276)
Spring. 4 credits. Not offered 1997-98.

PSYCH 681 Advanced Social Psychology (also Psychology 481)
Fall. 4 credits. TR 10:10-11:25.
D. T. Regan.

PSYCH 689 Seminar: Beliefs, Attitudes and Ideologies (also Psychology 489)

PSYCH 691 Research Methods in Psychology (also Psychology 491)
Spring. 4 credits. TR 10:10-11:25.
D. A. Dunning.

[PSYCH 692] Sensory Function (also Psychology 492 and BIONB 492)
Spring. 4 credits. Not offered 1997-98.

[PSYCH 696] Introduction to Sensory Systems (also Psychology 396 and BIONB 396)
Spring. 4 credits. Not offered 1997-98.
M W F 10:10. B. P. Halpern.

PSYCH 700 Research in Biopsychology

PSYCH 709 Developmental Psychology (also Psychology 209)
Spring. 4 credits. TR 10:10-11:25.
F. C. Keil.

PSYCH 710 Research in Human Experimental Psychology

PSYCH 713 Information Processing: Conscious and Non-conscious (also Psychology 413)
Spring. 4 credits. R 10:10-12:35.
B. Khurana.

PSYCH 714 Comparative Cognition (also Psychology 414)

[PSYCH 715] Psychology of Language (also Psychology 215)

PSYCH 716 Auditory Perception (also Psychology 316)
Fall. 4 credits. T R 10:10-11:25.
C. L. Krumhansl.

[PSYCH 717] The Origins of Thought and Knowledge (also Psychology 417)

PSYCH 720 Research in Social Psychology and Personality

PSYCH 722 Hormones and Behavior (also Psychology 322 and BIONB 322)
Spring. 4 credits. M W F 1:25.
E. A. Regan.

PSYCH 773-774 Proseminar in Cognitive Studies I and II (also Cognitive Studies 773-774, Philosophy 773-774, Linguistics 773-774, and Computer Science 773-774)
Fall: R. grade. Spring: S-U only. 4 credits.
The Cognitive Studies Proseminar consists of two semesters of meetings with the graduate faculty in the field of Cognitive Studies. The proseminar will consist of a general introduction to the field of Cognitive Studies including an introduction to each of the major disciplines that make up the minor: i.e., computer science, linguistics, philosophy, and psychology. In each of these disciplines, faculty members from the field will introduce the theoretical and methodological issues that underlie the field and its relation to Cognitive Studies; in addition, they will introduce various labs in which active research is being conducted in their field at Cornell. The proseminar will include suggestions from faculty in each field for further advanced interdisciplinary research that can be pursued at Cornell during a Cognitive Studies minor. It will conclude (end of second term) with individual student presentations in which students initiate a critique of some interdisciplinary research, after consultation with a faculty member of their choice.

Although suitable to entering graduate students, the proseminar is also open to graduate students beyond their first year. Advanced undergraduates with a Cognitive Studies concentration may also be admitted. This is a year-long lecture and discussion course. The year-long commitment is mandatory. An “R” grade will be assigned in the fall semester, and a S-U grade only will be assigned in the spring semester.

PSYCH 775 Proseminar in Social Psychology I
Fall. 2 credits. Limited to 10 graduate students in social psychology. Hours to be arranged. D. A. Dunning and T. D. Gilovich.

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, emotional experience, etc., will be covered.

PSYCH 776 Proseminar in Social Psychology II
Spring. 2 credits. Limited to 10 graduate students in social psychology. Hours to be arranged. D. A. Dunning and T. D. Gilovich.

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 will emphasize social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, emotional experience, etc., will be 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 will be 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 123 Introduction to Biopsychology

PSYCH 128 Introduction to Psychology: Personality and Social Behavior

PSYCH 280 Introduction to Social Psychology

PSYCH 350 Statistics and Research Design

PSYCH 380 Community Mental Health (also Human Service Studies 380)

QUECHUA

See Language Courses under Languages and Linguistics.

RELIGIOUS STUDIES MAJOR

See "Special Programs and Interdisciplinary Studies."

ROMANCE STUDIES

The Department of Romance Studies (Mitchell Greenberg, chair) offers courses in French literature, Italian literature, and Spanish literature. In addition, the department's program includes courses in the French and Spanish languages, French linguistics, Spanish linguistics, semiotics, and Francophone, Italian, and Hispanic culture. Through its course offerings and opportunities for independent study, the department seeks to encourage study of the interactions of the Romance literatures among themselves, with other topics, such as group dynamics, social influence, the social psychology of language, emotional experience, etc., will be covered.
other literatures, and with other fields of inquiry.

French


The Major

The major in French, literature option, is described below.

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 FRIT 201, 220, or 221 plus 222 and FRDML 213 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 French language. This competence is demonstrated by the successful completion of French 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—African studies, anthropology, comparative literature, French literature, economics, government, history, history of art, linguistics, music, theater arts, women's 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, Professor Jacques Béreoud.

The French Area Studies Option

Admission

To be admitted to the major, students should have completed French Literature 201, 220, 221 or 224 plus French Language 213 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 French 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—African studies, anthropology, comparative literature, French literature, economics, government, history, history of art, linguistics, music, theater arts, women's 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 will be guided by their individual advisers. A copy of each student's program will be 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. For one of several study-abroad programs recognized by the departments of Romance Studies, Modern Languages, 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 FRDML 213 or its equivalent in advanced French preparation is the completion 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 EUDUCO, the program in Paris cosponsored by Cornell and by Duke University. EUDUCO offers 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 entire year as well-qualified students majoring in French or other related fields. The program provides students with the opportunity to experience French life, culture, and language in a stimulating and enriching environment. Participants will have access to a wide variety of cultural events, including concerts, exhibitions, and theater productions, as well as to a large and diverse selection of courses offered by the University of Paris VII and other institutions of higher learning in Paris, including the Institut d'Études Politiques (Sciences Po), selecting courses in many fields from the regular university course offerings. Students begin the academic year with an intensive three-week orientation into French history, society, and daily life. While it is possible to enroll in the EUDUCO Program for a single course, admission will be given first to students planning to study abroad for the full academic year. EUDUCO maintains a center in Paris with appropriate support staff. The resident director, chosen annually from the Cornell 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.

Honor’s. The honors program encourages well-qualified students majoring in French literature or 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. No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have agreed to supervise their work. They may receive course credit by enrolling in French 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 awarding of honors is determined by the student’s grades in the major and the quality of the honors essay.

Fee. Depending on the course, a small fee may be charged for copies of texts used in course work.

Language and Linguistics

Most language courses and French linguistics courses are offered by the Department of Modern Languages and the Department of Linguistics. Further language courses (conversation and advanced level), French linguistics courses, and all literature courses are listed below.

Note: Students placed in the 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 French Language 201 or 213 (offered by Modern Languages and by Linguistics) or Hotel Administration 266.

FRROM 301 Advanced French I

Fall or spring. 4 credits. Limited to 15 students. Prerequisite: FRDML 213 or Q++. On the Cornell Advanced Standing Examination (CASE) Fall: J. Béreoud or J. Daly; spring: J. Daly and staff.

Class discussions based on reading of selected contemporary texts: half will be short stories by 20th-century writers, half will be articles on current events taken from French magazines or newspapers. All texts are chosen for thematic or cultural interest and linguistic quality. Special attention will be given to correctness and accuracy in French through grammar review and weekly papers (essays or translations). Two films will be shown to illustrate today's idiomatic language. Course required of French majors.

FRROM 312 Advanced French II

Fall or spring. 4 credits. Limited to 15 students. Prerequisite: FRROM 301 or placement by the Cornell Advanced Standing Examination (CASE). Fall, A. Berger; spring, S. Tarrow and staff.
Continuation of work done in French 301. The objective of French 301 is to teach students to speak and write correct French; in French 312 students will be expected to have a richer, more idiomatic and hopefully elegant command of the language.

Formal study of grammar will be discontinued, and more attention will be devoted to the examination of language in texts and to oral presentations by students. Weekly papers as in French 301.

**FRLIT 201 Introduction to French Literature**
Fall, spring or summer. 3 credits. Prerequisite: qualification in French (SAT II score of 640, LF P score of 56, or French 123). Fall, A. Szczeznec and staff, spring, M.-C. Vallois and staff.

French 201, like all other 200-level French literature courses, is devoted to the language requirement by giving proficiency in French; but French 201 and 221 are mutually exclusive. Students with an SAT II score of 690 or more, or an LF P score of 60 or more, should take French 221. French 201 is divided into small sections and is conducted in French. Papers can be written in French or in English.

French 201 is designed for students interested in improving their written and oral skills in French and also their literary proficiency. Texts have been chosen both as a function of their literary merit and their manageable linguistic difficulty. Close scrutiny of the works and active class discussions will sharpen students' critical and analytical abilities. Different genres are covered (poetry, drama, and narrative prose); and the reading list may include authors such as Baudelaire, Beckett, Ionesco, Camus, Duras, Rimbaud and Sartre.

### FRLIT 222 Early Modern French Literature 
Spring. 3 credits. Prerequisite: FRLIT 201, 220, 221 or permission of the instructor. Required of all literature majors, but not limited to them. Conducted in French. M. Greenberg and staff.

Study of the classic literature of seventeenth-century France (Corneille, Racine, Molére, 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 will also invite reflection on the status and centrality of female characters in classical and neo-classical French literature and on the ideological context. It will then try to trace the evolution from the classical tragic heroine to more modern (but no less problematic) representations of women.

### FRLIT 224 The French Experience: An Introduction
Fall. 3 credits. M. Greenberg. An examination of French society, culture, and institutions. What has made French culture so distinctive? Its literature and its revolutions, its gastronomy and fashion, its painting, cathedrals, and cinema. Looking attentively at texts, images, and contexts from selected moments in the eighteenth, nineteenth, and twentieth centuries, we will attempt to unravel some of the defining enigmas of the French experience. Readings available both in French and in English translation.

Note: Prerequisite for all 300-level courses in French literature: FRLIT 201, 220, 221, or the equivalent.

### FRLIT 226 From Chivalry to Chanel: Perspectives in French Culture
Spring. 3 credits. Conducted in English. R. Klein and staff.

From chivalric and courtly codes of conduct through the poetic and artistic theories of the Renaissance, the rise and articulation of absolutism, the scientific skepticism of the Enlightenment, the manifestoes of the Revolution, of surrealism, of French feminists from Christine de Pizan to Hélène Cixous, French culture has always analyzed itself with a methodological rigor and theoretical alertness that has frequently been imitated and adopted by others. This course proposes a study of how French people read, and reads, itself, by means of a range of texts chosen from the above-mentioned fields, among others.

### FRLIT 320 French Civilization II: Contemporary France
Fall. 4 credits. French 213 or equivalent. Conducted in French. M. Béreaud.

Detailed, analytical study of contemporary French society, its structure and its culture. In the second half of the course, students will select a topic for in-depth personal research leading to the writing of a term paper. Short oral presentations will be encouraged. A variety of resources will be used: texts, magazine and television excerpts, and internet items. A few films will be shown to illustrate some aspects of French life.

### FRLIT 330 Francophone African Literature
Fall. 4 credits. Conducted in French. J. Ngaté.

Introduction to the works of representative poets, dramatists, novelists, and short story writers from sub-Saharan Africa and Madagascar. A. Seznec and staff; spring: N. Furman and staff.

This course will first study the writers’ revolt of May 1968 in France, placing it in its national and international political and ideological context. It will then try to trace the changes brought about by the spirit of May 68 in some areas of French society, especially youth and education. Finally, it will lead to a reflection on current ideologies and the change from modernism to postmodernism.

### FRLIT 334 The Novel as Masterwork
Spring. 4 credits. Conducted in French. J. Ngaté.

Introduction to the works of representative poets, dramatists, novelists, and short story writers from sub-Saharan Africa and Madagascar. A. Seznec and staff; spring: N. Furman and staff.

This course traces the evolution of the nineteenth-century French novel. Readings include novels by Stendhal, Balzac, Flaubert, and Zola.

### FRLIT 349 Love and Hate in the Middle Ages
Fall. 4 credits. Prerequisite: FRLIT 221 or permission of instructor. Conducted in French. K. Long.

This course is designed to offer an introduction to medieval French literature and old French while tracing the invention and decline of courtly ideals and the rise of satirical misogyny. The basic tenets of courtly love and courtly poetics will be analyzed by selections from the Lais of Marie de France, the Chevalier au Lion of Chrétien de Troyes, and the Roman de la Rose of Guillaume de Lorris. Satirical revisions of the courtly ideal will be studied in selections from the Roman de la Rose of Jean de Meun, the lyric poetry of Rutebeuf, Charles d’Orléans, François Villon,
and Christine de Pizan, as well as in medieval *farces* and *fabliaux*. Readings in old and medieval French.

**FRLIT 356 Urban Cultures: Lyon and Paris**

Spring. 4 credits. Prerequisite: FRLIT 221 or permission of the instructor. Conducted in French. K. Kroll.

This course will explore the importance of royal patronage and systems of censorship for the evolution of a centralized culture in France. This culture, however, is surrounded by multiple alternative cultures which intersect at various points: popular culture, with its tendency to mock the institutions of Church and State; Huguenot (Protestant) culture, the repression of which is a defining moment in the rise of absolutism; women's culture, which alternately creates new intellectual parameters and is mocked and suppressed by representatives of the predominant institutions. Texts will include works by Labè, Marguerite de Navarre, Ronsard, du Bellay, d'Aubigné, Mme. de Lafayette, Mollière, among others.

**FRLIT 370 Perspectives on the Age of Enlightenment: "Enlightened" Literature**

Fall. 4 credits. Conducted in French. M.-C. Vallois.

Through a reading of various works of the French eighteenth century (by Montesquieu, Voltaire, Diderot, Rousseau and Sade), we will study the emergence of new literary discourses and practices aiming at a "secularisation" of the literary field, in conjunction with the ideological and epistemological changes that took place under the name of Enlightenment.

**FRLIT 371 French Comedy in the Seventeenth and Eighteenth Century**

Fall. 4 credits. Conducted in French. A. Seznec.

Starting with *L'illusion comique* of Corneille and ending with *Beaucaire* and *Le Mariage de Figaro*, we will read plays by Mollière, Sedaine, Lesage, and Marivaux. The course will study the evolution of the comic form, as well as the political and social changes these works reflect.

**FRLIT 381 Nineteenth-Century French Women Writers (also WOMNS 381)**

Fall. 4 credits. Conducted in French. A. Berger.

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 will include Mme. de Staël, George Sand, M. Desbordes-Valmore, Flora Tristan, and Rachilde.

**FRLIT 393 Fin de Siècle or Belle Époque?: Parisian Culture around 1900 (also Comparative Literature 393)**

Spring. 4 credits. Conducted in English. E. Apter.

For description, see Comparative Literature 393.

**FRLIT 419-420 Special Topics in French Literature**

419, fall; 420, spring. 2-4 credits each term. Prerequisite: permission of instructor. Staff.

Guided independent study of special topics.

**FRLIT 420-430 Honors Work in French**

420, fall; 430, spring. 8 credits year-long course, R grade fall semester, letter grade spring semester, with permission of the adviser. Open to juniors and seniors. Consult the director of the honors program. R. Klein.

**FRLIT 448 Medieval Literature**

Spring. 4 credits. Prerequisite: French 221 or permission of the instructor. Conducted in English. A. Colby-Hall.

French 448 deals with the romance and the lyric. Faculty in reading Old French and appreciation of these two major genres are the primary goals of this course.

**FRLIT 476 The Libertine Novel**

Fall. 4 credits. Conducted in French. M.-C. Vallois.

From Montesquieu and Crébillon to Sade, we will study the rise of the libertine novel in eighteenth-century France. Foucault writes that this type of novel marks the beginning of the "epoch of sexuality." We will try to understand what is at stake in this new staging of "sexuality." The assertion of the supremacy of desire over social rules and values participated in the undermining of the theological and patriarchal order. We will inquire about the extent of this process as we discuss the place and representation of women's desire in these novels.

**FRLIT 483 France and Its Jews (also FRLIT 681 and JWST 452)**

Spring. 4 credits. Prerequisite: one 300-level course in French literature or permission of the instructor. Conducted in English. N. Furman.

From their expulsion from Paris during the Middle Ages to the French Revolution that extended citizenship to the Jews of France; from the Dreyfus affair to their deportation during the Holocaust, France has in turn welcomed and expelled the Jews. We will study this uneasy relationship through a variety of texts: historical documents, anti-Semitic tracts, essays by Sartre and Sarras, novels (Proust and Modiano) and films.

**FRLIT 484 Perfume, Jewelry, Cigarettes: Cultural Artifacts in French Literature**

Fall. 4 credits. Conducted in French. R. Klein.

This course invites reflection on some of the cultural artifacts that have played a large part in the social imagination of the French, and in France's idea of itself. Literary texts, poetry and prose, will serve as the principle means for understanding the function of these artifacts and their beauty, their utility and frivolousness—the dreams they incite and the ambitions they fulfill. Readings will include works of Barville, Baudelaire, Mallarmé, Mertini, Maupassant, Mauriac, Pierre Louys, Colette, and Sarras.

**FRLIT 486 Hospitality in Twentieth-Century French and Francophone Literature (also S HUM 486)**

Fall. 4 credits. Conducted in French. E. Kaufman.

Through readings in French and North African literature, this course seeks to explore the various dynamics of hospitality, a fundamental ethical mode of relating to an other. Topics considered include hospitality and exile, gendered and racialized relations of hospitality, same-sex hospitality, hospitality to the non-human, transgressive hospitality, and nomadic hospitality. Readings will include works by Albert Camus, Simone de Beauvoir, Tahar Ben Jelloun, Pierre Klossowski, Bouguin Ami, Georges Bataille, Marguerite Duras, and Ken Bugul.

**FRLIT 489 Politics and Silence in the Wake of World War Two (also S HUM 489)**

Spring. 4 credits. French recommended but not required. E. Kaufman.

This course will focus on texts that engage the events of World War Two (as well as the Moroccan and Algerian revolutions) with restraint, reserve, circumscription, and silence. We will read literature that might be variously categorized as apolitical, political allegory, and poeticized history. Our theoretical readings will analyze the complexity of the term "politics" and "silence", they will also address the specific relation of the intellectual to politics and silence (specifically with regard to accusations of collaboration). Readings will include works by Sarras, Tales, Celan, Cesáre, Djibril, Duras, Blanchot, Derrida, Agamben, and Lyotard.

**FRLIT 495 Existentialism**

Spring. 4 credits. Conducted in French. R. Klein.

This course will focus on the writing of Jean-Paul Sarrte, with special emphasis on his principle philosophical text, *Being and Nothingness*. Sarrte's literary work, as well as that of some of his contemporaries (de Beauvoir, Vian, Camus), will be read in conjunction with specific chapters of *L'être et le néant*. The question of what it means for there to have been such a profoundly theoretical, philosophical influence on literature, at that moment in French history, will be at the center of our concern.

**FRLIT 499 France During the Occupation**

Fall. 4 credits. Prerequisite: FRLIT 221 or ability to read French. D. I. Grossvogel.

This course intends to examine an important moment of French history: the period between 1940 and 1944 when France was defeated by Nazi Germany. During four years, there were those who collaborated and those who resisted. The trauma was felt long after Germany was finally defeated. The texts to be read were for the most part written during the Occupation. The films to be shown were either made during the Occupation or reflect upon it.

**FRLIT 639-640 Special Topics in French Literature**

639, fall; 640, spring. 4 credits each term. Staff.

Guided independent study for graduate students.

**FRLIT 681 France and Its Jews (also FRLIT 483 and JWST 452)**

Spring. 4 credits. Prerequisites: one 300-level course in French literature or permission of the instructor. Conducted in English. N. Furman.

For description, see FRLIT 483.
FRLIT 684 The Novel as Masterwork (also FRLIT 334)
Spring. 4 credits. Prerequisite: FRLIT 201 or permission of instructor. Conducted in French. N. Furman.
For description, see FRLIT 334.

FRLIT 695 Theorizing Film (also ENGL 703)
Fall. 4 credits. T. Murray.
For description, see ENGL 703

Italian

M. Migiel, director of undergraduate studies.

The Major
Students who wish to major in Italian should choose a faculty member to serve as a major adviser; the general plan and the details of the student's course of study will be worked out in consultation with the adviser. Italian majors are encouraged to take courses in related subjects such as history, art history, music, philosophy, anthropology, classics, linguistics, and other modern languages and literatures. While a major often occupies only the junior and senior years, it is wise for students to seek faculty advice about the major as early as possible.

Students who elect to major in Italian ordinarily should have completed Italian 201 by the end of their sophomore year. Exemptions can be made on the basis of an examination. 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 history, and to develop some skill in literary analysis. To this end, students will be expected to complete successfully 32 credits of Italian literature courses at the 300 level or higher, with papers to be written in Italian or English. Required courses for the major are ITALL 303, 304, and a course on Dante. ITALL 402, History of the Italian Language, and 403, Linguistic Structure of Italian, may be counted toward the 32 credits required for the major (an introductory linguistics course is a prerequisite of ITALL 402 and 403).

Students majoring in Italian will also be expected to acquire competence in the critical handling of the language. That competence may be demonstrated by passing an oral and written examination to be arranged with the adviser.

Italian majors will also be required to complete successfully two courses in related fields (for example, Italian history, Italian art history, literary theory). Italian majors may study in Italy, generally during their junior year, under any of those study-abroad plans organized by American universities that allow the transfer of grades and credit, such as the Cornell program in Rome.

The College of Architecture, Art, and Planning maintains a section for qualified students attending Cornell. The program is housed in the sixteenth-century Palazzo Massimo, designed by the architect Baldassare Peruzzi, on the Corso Vittorio Emanuele, in the heart of Rome. Students may enroll for a semester in the fall or spring. Courses regularly taught at the Palazzo Massimo include Italian language (beginning and intermediate); Architecture 300, 401, 402, 500, 502, Design Studio, Architecture 338 and 399, Special Topics in Architectural History; Architecture 458, Special Projects in Design Communications; Architecture 357, Contemporary Italian Culture; Architecture 510, Thesis Introduction; Art 251, 311, 322, and 371; and History of Art 371, Renaissance and Baroque Art in Rome.

To be eligible, students must have completed the first two years of their curriculum requirements and be in good academic standing.

Literature
Most language courses and Italian linguistics courses are offered by Modern Languages and by Linguistics. Advanced language courses and all literature courses are listed below.

ITALL 201-202 Introduction to Italian Literature
3 credits. Prerequisite: permission of instructor. ITALL 201 is not prerequisite to ITALL 202 or ITALL 205. Conducted in Italian. Fall, 202; spring, 201. M. Migiel and staff.
In this course, students will develop their language skills in Italian by reading, discussing, and writing about short works of fiction (twentieth-century short stories in ITALL 201; sixteenth-century novels in ITALL 202).

ITALL 250 Introduction to Italian Cultural Studies
Spring. 3 credits. Conducted in Italian. M. Migiel and staff.
This course is a historical, socio-political, and cultural survey of 20th century Italy. We will be looking at literature, movies, television, music, newspaper articles, advertisements, various other cultural products from the Fascist period to the present. By incorporating a variety of texts across disciplines the course will attempt to contextualize works within a historical framework as well as suggesting the limitations of such a framework through the use of feminist and post-structuralist theories. Students will be expected to speak, read, write, and understand Italian at a high level of proficiency. They will improve and polish these skills during the course of the semester.

ITALL 203 Introduction to Medieval and Renaissance Literature #
Spring. 4 credits. Conducted in Italian. Prerequisite: one Italian literature course at the 200 level or permission of the instructor. M. Migiel.
Manageable readings selected from authors such as: early Italian lyric poets, Dante, Petrarch, Boccaccio, Machiavelli, Castiglione, Ariosto, Tasso, and lyric poets of the sixteenth century. The course is designed not only to introduce students to the major authors and currents of the Italian Middle Ages and Renaissance, but also to help students improve their critical thinking and their linguistic skills.

ITALL 323 Encounters with the Dead (also ITALL 623 and COM L 323)
Spring. 4 credits. Conducted in English. M. Migiel.
Focusing on two epic works obsessed with death and with the dead (Dante Alighieri's Comedy [1321] and Claude Lanzmann's Shoah [1985]), this seminar will explore how Dante's poem and Lanzmann's film, often along analogous lines, address such issues as the problems inherent in the representation of events, the search for a poetic/cinematic language adequate to convey experiences surpassing human comprehension, the creation of a narrating "I," the "education" of the reader/spectator; national, political, and religious identities; the possibility of heroism; the place of women in the epic enterprise; the challenge of writing a history based on ironic displacement; the redemptive potential of art (and its ability to deceive as well as to enlighten and console); the call to bear witness, both to life and to loss. The seminar will also ask what value there is in comparing such vastly different works (a pre-Renaissance conversion narrative bearing witness to the Creator vs. a post-Holocaust testimonial marked by a crisis of witnessing). Students may read in English translation or the original; Shoah will be shown with English subtitles.

ITALL 374 Opera and Culture (also MUSIC 374 and GERST 374)
Spring. 4 credits. Prerequisite: any three-credit music course or proficiency in German or Italian. A. Groos.
For description, see MUSIC 374.

ITALL 394 Calvino and Levi: Then and Now (also ITALL 694)
Fall. 4 credits. Conducted in English. M. Migiel.
A study of the principal works by Italo Calvino and Primo Levi, two of the most important Italian writers of the second half of the twentieth century, and a critical examination of the theoretical frameworks that have been used to understand them so far.

ITALL 419-420 Special Topics in Italian Literature
419, fall; 420, spring. 2-4 credits each term. Prerequisite: permission of instructor. M. Migiel.
Guided independent study of specific topics.

ITALL 429-430 Honors in Italian Literature
429 fall; 430, spring. 8 credits. Year-long course, B for fall semester; letter grade for spring semester. Limited to seniors. Prerequisite: permission of instructor. M. Migiel.

ITALL 445 Boccaccio: Gender, Power, and the Medieval Text (also COM L 456, WOMNS 448, ITALL 645)
Fall. 4 credits. Conducted in English. M. Migiel.
A study of the discourses about reading and sexual difference in Boccaccio's Decameron. We will devote special attention to two questions: 1) What does it mean to carry out a feminist reading of a male-authored text? 2) How do the narrators of the Decameron rework earlier discourses about reading and sexual difference found in literary, historical, and philosophical material drawn from Italian, Old French, and Latin sources? All readings will be done in English translation; students who command the pertinent foreign languages may read texts in the original language. An extra hour-long discussion section will be organized for students who read and speak Italian.

ITALL 623 Encounters with the Dead (also ITALL 323, COM L 623)
Spring. 4 credits. Conducted in English. M. Migiel.
For description, see ITALL 323.
3) Either of the above options with a

2) A combination of literature and linguistics.

major are: concentration. Some typical options of the

Spanish majors have great flexibility in
devising their programs of study and areas of

language and contemporary society and take

proficiency in the oral and written language,

be taken concurrently with SPAND 203-204

option a student chooses, he or she is

couraged 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

Spanish 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.

For the concentration in Spanish linguistics,

see Department of Linguistics—Spanish.

Study abroad in Spain. Cornell, the

University of Michigan, and the University

of Pennsylvania cosponsor an academic year in

Spain program. Students enrolled in this

program spend the first three weeks before

the fall semester begins in a residential college

located on the campus of the University of

Madrid, where they take a course in Spanish

language and contemporary society and take

advantage of special lectures and field trips in

Madrid and other regions. The course carries three

credits. In early October the program moves to

Seville, where students enroll in as many

regular classes at the University of Seville as

their language competency and general

education permit. Their academic work is

supplemented by courses designed explicitly for

the program by Seville faculty, as well as a

seminar regularly offered by the resident
director, who is chosen from the faculty of

either Cornell, Michigan or Pennsylvania.

The special courses normally include history of

art and architecture, Spanish composition and

syntax, and modern Spanish history.

In Seville students live with selected families in

"residencias," or in a few cases in "colegios

mayores." Cornell-Michigan-Pennsylvania also

maintains a center in Seville, which is used by

students for special seminars, tutorials,

lectures, and informal gatherings.

Applicants are expected to have at least

completed SPAN 204 prior to departure.

Students are strongly encouraged to study

abroad for two or even three quarters rather than for one

semester. Students interested in the study

abroad program should consult with the

Cornell Abroad office for further information.

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 essays (see Spanish 429–430).

Fees. Depending on the course, a small fee

may be charged for film use or for copies of
texts for course work.

Language

Most language courses and Spanish linguistics

courses are offered by the Department of

Modern Languages and the Department of

Linguistics. Advanced language courses and

all literature courses are listed below.

Note: Students placed in the 200-level courses

have the option of taking language and/or

literature courses, see listing under SPANL 201

for description of the literature course that may

take place concurrently with SPAND 203–204

(offered by Modern Languages).

SPANL 311 Advanced Composition and

Conversation

Fall. 4 credits. Prerequisite: SPAN 204

or 212 or equivalent. M. Stycos and staff.

Advanced language skills, developed through

reading, grammar review, and intensive

practice in speaking, writing, and translation.

Analysis of present-day Spanish usage in a

wide variety of oral and written texts.

SPANL 312 Advanced Composition and

Conversation

Spring. 4 credits. M. Stycos and staff.

Readings and class discussion will focus on the

stylistic analysis of modern texts.

Increased emphasis, through weekly essays,

on students' development of an effective

Spanish prose style.

Literature

SPANL 201 Introduction to Hispanic

Literature 6

Fall or spring. 3 credits. Prerequisite:

qualification in Spanish or permission of

instructor. The course is divided into small

sections and is conducted mainly in

Spanish. (Fulfills both the language

proficiency requirement and the humani-
ties distribution requirement. The

literature course that normally follows

SPANL 201 is either 316 or 318.)

D. Castillo and staff.

SPANL 239 Cultural History of the Jews

of Spain (also NES 239, JWST 239,

COM L 239, and RELST 239)

Fall. 3 credits. Conducted in English.

R. Brann.

For description, see NES 239.

SPANL 246 Contemporary Narratives by

Latina Writers (also LSP 246)

Spring. 3 credits. L. Carrillo.

This course offers a survey of narratives,

including novels, short fiction, essays,

political/feminist manifestoes and memoirs by

representative Latina writers of various Latino

ethnic groups in the United States including

Chicana, Chileno, Cuban, Dominican, and

Puerto Rican, among others. We will

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

will investigate these works as artistic attempts

to deal with such issues as culture, language

and bilingualism, family, gender, sexuality,

and domesticity. We will account for regional

distinctions and contributions. Readings will

include works by Julia Alvarez, Gloria

Anzaldua, Elena Castedo, Ana Castillo, Denise

Chavez, Sandra Cisneros, Judith Ortiz Cofer,

Cristina Garcia, Nora Glickman, Nicholas

Mohl, Cherrie Moraga, Achy Obejas,

Esmeralda Santiago, Ana Lydia Vega, and

Helena Maria Viramontes.

SPANL 301 Hispanic Theater Production

Fall or spring. 1-2 credits. S/U only.

D. Castillo.

Students involved in Hispanic Theater

Production develop a specific dramatic text for

full-scale production. The course will involve

selection of an appropriate text, close analysis of

the literary aspects of the play, and group

evaluation of its representational value and

effectiveness. All students signing up for the

course will be involved in some aspect of

production of the play, and will write a final

paper as a course requirement. Credit will be
SPANL 315 Renaissance Hispanisms: Spain and the Americas #
Spring. 4 credits. Conducted in Spanish.
Prerequisite: SPANL 316 or SPANL 318.
C. M. Arroyo.
Study of canonical texts of the "Golden Age" of Spanish Literature. Discussions on the historical and ideological background—the era of Charles V, Lutheranism, the very notions of Renaissance, Humanism and Baroque, etc. Readings include Columbus, Larazzil de Torres, Garcilaso, St. Teresa of Avila, Cervantes, and plays by Lope de Vega, Calderón, and the birth of the Don Juan myth.

SPANL 316 Readings in Modern Spanish Literature
Fall or spring. 4 credits. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor.
Taught in Spanish: Fall: M. Stycos or J. R. Resina; spring: J. R. Resina or M. Gil.
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 Spanish-American Short Story
Fall or spring. 4 credits. Fall: J. E. Paz-Soldán or M. Gil; spring: J. E. Paz-Soldán or J. Piedra.
Readings and discussion of representative works from Spanish America during the past two centuries. In addition to representatives of the Romantic, Realist, Modernist, and creolista schools, the course focuses on contemporary writers such as Arreola, Borges, Cortázar, Fuentes, García Márquez, and Rojo.
Note: The prerequisite for the following courses, unless otherwise indicated, is SPANL 315, 316, or 318, or permission of instructor.

SPANL 333 The Spanish-American Short Story
Spring. 4 credits. Conducted in Spanish.
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 creolista schools, the course focuses on contemporary writers such as Arreola, Borges, Cortázar, Fuentes, García Márquez, and Rojo.

SPANL 339 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also SPANL 699, NES 339, JHST 339, COM L 334, and RELST 334) #
Spring. 3 credits. S/U option. This course can be used to fulfill the requirements of the Medieval Studies Program. Taught every other year. R. Brann.
For description, see NES 339.

SPANL 363 The European Novel (also Comparative Literature 363)
Fall. 4 credits. C. M. Arroyo.
For description, see COM L 363.

SPANL 365 "Fin de Siglo" and Modernity
Fall. 4 credits. Conducted in Spanish.
J. Paz-Soldán.
A comprehensive review of the literature written in Spanish America during the period known as the "fin de siglo." Movements such as "naturalismo" and "modernismo," and a variety of genres will be examined in the context of the crisis of liberal projects of modernization, and in the light of the specific nature of modernity in Latin America. A selection of texts includes Martí, Cambaceres, Dario, Clorinda Matta, Silva, Quiroga, Agustini, and others.

SPANL 384 Literature and Revolution
Spring. 4 credits. Conducted in Spanish.
J. Piedra.
A study of primary and secondary documents of and about Spanish American revolutionary episodes with a literary flair or literary and meta-literary texts which endorse revolution. Materials range from testimonies and manifestoes to novels and films, from Evita Peron to Che Guevara, from national liberation and civil war to gender and sexual liberation.

SPANL 387 The Novel of Memory
Spring. 4 credits. Conducted in Spanish.
J. R. Resina.
In the 1960s a category of novels develops in Spain that seeks to account for history in terms of personal experience and self-understanding. Through an ideological reversal, the 1980s and 90s are a period of political aestheticization driven by the impulse to forget the past. Some of the theoretical issues explored include the relation between fiction and memory, the fantastic, and the social construction of memory. Authors studied include Matute, Rodoreda, Benet, Goytisolo, Martín Gaite, Marsé and Vázquez Montalbán.

SPANL 399 Spanish Film
Fall. 4 credits. Conducted in Spanish.
Screenings to be announced. J. R. Resina.
Examines the evolution of Spanish cinema since Franco's death in 1975, both from a historical and a cinematic perspective. The focus will be on documentary, fictional and allegorical reconstructions of the past, and on the images of the new democratic society which illustrate a postmodern aesthetics. Selected films include works by directors who started their careers under the dictatorship (Saura, Erice, Borau), and by members of the younger generation, such as Almodóvar.

SPANL 404 Trauma and Captivity from Cervantes to Garcia Marquez (also S HUM 404)
Fall. 4 credits. Conducted in English.
M. A. García.
For description, see S HUM 404.

SPANL 417 Maladies of the Soul: Don Quijote and the Modern Novel (also S HUM 417)
Spring. 4 credits. Conducted in English.
M. A. García.
For description, see S HUM 417.

SPANL 419-420 Special Topics in Hispanic Literature
419, fall; 420, spring. 2-4 credits each term. Staff.

SPANL 429-430 Honors Work in Hispanic Literature
429, fall; 430, spring. 8 credits. Year-long study of specific topics. Limited to seniors. Prerequisite: permission of instructor.
D. Castillo.

SPANL 451 Spanish Theater of the Golden Age #
Fall. 4 credits. Prerequisite: limited to juniors, seniors, and graduate students. Conducted in Spanish.
This course will examine plays of the "Spanish National Theater" from Juan del Encina to Calderón; philosophical anthropology of the period and the art of characterization; topical themes and structures, and originality; text and performance. Readings include Encina, Gil Vicente, Lope de Vega, Tirso, Alarcón, Mira de Amezcua, and Calderón. Open to Spanish majors and to other students who can read the texts in Spanish.

SPANL 483 MACONDO/McDONDO: Our "Fin de Siglo"
Spring. 4 credits. Conducted in Spanish.
J. Paz-Soldán.
A review of Latin American narrative of the last two decades, in the context of the modernity/postmodern debate, and in view of the social, cultural, and political changes brought about by globalization. Topics will include the new historical novel, the emergence of new cultural actors, magical realism and the revolt against it by the new generation of Latin American writers. Works by Vargas Llosa, Allende, Cervantes, Martínez, Mastretta, among others.

SPANL 609 The Generation of 1898
Spring. 4 credits. Conducted in Spanish.
C. M. Arroyo.
Graduate seminar on one of the most controversial moments in Spanish civilization. Topics covered will include the Cubans' wars of independence; José Marti; the Spanish-American War; the idea of generation in literature; the search for "the soul of Spain"; the contemporary European discourse on nationalism, the origins of Catalan and Basque nationalism; the generation of 1898 and Modernism. Readings include Unamuno, Rubén Darío, Valle-Inclán, Benavente, Azorín, Baroja, R. de Maetzu, A. Machado.

SPANL 639-640 Special Topics in Hispanic Literature
639, fall; 640, spring. 2-4 credits each term. Staff.

SPANL 690 Hispanic Feminisms (also WOMNS 692)
Fall. 4 credits. Conducted in Spanish.
D. Castillo.
This seminar is designed to explore the interrelationship of feminist literary theory and the narrative production of the Hispanic world. In this inquiry, we will be developing feminist critical methodologies (based on readings of essays by thinkers such as Barthes, Castellanos, Derrida, Freud, and Glantz) and defining strategies or possibilities for feminist criticism(s). Finally, we will study the ways in which feminist analyses of literature alter our readings of texts by men (Isaacs, Cortázar, Onetti, García Lorca) as well as by women (Pardo Bazán, Tusquets, Valenzuela, Garro), and how they challenge our conceptions of criticism and the task of the critic.

SPANL 699 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also SPANL 339, COM L 339, NES 639) #
Spring. 3 credits. S/U option. This course can be used to fulfill the requirements of the Medieval Studies Program. Taught every other year. R. Brann.
For description, see NES 639.
**RUSSIAN**

See Language Courses under Languages and Linguistics.

**P. Carden, director of undergraduate studies**

**The Russian Major**

Russian majors study Russian language, literature, and linguistics, emphasizing their specific interests. It is desirable, although not necessary, for prospective majors to complete Russian 121–122, 201–202, and 203–204 as freshmen and sophomores, since 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 Russian 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 will be required to complete (1) Russian 301–302 or 303–304 or the equivalent, and (2) 18 credits from 300- and 400-level literature and linguistics courses, of which 12 credits must be in literature in the original Russian.

Certain courses may, with the permission of the instructor, be taken for one additional hour’s credit. Such courses will involve a one-hour section each week with work in the Russian language. These courses count one hour each of credit toward the 12 courses of Russian literature in the original language required for the major.

**Study Abroad**

Cornell is an affiliated institution in the Council on International Educational Exchange program for Russian language study at St. Petersburg State University. Cornell students also frequently attend the American Council of Teachers of Russian program in Moscow and other Russian language programs. Opportunities are available for study during the summer, a single semester, or the full year. Further information is available from W. Browne, in the Department of Modern Languages.

**Honors.** Students taking honors in Russian undertake individual reading and research and write an honors essay.

**Fees.** Depending on the course, a small fee may be charged for photocopied texts for course work.

**Freshman Writing Seminar Requirement.** The following courses will satisfy the freshman writing seminar requirement: Russian 103, 104, 105, and 109.

**Russian and Soviet Studies Major**

See “Special Programs and Interdisciplinary Studies,” which follows the department listings.
politics and government; relations with other nations, inside Russia and outside; Jews and Russians; folklore; social matters, customs, values; position of women; education; music, architecture; agriculture and industry; Russian materialism, rationalism, the ecology, film, TV, theatre, journalism.

[RUSSL 321 Introduction to Russian Poetry #] Fall. 4 credits. Prerequisites: Russian 202 or equivalent and permission of instructor. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students. Not offered 1997–98. S. Senderovich. A survey of Russian poetry with primary emphasis on the analysis of individual poems by major poets.

[RUSSL 332 Russian Drama and Theatre (also Theatr 322)] Fall. 4 credits. Not offered 1997–98. S. Senderovich. Selected topics. Discussion of a number of the most representative Russian plays of the nineteenth and twentieth centuries in chronological order. Introductions to the historical period, cultural atmosphere, literary trends, and crucial moments in the history of the Russian theater will be especially emphasized. Among the works we will be studying will be Gogol’s Inspector General, Ostrovsky’s The Storm, and Chekhov’s The Cherry Orchard. All readings will be in English translation. Additional assignments in critical literature will be made for graduate students.


[RUSSL 334 The Russian Short Story #] Fall. 4 credits. Prerequisites: Russian 202 or equivalent and permission of instructor. This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students. Not offered 1997–98. N. Poliak. A survey of two centuries of Russian story telling. Emphasis on the analysis of individual stories by major writers, on narrative structure, and on related landmarks of Russian literary criticism.

[RUSSL 350 Education and the Philosophical Fantasies] Spring. 4 credits. Not offered 1997–98. P. Carden. A major philosophical tradition has conceived of education as encompassing the whole of our lives. What we should do or be is seen as the result of every choice we make. The whole of our human contacts is understood as a school in which we form ourselves. This all-encompassing vision of education has been embodied in the works of great philosophers: those who use the forms of fiction to explore fundamental issues of education. In this course we will examine several key philosophical fantasies, among them Plato’s Republic, Rousseau’s Emile, and Tolstoy’s War and Peace. Our aim will be to understand how the discourse on education became a central part of our Western tradition.

[RUSSL 367 The Russian Novel (also Comparative Literature 367)] # Fall. 4 credits. Also open to graduate students. Special discussion section for students who read Russian. G. Gibian. Sentimentalism, rationalism, Realism, Modernism. Novels and short stories by Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, and others. Readings in English translation.

[RUSSL 368 Russian Literature from 1917 to the Present] Fall. 4 credits. Also open to graduate students. Prerequisites: Russian 367. No prerequisites. There will be a special section for students who read Russian. G. Gibian. In translation. A survey of Russian literature focusing on the most important writers. Among the themes to be explored will be Russian Modernism, social command, socialist realism, the Thaw, dissident and emigre literature, post-modernism. Writers include Blok, Mayakovsky, Babel, Olesha, Platonov, Pasternak, Nabokov, Solzhenitsyn, and the two Euroepeans, and contemporary women poets and short story writers.

[RUSSL 369 Dostoevsky #] Fall. 4 credits. Not offered 1997–98. S. Senderovich. Reading and discussion of Anton Chekhov’s short stories in the context of the European art of the short story and painting of that era. The course is designed for nonspecialists as well as literature majors. All reading is in English translation.

[RUSSL 373 Chekhov in the Context of Contemporary European Literature and Art (also Comparative Literature 373)] Spring. 4 credits. Not offered 1997–98. S. Senderovich. Reading and discussion of Anton Chekhov’s short stories in the context of the European art of the short story and painting of that era. The course is designed for nonspecialists as well as literature majors. All reading is in English translation.

[RUSSL 377 Baltic Literature (also German Studies 377)] Spring. 4 credits. Not offered 1997–98. I. Ezergailis. Estonia, Latvia, and Lithuania have created a rich literary tradition since the beginning of a written indigenous culture. In the twentieth century, we will read texts from each of these literatures, selected for their quality, importance, and the availability of acceptable translations, representing, as much as possible, writers from the pre-Soviet independence period, those writing under Soviet rule, and emigres.

[RUSSL 379 The Russian Connection (also Comparative Literature 379)] # Spring. 4 credits. P. Carden. Our topic will be the development of a poetics of introspection in European prose in the course of the 19th century, culminating in two major Russian novels: Tolstoy’s War and Peace and Dostoevsky’s The Idiot. Among other works we will read: Constant’s Adolphe, Stendhal’s Chartreuse of polyester, and several short works relevant to the theme.

[RUSSL 384 Dialogue into Text (also Comparative Literature 384)] Spring. 4 credits. Not offered 1997–98. P. Carden. An examination of the principle of dialogue and dialogism as it appears in fictional discourse. Using the theories of Mikhail Bakhtin as a point of departure, we will examine the use of dialogue as a form of discourse beginning with Plato’s Phaedrus. Dostoevsky’s novels Notes from Underground, The Possessed, and The Brothers Karamazov will be discussed as dialogic, or polyphonic forms of discourse. Finally, we will discuss selected works of Gide, Sartre and Camus, who acknowledged their debt to Dostoevsky, to see if they are indeed polyphonic in structure.

[RUSSL 385 Reading Nabokov (also Comparative Literature 385 and English 379)] Fall. 4 credits. Not offered 1997–98. G. Shapiro. This course offers an exciting trip to the intricate world of Nabokovian fiction. After establishing himself in Europe as a distinguished Russian writer, Nabokov, at the outbreak of WWII, came to the United States where he reestablished himself, this time as an American writer of world renown. In our analysis of the Nabokovian artistic universe, we shall focus on his two splendid achievements as a Russian writer, The Defense (1930) and Despair (1954) (both in their English forms), and then examine the two widely read novels that he wrote in Ithaca while teaching literature at Cornell—Lolita (1955) and Pnin (1957).

[RUSSL 389 Contemporary Literature in Central and East Europe (also Comparative Literature 389)] Spring. 4 credits. Not offered 1997–98. G. Gibian. The course this year will study developments in literature (and to some extent in other areas of culture) in Hungary, Poland, Slovakia, and the Czech Republic in the most recent periods. We shall study novels and short stories, but some consideration will also be given to drama and poetry. No knowledge of Eastern European languages is required. The reading will be done in English translation.

[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.

[RUSSL 404 History and Nationality in Russia and Eastern Europe (also S Hum 404)] Fall. 3 credits. Not offered 1997–98. G. Gibian. Ethnicity and nationality appear as the main forces behind the recent dramatic changes in Eastern Europe. The seminar addresses these issues in Russia, Czech Republic, and elsewhere, mainly from a literary perspective and also in the context of rising ethnic and national consciousness throughout the world.

[RUSSL 409 Russian Stylitics] Fall. 4 credits. Also open to graduate students. Prerequisite: three years of Russian. Not offered 1997–98. G. Gibian. A few steps beyond normative grammar. Introduction to the subtleties of idiomatic Russian on the levels of morphology, syntax, vocabulary, and phraseology. Introduction to the genres of live colloquial and written language. Development of writing skills through short assignments and their analyses. First notions of literary stylitics and their practical application.
This course is a survey of Russian Formalism, a trend in literary interpretation that flourished in the 1910s and the 1920s. We will read the writings of such scholars as Tytianov, Elkhinbaum, Shklovsky, and Jakobson, as well as the works they studied. The course provides a historical examination of some of the most important movements in twentieth-century Western criticism—and in other disciplines, such as linguistics and anthropology. The course also provides both a look at classics of Russian prose and an approach to literature that has something to offer readers today. No knowledge of Russian is required.

**RUSSL 428 Futurism and Formalism**

FALL. 4 CREDITS. S. BANKS.

In the linguistic inventiveness of the Futurists, theorists such as Viktor Shklovsky found the vital engagement with the material of poetry which they believed could truly renovate Russian literature. In this course we will read key critical essays by members of the Petersburg OPAYAZ and the Moscow Linguistic Circle, while we also carefully examine the material and textual elements of Futurist poetry collections and dramatic productions. We will also study the literary and theoretical impact of new genres such as the manifesto which, with its status between literary utterance and performative program incubates the intersection of literature and theory. Readings in English translation.

**RUSSL 429 Music in Russian Symbolist Poetry**

SPRING. 4 CREDITS. S. BANKS.

In his hierarchy of the arts, Schoenauer placed music at the apex as the pure manifestation of world will. Poetry claimed second place, and to the Russian Symbolists this meant that a heightening of the musical aspects of poetry could bring it closer to the ideal art. In this course we will read essays and poems by Blok, Ivanov, Briussov, and others as well as excerpts from Schoenauer and a few selected works of the French Symbolists, whom the Russians admired and translated. We will examine the idea of musicality as expressed in the rhythm and sonority of the poems while we also interpret musical metaphors and themes against the backdrop of larger aesthetic and philosophical valuations of music. Our attention to musical motifs and techniques will take us out of the traditionally defined chronological boundaries of Symbolism, but this breadth will help us to define an essential aspect of the movement as well as to assess the movement's impact on other artistic programs of the early twentieth century. Readings in English translation.

**RUSSL 430 Practice in Translation**

SPRING. 4 CREDITS. PREREQUISITES: PROFICIENCY IN RUSSIAN OR APPROVAL OF INSTRUCTORS. W. BROWNE AND S. SENDEROVICH.

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 to problems and development of skills.

**RUSSL 431 Contemporary Russian Prose**

SPRING. 4 CREDITS. PREREQUISITES: RUSSIAN 301-302 OR 303-304, AND PERMISSION OF INSTRUCTOR. THIS COURSE MAY BE COUNTED TOWARDS THE 12 CREDITS OF RUSSIAN LITERATURE IN THE ORIGINAL LANGUAGE FOR THE RUSSIAN MAJOR. GRADUATE STUDENTS MAY AUDIT THE COURSE. NOT OFFERED 1997-98. STAFF.

This course is designed to acquaint students with the way Russian prose has developed during the past forty years. Although the emphasis will be on comprehension of the text, we will also discuss literary structure, modern literary history, social and political problems, and the ways in which life in Russia is reflected in its literature. Authors to be read include Viktor Nekrasov, Yuri Kazakov, Alexander Solzhenitsyn, Varlam Shalamov, Abram Tertz (Andrei Sinyavsky), Vasilii Axyonov, and Tatyana Tolstaya. This course is specifically intended for third- and fourth-year Russian majors.

**RUSSL 432 Pushkin I**

SPRING. 4 CREDITS. PREREQUISITES: RUSSIAN 202 OR EQUIVALENT, AND PERMISSION OF INSTRUCTOR. THIS COURSE MAY BE COUNTED TOWARDS THE 12 CREDITS OF RUSSIAN LITERATURE IN THE ORIGINAL LANGUAGE FOR THE RUSSIAN MAJOR. ALSO OPEN TO GRADUATE STUDENTS. NOT OFFERED 1997-98. S. SENDEROVICH.

Reading in the original language and discussion of selected works by Pushkin: lyrics, narrative poems, and Eugene Onegin.

**RUSSL 445 Batiushkov and Pasternak**

FALL. 4 CREDITS. PREREQUISITES: AT LEAST ONE 300-LEVEL COURSE IN RUSSIAN LITERATURE IN THE ORIGINAL LANGUAGE OR PERMISSION OF THE INSTRUCTOR. N. POLIAK.

A study of the works of Konstantin Batiushkov (b. 1787) and Boris Pasternak (b. 1890), two poets who have been described as innovators in Russian poetic language. We will examine the poetry (and prose) of these poets and some of their contemporaries, with a view to exploring their parallel roles in two ages of poetry a century apart.

**RUSSL 460 Short Works of Tolstoy and Dostoevsky**

SPRING. 4 CREDITS. DAYS AND HOURS, TBA. G. GIBIAN.

Readings in Russian and in translation. Open to graduate students.

**RUSSL 491 Reading Course: Russian Literature in the Original Language**

FALL OR SPRING. 1 CREDIT EACH TERM. PREREQUISITE: PERMISSION OF INSTRUCTOR. STAFF.

This course is to be taken in conjunction with any Russian literature course in English translation. Students will receive one credit for reading and discussing works in Russian in addition to their normal course work.

**RUSSL 492 Supervised Reading in Russian Literature**

FALL OR SPRING. 1-3 CREDITS EACH TERM. PREREQUISITE: PERMISSION OF INSTRUCTOR. STAFF.

**RUSSL 499 The Avant-Garde in Russian Literature and the Arts**

SPRING. 4 CREDITS. OPEN TO ANY STUDENT WHO HAS COMPLETED RUSS 202. MAY BE USED IN SATISFACTION OF THE TWELVE HOURS OF READING IN RUSSIAN REQUIRED FOR THE RUSSIAN MAJOR. NOT OFFERED 1997-98. IN THIS COURSE WE WILL EXAMINE CLOSELY REPRESENTATIVE SHORT TEXTS IN RUSSIAN BY SUCH LEADING FIGURES OF THE RUSSIAN AVANT-GARDE AS BLOCK, BEHJ, REMIZOV, MAYAKOVSKY, KHLÉBNIKOV, KRUCHENYKH, AND BABEL. WE WILL ALSO EXAMINE RELATED DEVELOPMENTS IN THEATER, FILM, AND THE VISUAL ARTS.

**Graduate Seminars**

**RUSSL 603 Graduate Seminar: Neglected Masterpieces of Short Russian Prose**

SPRING. 4 CREDITS. NOT OFFERED 1997-98. G. GIBIAN.

Nineteenth- and twentieth-century works chosen according to the needs of the students enrolled. Stress on skills useful in teaching Russian literature.

**RUSSL 611 Supervised Reading and Research**

FALL OR SPRING. 2-4 CREDITS. PREREQUISITE: PERMISSION OF THE DEPARTMENT. STAFF.

**RUSSL 617-618 Russian Stylistics I and II**

NOT OFFERED 1997-98.

**RUSSL 619 Seventeenth-Century Russian Literature**

FALL. 4 CREDITS. NOT OFFERED 1997-98. G. SHAPIRO.

Seventeenth-century Russian literature is often studied together with Medieval literature. Is such an arrangement justified, or does seventeenth-century literature have its own problematic that makes it worth studying separately? In scholarship the seventeenth century is referred to as the Age of Baroque. Did Muscovite Russia experience its own Baroque, and, if so, what are its unique features? These and other important issues will be addressed in the seminar. In the course of the seminar a variety of concepts, genres, and themes characteristic for the epoch will be discussed. We will read the works of such authors as Simeon Polotsky, Silvester Medvedev, Karion Isomirin, and the archpriest Avvakum.

**RUSSL 620 Twentieth-Century Russian Prose**

SPRING. 4 CREDITS. OPEN TO ADVANCED UNDERGRADUATES WITH PERMISSION OF INSTRUCTOR. NOT OFFERED 1997-98. N. POLIAK.

An in-depth study of the works of selected twentieth-century poets. Authors may include Blok, Mandelstam, Pasternak, Tsveetayeva, and Khlébnikov.

**RUSSL 621 Old Russian Literature**

SPRING. 4 CREDITS. NOT OFFERED 1997-98. S. SENDEROVICH.

A survey.

**RUSSL 622 Eighteenth-Century Literature**

SPRING. 4 CREDITS. NOT OFFERED 1997-98. S. SENDEROVICH.

[RUSSL 624] Russian Romanticism
Spring. 4 credits. Taught in Russian. S. Senderovich.
A survey of concepts, themes, genres, and main individual contributions in Russian literature of the Age of Romanticism. The Age of Romanticism encompasses the first four decades of the nineteenth century. Zhukovsky, Batiushkov, Pushkin, Baratynsky, Gogol, and Lermontov are the major representatives of this style and the most important period of Russian literature. The emphasis is on poetry, its historical and theoretical problems. It was, above all, the golden age of Russian poetry, which prepared and deeply influenced the following age of great Russian prose. Turgenev, Tolstoy, Dostoevsky, and Chekhov are full of allusions to the texts of the golden age and cannot be properly understood without it.

[RUSSL 625] Russian Realism
Fall. 4 credits. Not offered 1997–98. P. Carden.
A study of the development of psychological realism in Russian prose of the nineteenth century, with some attention to the poetic tradition. In addition to reading representative works, we will pay attention to the historical background of the period. We will approach the works through the critical writings of several important theorists, in particular those of Lydia Ginzburg.

[RUSSL 626] The Tradition of Russian Poetry
This course will examine a selection of poems that have been particularly important for the tradition of Russian poetry, with some attention to the poetic tradition. In addition to reading representative works, we will pay attention to the historical background of the period. We will approach the works through the critical writings of several important theorists, in particular those of Lydia Ginzburg.

[RUSSL 627] Russian Formalism (also Comparative Literature 627)
See RussL 427 for course description.

[RUSSL 630] Gogol
Gogol's artistic career from his "Ukrainian" cycles to Dead Souls. We will examine representative works from each of the major divisions of Gogol's early work, in particular from his cycles Evenings on a Farm near Dikanka and Mirgorod, and will trace the writer's development toward his magnum opus, Dead Souls. Although some of the readings will be done in English to enable the class to cover a significant amount of material, the class work will be focused on close analysis of the Russian text.

[RUSSL 641] Bakhtin as Reader (also COMP L 641)
Spring. 4 credits. Also open to undergraduates with permission of instructor. P. Carden.
The course will investigate the literary and cultural theories of Mikhail Bakhtin, focusing in particular on his interpretations of literary texts. We will read a representative selection of works by Bakhtin covering the chronological development of his ideas. Each member of the class will select one or more of the literary texts commented on by Bakhtin as an occasion for independent work. A reading knowledge of Russian is not required, although Russian readers may have alternative assignments in the language.

[RUSSL 650] Russian Intellectual History
Nineteenth- and twentieth-century selected topics. Taught mostly in English.

[RUSSL 669] Dostoevsky
Fall. Also open to advanced undergraduates. Not offered 1997–98. G. Gibian and guest lecturers.
Study of representative works from various periods of Dostoevsky's life, including some articles, speeches, and parts of The Diary of a Writer, against the context of nineteenth-century Western European and Russian literature. A variety of critical and scholarly approaches (from Russian formalists to recent Western scholars) will be sampled and evaluated.

[RUSSL 671] Seminar in Nineteenth-Century Russian Literature
Fall. 4 credits. P. Carden.
Topic: War and Peace.

[RUSSL 672] Seminar in Twentieth-Century Russian Literature
Fall. 4 credits. Open to advanced undergraduates. Not offered 1997–98.

[RUSSL 673] The Russian Nabokov
Fall. 4 credits. Also open to advanced undergraduates. G. Shapiro.
Vladimir Nabokov wrote much verse, several plays, numerous short stories, and nine novels in Russian before switching to English. He is a major Russian writer of the twentieth century. This seminar will examine his work in the context of modern Russian literature, concentrating in particular on the novels. Knowledge of Russian is highly desirable, but all the works discussed also exist in English translation.

[RUSSL 675] Russian Literature, 1917–1945
Fall. 4 credits. Not offered 1997–98.
This semester will focus on the achievements of Russian prose between the two World Wars. Among the authors whose works will be closely read and discussed, there are Babel, Olesha, Zoshchenko, Ilf and Petrov, Bulgakov, and Nabokov.

[RUSSL 676] Russian Literature, 1945–Present
Spring. 4 credits. Not offered 1997–98.

[RUSSL 699] Russian Modernism
We will be investigating the rich and innovative period of the avant-garde in Russia from 1910 to 1925. In addition to examining outstanding works in a variety of forms, we will look at the movements, social context, and ties to the European avant-garde. Among the artists whose works we will examine are Blok, Bely, Mayakovsky, Khlebnikov, Pilyuk and Babel. We will examine theater through the Futurist performance piece, "Victory Over the Sun," through Meyerhold's productions of Mayakovsky's plays and other experimental pieces, and through mass spectacles. We will discuss the film theories of Eisenstein and Dziga Vertov and see several of their films. In the visual arts we will be examining the experiments of Larionov and Goncharova, Malevich, Kandinsky, and Tatlin. We will also look at the photomontage of Rodchenko.

RUSSIAN AND EAST EUROPEAN STUDIES MAJOR
See "Special Programs and Interdisciplinary Studies.

SANSKRIT
See Language Courses under Languages and Linguistics.

SERBO-CROATIAN
See Language Courses under Languages and Linguistics.

SCIENCE AND TECHNOLOGY STUDIES
The importance of science and technology in the modern world is difficult to overstate. Whether one looks at the role of computers in society, the history of evolutionary theory, the challenges of environmental controversies, the ethical dilemmas of biomedicine, or the military applications of research, science and technology profoundly affect our lives—often in ways that we scarcely understand or only dimly perceive. The field of science & technology studies uses tools from the history, philosophy, sociology, and politics of science and technology to examine science and technology in their social and cultural context and to explore their political and policy implications. Systematic, integrated study of the origins and impacts of science and technology provides an understanding of the interactions among science, technology, and society and yields invaluable insights into the nature of the modern world.
The Science & Technology Studies Major

The major in Science & Technology Studies offers students wishing to pursue careers in law, public policy, health care, or management an opportunity to develop a full appreciation of the place of science and technology in society. The curriculum aims to further students' understanding of the historical, social, political, and ethical aspects of science and technology and to enable students to participate effectively in policy debates and decision making. In today's world, issues at the intersection of the technical and social arise continually in professional practice, management, and research. Thus, the integrated approach of the S&TS major provides a strong foundation for careers in the professions, in public policy, and in management, as well as in research and teaching.

Themes of the Major

Students in the S&TS major develop a program individually tailored to their particular interests. To give their coursework a coherent focus, students select a theme that draws together a group of related courses. Available themes include:

1. Science, Technology & Public Policy. Many of the most important policy issues of our time involve science and technology. This theme offers students an opportunity to gain a deep appreciation of the problems this situation raises in democratic societies. Through courses that survey the place of science in American politics and through courses that focus on such substantive issues as national technology policy or the politics of genetic engineering, this theme explores the tensions between expertise and democracy, the uses of scientific knowledge in making and legitimating policy, social movements that question technology and science, and contemporary debates over economics, innovation, and technology policy.

2. Technology, Culture, & Society. Students interested in this theme may examine the connections among technology and culture by studying the manifold ways in which social groups (scientists, engineers, inventors, corporations, government agencies, and consumers) interact to construct technological artifacts and systems, and how the use of these artifacts and systems is related to social and cultural change. Areas of particular interest are: computers and society, the military and technological change, gender and technology, biotechnology and society, and telecommunications.

3. Environment, Science, & Society. By focusing on the relationship between scientific knowledge and political power, this theme offers unique insights into the making and implementation of environmental policy. Courses are available on such topics as American environmental politics, international environmental policy, science and the law, the history of agricultural science, and environmental communication. Students explore the causes and consequences of environmental controversies, the nature of risk and uncertainty in environmental issues, the roles of experts and the public in environmental decisions, and the challenges of global environmental policy.

4. History and Philosophy of Science and Technology. This theme provides students with an appreciation of science and technology in historical perspective and with an understanding of the philosophical problems posed by scientific knowledge. Courses available range from broad surveys to intensive studies of focused subjects. Students in this theme address such topics as the emergence of modern science; gender and science; the goal of achieving valid knowledge and the philosophical and institutional problems that this entails; the issues for history and philosophy of science raised by the new sociology of scientific knowledge; the relationship between knowledge, technology, and ethics; and the impact of major institutions—such as religion, medicine, the military, and the modern consumer economy—on the development of the sciences.

Beyond the four themes described above, S&TS majors may also create their own themes, carefully tailored to their particular interests. Examples might include "Computers, Innovation, and Society" or "Science, Technology, and Globalization."

Admission to the Major

Students intending to major in Science & Technology Studies should submit an application during their sophomore year. Juniors are considered on a case-by-case basis. The application includes (1) a one-page statement explaining the student's 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 chosen from some combination of history, philosophy, sociology, or government; b) the science requirement of the College of Arts and Sciences; c) Mathematics or computer science courses in fulfillment of the Arts College Group Two distribution requirement. 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 at 275 Clark Hall (255-6047).

Requirements

S&TS majors must complete the following requirements:

1. Core Courses. Science and Technology Studies majors will be required to take:
   (a) either S&TS 250 (Technology in Society) or S&TS 282 (Science in the American Polity: 1800-1960) and S&TS 381 (Philosophy of Science: Knowledge and Objectivity)
   (b) either S&TS 250 (Technology in Society) or S&TS 381 (Philosophy of Science: Knowledge and Objectivity) or S&TS 382 (Science in the American Polity: 1800-1960)

2. Additional Science and Technology Studies Courses. Science and Technology Studies majors will be required to complete at least 21 credit hours of additional courses in Science and Technology Studies, subject to the following restrictions:
   (a) Breadth requirement: At least one course beyond the core courses in each of the three areas of concentration (history, philosophy, and social studies of science and technology);
   (b) Depth requirement: At least two courses in one area beyond the core courses and intended for advanced undergraduates or graduate students.

3. 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) course. Mathematics sufficient to follow the additional science requirement should be completed before undertaking that requirement. Choice of these courses should be made in consultation with the student 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 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 spring semester before their junior year. More information on the honors program is available from the S&TS undergraduate office at 275 Clark (255-6047).

The Biology and Society Major

The Department of Science & Technology Studies also offers the Biology and Society major, which includes faculty from throughout the university. The Biology and Society major is ideally suited for students who wish to combine training in biology with exposure to perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern biology. In addition to providing foundational training in biology, Biology and Society students obtain background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The Biology and Society major is offered to students enrolled in the College of Arts and Sciences and the College of Human Ecology. Undergraduates in the College of Agriculture and Life Sciences can develop an approved sequence of courses from the Biology and Society curriculum under general studies. The major is coordinated for students in all colleges through the Biology and Society.
The concentration in Science and 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 multiple disciplinary perspectives.

The S&TS concentration permits students to develop an individualized program of study closely related to their major field. For example, students might use the S&TS concentration to further explore issues related to their major focusing on such topics as computers and society; gender and technology; science and law; biotechnology; science and politics; and environmental policy. By choosing courses in which their particular goals, students can tailor the concentration to provide breadth and depth in areas of special interest.

S&TS courses are organized into three areas: history, philosophy, and social studies of science and technology. 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 should be chosen from the list of core courses. The remaining three courses should be chosen in consultation with an S&TS faculty adviser and must be drawn from at least two of the three areas. Interested students may obtain further information about courses by contacting the S&TS undergraduate office, 275 Clark Hall (255-6042).

Course Offerings

History

Philosophy

Social Studies of Science

Independent Study

History

S&TS 233 Agriculture, History, and Society: From Squanto to Biotchnology
Fall. 3 credits. Not offered 1997–98. M. W. Rosister.

S&TS 444 Historical Issues of Gender and Science (also Women's Studies 444)
Fall. 4 credits. Open to sophomores. M. W. Rosister.

One-semester survey of women's role in science and engineering from antiquity to the 1980s, with special emphasis on the United States in the twentieth century. Readings will include biographies and autobiographies of prominent women scientists, educational writings and other primary sources, and recent historical and sociological studies. By the end of the semester, we shall have attained a broad view of the problems that have faced women entering science and those that still remain.

S&TS 447 Seminar in the History of Biology (also Biology and Society 447, History 414, and Biological Sciences 447)
Summer. 4 credits. Limited to 18 students. S/U grades optional. For description see Biology Sci (BIO G) 467.

S&TS 525 Seminar in the History of Technology (also History 525)
Fall. 4 credits. R. Kline.

Exploration of the history of technology in Europe and the United States from the eighteenth century to the present. Typical topics include the industrial revolution in Britain, the emergence of engineering as a profession, military support of technological change, labor and technology, the "incorporation" of science and engineering, technological utopias, cultural myths of engineers and inventors, social aspects of urbanization in the city and on the farm, post-war consumerism, and gender and technology. The interests of students and recent literature in the field will be considered in selecting the topics for the seminar.

S&TS 644 Topics in the History of Women in Science

This is a one-semester graduate seminar on selected topics in the history of women and gender in science and technology, covering mostly the U.S. in the 20th century but broadly defined to include earlier periods and other countries. It seeks to acquaint advanced students with some of the best recent literature on this topic and to identify and explore possible new topics. Weekly readings and a research paper.

S&TS 680 Seminar in Historiographical Approaches to Sciences (also History 680)
Fall. 4 credits. Not offered 1997–98. For description, see History 680.

S&TS 682 Topics in the Scientific Revolution (also History 682)
Fall. 4 credits. Not offered 1997–98. For description, see History 682.

S&TS 687 Seminar in the History of the Agricultural Sciences
Fall. 4 credits. Open to advanced students interested in the history of the agricultural sciences, broadly defined. M. W. Rosister.

Weekly readings and a research paper.
This graduate seminar will examine the weekly discussion, each student will prepare a organization of the postwar university, and the biomedical, and environmental sciences since seminar. In addition to participation in the particular institutions, technologies, and affect the development of the sciences, the research paper for presentation to the seminar. We will examine the structure of the medical profession, medical training and professional socialization; the social organization of the hospital, and doctor-patient interactions. The course will also explore how biomedical knowledge and technology get produced and introduced into clinical practice. Topics may include the intensive care unit, the training of surgeons, the regulation of pharmaceuticals, AIDS and breast cancer activism, genetic testing, and priority setting in biomedical science.

S&T 324 Environment and Society (also Rural Sociology 324) Spring. 3 c. dis. For description, see R SOC 324.

S&T 350 Atomic Consequences: The Incorporation of Nuclear Weapons in Postwar America (also Government 305) Spring. 4 credits. M. Dennis. This course will explicate the development of atomic weapons from early twentieth-century rumina tions about super bombs in science fiction through the Manhattan Project, the postwar development of thermonuclear weapons and civil defense, and more recent plans for strategic defense. Our focus will expand to cover the lives of researchers at such institutions as Los Alamos during and after World War II as well as discussions of national politics. Other topics include the Nazi effort to develop an atomic bomb, the role of technical espionage during and after World War II, and the problems posed by the classification of technical knowledge. We will seek to understand how the bomb became part of American culture through the use of literature and film, as well as readings in primary historical documents and secondary analyses. In addition to class meetings, there is also a required screening session on T 7-10 p.m. in Lins media room b. Films will generally last less than two hours, but some are longer. Viewing the movies is an essential part of the course.

S&T 352 Science Writing for the Mass Media (also Communication 352) Fall. 3 credits. For description, see COMM 352.

S&T 360 Ethical Issues in Engineering (also Engineering 360) Spring. 3 c. dis. For description, see ENGR 360.

S&T 390 Science in the American Polity, 1800-1960 (also Government 308) Fall. 4 credits. M. Dennis. How did America become a leading nation in scientific and technical research? This course charts the development of American science from its origins in gentlemanly societies in the early nineteenth century through the development of large-scale federally funded research or Big Science. Particular attention will be paid to the interplay of government patronage in creating new social and intellectual spaces for research; the importance of medicine and the biomedical disciplines for the development of university-based research; the origins and expansion of research in corporations; and the role of war in the political economy of American science.

S&T 391 Science in the American Polity, 1960-Now (also Government 309) Spring. 4 credits. S. Jasanoff. This course reviews the changing political relations between science, technology and the state in America from 1960 to the present. It focuses on the politics of choices involving science and technology in a variety of institutional settings, from Congress to courts and regulatory agencies. The tensions and contradictions between the concepts of science as an autonomous republic and as just another special interest provide the central theme for the course. Topics addressed will include science funding, technological controversies, scientific advice, citizen participation in science policy, and the use of experts in courts.

S&T 400 Components and Systems: Engineering in a Social Context (also Mechanical and Aerospace Engineering) Spring. 3 credits. Not offered 1997-98 For description, see M & AE 400.

S&T 401 Biology and Society: The Social Construction of Life (also Biology and Society 301) Fall. 4 credits. For description, see B & SOC 301.

S&T 406 Biotechnology and Law (also Biology and Society 406) Fall. 4 credits. Limited to 16 students. Recommended: a course in genetics or rDNA, a course in American government or law, or permission of instructor. Fee for course reading material. Not offered 1997-98. S. Jasanoff.

Biotechnology, with myriad applications in areas such as medicine and agriculture, is developing more rapidly than the social institutions that are capable of controlling it. This course explores the use and potential abuse of biotechnology in areas such as genetic screening and counseling, reproductive technologies, intentional release of genetically engineered organisms, patents, and ownership of human tissue. Particular attention will be given to evolving legal and management strategies for regulating the applications of biotechnology. Readings are from science, medicine, law, and public policy. A research paper is required.


This course explores the varied interactions between science and the legal process that have developed in recent years as a result of attempts to bring greater public accountability to the use of science and technology. It examines the activities of both legislatures and
courts in controlling science and analyzes the values underlying these initiatives. Three major types of science-law interactions form the focus of the course: expert testimony in the courtroom, regulation of hazardous chemicals and nuclear power, and the control of professional standards in science and medicine. Specific topics include the regulation of toxic chemicals and nuclear power, controversies about biotechnology, reproductive technologies, and biomedical research, and scientific misconduct.

S&TS 425 Science and Technology Policy in Global Perspective (also Government 468)
Spring. 4 credits. S. Jasanoff
This course examines the influence of globalization on contemporary science and technology policy. The development of science and technology is increasingly shaped by national as well as transnational forces, such as strategic alliances or confrontations between companies, supranational institutions, and international organizations. Furthermore, many scientific and technological developments, from the damming of rivers in India to power generation in the United States, arouse social resistance on a cross-national level. Is a coherent national science and technology policy possible in this field of apparently centrifugal forces? What values, philosophies, and institutions could guide a socially responsible science and technology policy in the post-cold war era? These questions will be at the center of the course. We will approach the normative questions by looking at the evolution of science and technology policy in a comparative framework covering the U.S., Japan, Europe, and various Third World countries.

S&TS 427 Politics of Environmental Protection in America (also Government 427)
Fall. 4 credits. S. Jasanoff
An introduction to the distinctive feature of environmental protection in America, focusing particularly on law, science, and citizen activism in public policymaking. Readings from law, political science, and policy analysis will examine the changing role of expert agencies, courts, public interest groups, Congress, and the states in environmental politics since the late 1960s. Case studies of specific environmental controversies (nuclear power, siting, pesticides, endangered species) will be used to explore dominant public conceptions of risk and safety, regulatory costs and benefits, and the goals and instruments of environmental policy.

S&TS 442 The Sociology of Science (also City and Regional Planning 442 and Biology and Society 342)
Spring. 4 credits. T. J. Pinch
A view of science as an autonomous activity than as a social institution. We will discuss such issues as controversies in science, analysis of scientific text, gender, and the social shaping of scientific knowledge.

S&TS 467 Innovation: Theory and Policy
Fall. 4 credits. Open to upper-level undergraduates and interested graduate students. Economics 102 or permission of the instructor. J. Reppy.
In this course we will 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 will be contrasted to the insights to be found in science and technology studies. The focus will be on the context of interests and ideology in which the various theories have been framed and their differing implications for technology policy. Authors to be covered include Schumpeter, Solow, Scherer, Nelson and Winter and Bijker and Pinch.

S&TS 469 Food, Agriculture, and Society (also Biology and Society 469, and Biology General 469)
Spring. 3 credits. For description, see BIO G 469.

S&TS 483 The Military and New Technology
Spring. 4 credits. For description, see GOVT 483.

[S&TS 490 The Integrity of Scientific Practice
Fall. 4 credits. Not offered 1997–98. S. Hilgartner.
Research? and ethical issues involving scientific fraud, debates about financial conflicts of interest, disputes about the use of human and animal subjects, and tensions over ownership of data have raised concern about integrity in science. In addition, changes in the American research system—from funding to new university-industry relationships to the growth of electronic communication—pose new questions about who owns and controls research. The course addresses practices that present problems of integrity in research (e.g., fraud, secrecy, commercialization). It also examines how scientific practices affect the structural integrity of science as an institution. Through these complementary concepts of integrity, the course explores the connections between the conduct of science and its cultural authority.

S&TS 520 Economics Meets Science Studies
Spring. 4 credits. J. Reppy.
This course will cover a variety of possible interactions between the disciplines of economics and science and technology studies. Economists (at least some economists) are interested in science and technology as important components in economic growth, while scholars in science studies often appeal to economic motives and institutions to explain behavior in the production of scientific and technological knowledge. We will explore ways in which economics can provide new questions and theoretical approaches for science and technology studies. From another perspective, economists, as the most "scientific" of the social sciences, is itself a subject for study. Internal critiques by economists will be compared to external analyses in the science and technology studies literature. Readings will include works on the epistemology and use of rhetoric in economics and on the "new economics of science," and examples of the use of economic analysis in the science studies literature.

S&TS 532 Inside Technology: The Social Construction of Technology
Spring. 4 credits. T. J. Pinch.
Rather than analyze the social impact of technology upon society, in this course we will 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 possible which embody different assumptions about society? 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 will be illustrated by detailed examinations of particular technologies, such as the ballistic missile, the bicycle, the electric car, and the refrigerator.

[S&TS 626 Workshop on Law, Science, and Technology (also Government 626)
Legal proceedings provide a powerful mechanism for deconstructing, and to some extent reconstructing, a society's understanding about the nature and social role of expertise, the boundaries of science and technology, and the meaning or validity of scientific "facts." Using a combination of primary legal materials and theoretical studies in science and technology, this course will explore how varying scientific realities are constructed in legal forums and what impact these constructions have on the social relations of science and technology. The course will also consider the policy implications of conflicting legal and scientific approaches to the discovery and verification of scientific facts.

[S&TS 627 Comparative Methods in Policy Analysis (also Government 627)
Fall. 4 credits. Not offered 1997–98. S. Jasanoff.
Comparisons, at levels of analysis ranging from individual biographies to national decisionmaking, have emerged as an important methodological approach in policy analysis. Focusing primarily on historical and social studies of science and technology, this course seeks to enhance the student's ability to carry out effective comparative analyses at a variety of research sites including laboratories, regulatory agencies, and new social movements. Work in structuralist as well as post-structuralist idioms will be examined in order to sharpen and refine notions such as national styles and political culture that have loomed large in the policy literature on the politics of science and technology. Topical areas include military research, biotechnology, and environmental controversies.

S&TS 631 Qualitative Research Methods for Studying Science
Spring. 4 credits. T. J. Pinch.
Much has been learned about the nature of science by sociologists and anthropologists doing lab coats and studying scientists in action. In this course we will look at the methods used in this new wave of science studies. We will examine what can be learned by interviewing scientists, from videos and from detailed examinations of scientific texts. Students will gain hands-on experience by conducting a mini-project in which they investigate some aspect of scientific culture.

[S&TS 645 Genomic Engineering: Politics and Society (also Government 634)
Spring. 4 credits. Limited to seniors and graduate students. Not offered 1997–98. S. Hilgartner.
Since its development, genetic engineering has been a passionately debated technology,
The goal of this course is to develop a technology transfer in different contexts, employing that framework to evaluate current production of knowledge and social order. Among the specific issues to be considered are trust and coherent analytical framework for analyzing theoretical developments in science and theoretical writings and case studies.

Sociology provides students with particularly effective ways to understand the complexities of modern life. For many students, the undergraduate years are a last opportunity to gain the insights these fields have to offer. The Department of Sociology is continuing to design an array of beginning and advanced courses that convey a broad understanding of the methods and insights of sociological analysis—courses that will be of particular interest to undergraduates who may not major in sociology. First- and second-year students should note that the introductory courses (101, 103, 110, 115, 150) provide substantial focus on the sociological analysis of major issues of public life. A wide selection of general education courses is available at the 200 level. Advanced undergraduates who are majors in other fields should also see, in particular, the descriptions of Sociology 303, 310, 354, 370, 380, for which there are no prerequisites other than junior or senior status.

Related Courses in Other Departments
Students interested in sociology should consult the course lists of the other social science departments in the College of Arts and Sciences (including Anthropology, Economics, Government, and Psychology) and of these other departments: Organizational Behavior (College of Industrial and Labor Relations), Human Development and Family Studies (College of Human Ecology), and Rural Sociology (College of Agriculture and Life Sciences).

The Major
Requirements for general sociology: (1) 101 and any other 100-level or 200-level course (excluding Freshman Writing Seminar) with a 2.5 minimum grade-point average; (2) no later than the junior year, the 301 and 303 methods courses; (3) one course in the department at the 400 level or higher (491 is recommended); and (4) 20 additional credits in sociology, of which 6 may be taken in related departments on the approval of the student's major adviser. A list of pre-approved courses is maintained by the director of undergraduate studies, some of which are listed under "Related Courses."

Requirements for honors: Potential honors students are encouraged to begin taking the methods and statistics courses during their sophomore year and to take at least 2 credits of Sociology 491, Independent Study, during their junior year. Honors students take Sociology 495–496 during their senior year. Graduation with honors requires a cumulative average of at least B+ in all sociology courses and the successful completion of an oral defense of the honors thesis. Interested students should consult the director of undergraduate studies no later than the second semester of their junior year.

Cornell-in-Washington program. Qualified sociology majors may include a semester in the Cornell-in-Washington program, in which students take courses and undertake a closely supervised internship. For further information, see p. 19. Supervised research. 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 be offered to assist the faculty member in an ongoing project, or the student may request that the faculty member
supervise the execution of a project conceived by the student. In either case the student should enroll in Sociology 491. Interested students may direct inquiries to any faculty member.

Society and Economy Concentration

Sociology majors or students in other disciplines who wish to prepare for graduate study in any of the social sciences or in a profession (Business, Management, or Law) may elect to acquire a concentration in society and economy (including international dimensions). This program is designed to provide training in economic sociology, formal organizations, and social science methods. The requirements for the concentration in society and economy include courses in economic sociology, formal organizations, and methods. For further information, consult Professor Victor Nee, 330 Uris Hall.

Introductory Courses

[SOC 115 Utopia in Theory and Practice] 3 credits. Not offered 1997–98. D. Strang. This course examines imaginings of the "ideal society" and how to realize them. We discuss the classic literary utopias, from Plato's Republic to Moore's Utopia to Bellamy's Looking Backward, and also the dystopias of Huxley and Orwell. We also examine social experiments like the nineteenth-century American intentional communities, various socialisms, and the design of contemporary political constitutions. Throughout, the emphasis is on two sociological questions. What leads people to conceive of particular social arrangements as ideal? How can we tell social structures that can work from those that cannot?

[SOC 150 Introduction to American Religion (also RELST 150)] Fall. 3 credits. MW 11:15–12:05 plus section. P. Becker. This course will introduce students to the sociological study of religion. Our main focus will be on how religion shapes social identity and influences public debate in our society. We will examine how religion serves as a marker for social status and contributes to the construction of gender and ethnic identities. We will explore how religion serves as a basis for moral critique and political mobilization by looking at local and national religiously based social movements. Our readings will provide a basis for our discussion of these themes, and will reflect the diversity of religious life in the contemporary United States.

General Education Courses

[SOC 203 Gender, Work, and Family (also ECON 103)] 3 credits. Not offered 1997–98. The line that divides men and women is one of the deepest and most firmly entrenched in societies. Many people believe that gender differences are natural and thus unchangeable, but most sociologists argue these differences are created and maintained by culture and social relationships. In this course, we will explore the social construction and maintenance of gender differences and inequalities, focusing particularly on the areas of work and family. Students of all levels (and genders) are welcome.

[SOC 204 Race and Ethnic Relations] Fall. 4 credits. Prerequisite SOC 101, SOC 103, or R SOC 101. H. A. Walker. This course focuses on race and ethnic relations in contemporary perspective. It examines the social and behavioral implications of attributions of race and ethnicity in small group interaction, the world of work, and the larger society. Topics: inequalities in income and employment, affirmative action, ethnic political mobilization, patterns of marriage and family formation.

[SOC 210 Group Solidarity] Spring. 4 credits. M. Macy. What is the most important group that you belong to? What makes it important? What holds the group together, and how might it fall apart? How do 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 will explore these questions from an interdisciplinary perspective, drawing on sociobiology, economics, and social psychology, as we apply alternative theories of group solidarity to a series of case studies, such as urban gangs, spiritual communes, the civil rights movement, protest activities, athletic teams, work groups, and college fraternities.

[SOC 215 Organizations: An Introduction] Fall. 3 credits. S. Han. This is an introductory course in the study of organizations. We will start by taking a look at various examples of organizing, including a street gang in a Boston neighborhood, General von Moltke's army, a government agency, and an industrial corporation. These brief glimpses serve as exercises in looking behind and beyond diverse rhetoric for common patterns in organizational phenomena. We will consider these both from the inside and outside perspectives. The focus of the course is upon research scholarship, not the training of managers. Nonetheless, the analytical skills you will acquire are applicable to work in firms, government agencies, and nonprofit organizations.

[SOC 227 Embedded Markets] Spring. 3 credits. S. Han. This is a course designed for a wide range of students who are generally interested in organization perspectives on markets and businesses. The primary focus of the course is on cases of organizing. In particular, we will look at the ways in which economic actions are played out in social settings. Call that "embedded markets." For example, what are the differences, if any, between the shops in the Pyramid Mall and the Commons? What kind of books do you find in small boutique bookstores vs. supermarkett bookstands, or huge chains like Barnes and Noble or Borders? Basic conceptual frameworks will be provided, yet the course will extensively use, and ask you to come up with, contemporary and local problems to illustrate the core issues.

[SOC 220 Culture and Conflict in Organizations] Spring. 3 credits. P. Becker. How do the organizations we belong to shape us? What is organizational identity and how does it come about? How do cultural beliefs shape organizations? What kinds of organizations strike us as legitimate and effective, and why? Organizations may be goal-directed problem-solvers, but they also locate functions for storing and transmitting social facts, like the hierarchical relations among groups, and powerful ideas, including moral codes. Organizations may seem to evolve naturally, but are often shaped by internal conflicts or powerful outsiders. The first part of this course will examine theories of organizational culture and power; the second part will consist of case studies or organizations, businesses, religious denominations, little league teams, and social movement organizations.

[SOC 222 Social Policy and Organization in Health, Education, and Welfare] Fall. 3 credits. Not offered 1997–98. D. Strang. Introduces the development of three central kinds of social policy: those concerned with delivering medical care, schooling the young, and providing resources for the economically vulnerable. The course treats the historical development of large-scale public programs, regulatory systems, or movements to formulate action; political struggles over social
rights and the allocation of resources; and the organizations that are constructed to carry out the policies. The focus is on American policy, but with considerable comparative attention to the health, education, and welfare programs of other nations.

**[SOC 230 Knowledge and Power]**
Spring. 3 credits. Not offered 1997–98. D. Sark

Modernity will be studied in this course by examining dual aspects of the rationalization of power 1) as attempts to bring ever-larger spheres of social action under rationalized control, and 2) as the production of rationalized justifications by which power is represented and legitimated. These processes will be examined in three historical settings: Frederick Winslow Taylor's schemes of "scientific management" at the turn of the century in the United States; the Leninist project of "scientific socialism" in Eastern Europe; and the International Monetary Fund's current project of "scientific capitalism" in contemporary post-socialist societies. Our century begins and ends with blueprints for making capitalism by design—but whereas Taylor's project was attempted in the microsphere at the level of the firm, current recipes attempt to shape entire national economies by making capitalism according to a plan.

**[SOC 235 Paradoxes of Cooperation and Collective Action]**

All theories of rational behavior predict that individuals will not voluntarily contribute to collective goods when they can receive the benefit without doing so; individuals will be freeloaders unless they are somehow forced to contribute. Yet many examples of successful and seemingly voluntary collective action abound in natural settings. The same theories of rational behavior also portray such collective action as being likely only when issues of self-image, identity, and commitment, yet most of us know how important these things are in our own behavior. How can we reconcile the theory with evidence? We will focus on the paradoxes of cooperation and self-interest, rationality and commitment, self-image and self-enhancement.

**[SOC 245 Social Inequality]**

Why do some people have a great deal of money and influence while others have barely enough to eat? Some degree of inequality among individuals exists in all modern industrial societies, inequality that is related to class, race, gender, and other social characteristics. This course focuses on the social systems that generate this inequality. We will learn how to analyze and interpret the processes that generate social stratification, drawing on alternative theoretical viewpoints to aid in our understanding. Specific topics include class consciousness, class hierarchies, social mobility, income and poverty. Course structure will be a mixture of lectures and class discussion. Homework includes hands-on data analysis using computers. No prerequisites or experience necessary.

**[SOC 250 Religion and Public Life (also RELST 249)]**
3 credits. Not offered 1997–98. P. Becker

This course explores how religion provides a basis for moral critique, political mobilization, and social identity in a modern society. The first part introduces basic issues—definitions of religion, the sociological approach to the study of religion, religion and modernity. In the main body of the course, we will read studies of specific religious groups and organizations in the contemporary United States—examining such questions as: "How does religion provide a basis for gender identity and gender norms?" "What do religious groups and discourses contribute to public debate on issues ranging from economic justice to abortion?" "How do religious leaders mobilize citizens for social action in their communities?"

**[SOC 265 Latinos in the U.S. (also LSP 265)]**
Spring. 3 credits (4-credit option available). 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.

**[SOC 275 Women at Work (also Women's Studies 275)]**
3 credits. Not offered 1997–98. E. Bell

Women have always contributed their labor to production and reproduction. With industrial development and the movement of market production out of the home and into the public sphere, however, women's work was relegated to the private sphere of the family. Recently this has changed as women seek employment outside the home. We will examine women's position and the role women play in the labor force, looking at data from both developed and developing societies. Specific topics will include sex differences in pay and sex segregation in the labor force, theoretical explanations from rational choice to Marxist feminism, the relationship between women's paid and unpaid labor and the role of the state and government policy.

**[SOC 283 Groups and Relationships]**
3 credits. Not offered 1997–98. S. Kanazawa

We will tackle the mysteries of human behavior and pursue a single question throughout this course: Why do human beings behave the way they do? We will first discuss several celebrated examples of seemingly unusual and bizarre behavior and then try to explain these with the help of selected social psychological theories: behaviorism, attribution theory, exchange theory and game theory. The emphasis will be on the application of the theories to explain empirical examples of human behavior.

**[SOC 290 Social Psychology of Interpersonal Relations]**
Fall. 3 credits. H. A. Walker

The focus of this course is on the relationship between the individual and the social group. It will examine the way in which the individual shapes "society," and in turn, how society influences behavior. Topics include formation of self, influence and conformity, and the emergence of racial and gender differences in status and power.

**Methods and Statistics Courses**

**[SOC 301 Evaluating Statistical Evidence]**
Fall. 3 credits. R. L. Breiger

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]**
4 credits. Prerequisite: a course in sociology. Not offered 1997–98. D. P. Hayes

Foundations of sociological analysis, issues arising from using humans as data sources; the quality of our primary data; methods of its collection, research design, and its limitations; pragmatic considerations in doing research on humans, organizations, communities, and nations.

**Intermediate Courses**

**[SOC 310 War & Peace]**

Every human group, community, or society presents many examples of altruism, helping, cooperation, agreement, and social harmony. Each grouping or society also manifests numerous examples of competition, rivalry, opposition, disagreement, conflict, and violence. Both conflict and cooperation are permanent and common aspects of the human condition. Collective conflicts, especially wars and revolutions, are frequent and dramatic events. But "peace" and "war" are equally active social processes, not passive happenings. This course describes various commonly accepted but erroneous notions of the causes and consequences of war and deterrence. It deals with the major theories concerning the sources of war in international and intranational social systems. The last half of the course analyzes the modes, techniques, and outcomes of efforts to restrict, regulate, and resolve international conflicts.

**[SOC 313 Social Networks and Social Structure (also SO 513)]**
4 credits. Not offered 1997–98. R. L. Breiger

A critical survey of theories and techniques of structural analysis in sociology, centering on the usefulness of social network analysis in providing integration of studies at different levels of generality. Applications in the areas of the sociology of organizations, community studies, social stratification, and dependence relations among nations. Emphasis on the mutual relevance of theories and operational research procedures.

**[SOC 315 Business Organization for the 1990s]**
4 credits. Not offered 1997–98. D. Strang

In the last two decades, American business organizations have undergone a revolution in form and process. Corporate downsizing has changed the face of American management, and altered white-collar career paths. Large bureaucratic organizations are giving way to smaller firms that develop complex relations with each other rather than building from within. Japanese organizational styles and organizational reform strategies like Total Quality Management have become the buzzwords of the 1980s and 1990s. This course discusses the new forms of business.
organization (and their manifestation in other domains, such as education and healthcare) that mark a crucial shift in the world of work and the way it shapes people’s lives.]  

**SOC 326 Social Policy (also SOC 526)**  
Fall. 4 credits. S. B. Caldwell.  
The dramatic growth of the policy research sector as an institutional and intellectual force signals a changing relationship of social science to social policy in the United States. With an eye on that relationship, this course examines the development of social policy in selected areas, among them welfare, poverty, housing, crime, and health. The policy research sector itself—people, values, and institutions—is also surveyed.  

**[SOC 340 Health, Behavior, and Health Policy]**  
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. Topic areas include: social context of health, disease and illness, role of medical services; use of health services; effectiveness of health service use; health promotion and disease prevention; and national health care policies.]  

**SOC 345 Gender Inequality**  
Gender inequality in contemporary perspective; emphasis on social origins of gender categories and implications of gender status for collective and individual behavior. Topics include inequalities in interpersonal relations, the family and work organizations, and implications of gender inequality for family violence, sexual harassment, and rape.]  

**SOC 350 Comparative Revolutions**  
Not offered 1997–98.  
For description, see GOVT 350.  

**SOC 354 Law and the Social Order (also JUR 354)**  
Fall. 4 credits. B. Breifner.  
In what ways, if any, do laws and legal institutions make a difference to people who have disputes? How did lawyering come to be a modern profession? How do business organizations deal with legal ambiguity in constructing symbols of compliance with laws? How do networks of interpretive communities structure the authority of law? By exploring selected topics such as these, we seek to understand the distinctive contributions of sociology to the study of law and the social order.  

**SOC 358 Modes of Institutional Analysis (also SOC 558)**  
Much social theory treats individual behavior as occurring within and shaped by “institutions.” For example, discussions of American health care policy emphasize not only the preferences of physicians, businesses, and consumers, but also the institutional structure of American government that provides multiple veto points and makes broad cross-class coalitions difficult to build. This course will examine the main types of institutional analysis active in contemporary social science, including sociological accounts of institutions as cultural frameworks and accounts of institutions as decision-making systems, and economic accounts of institutions as decision-making systems, and economic accounts of institutions as choice-theoretic equilibria. These approaches will be examined via the discussion of classic problems such as the bases of collective action, the construction of the rationalized actor, the diffusion of new models of appropriate behavior, and the explanation of cross-societal differences in national policies.]  

**SOC 370 Careers**  
By examining various career paths, we will consider the implications of career as a continuous process or as a sequence of periodizations. We will explore differences and similarities among different career paths and lay out the patterns and structures of the career formation from a sociological point of view. We will also discuss the settings in which the career development takes place, giving some comparative attention to the ways of organizing careers in other societies.]  

**SOC 380 Gender, Ideology, and Culture**  
This course will explore representations of women in popular culture, including images, narratives, and religious practices. We will examine the relationship between popular culture and ideology, and look at how women “read” popular culture. The aim of the course is to enable students to think critically and analyze the effects of ideological representations of difference on personal identity construction, family, and personal relationships. Readings are drawn mostly from sociology of culture and cultural studies; most texts deal with popular culture and gender in the 19th- and 20th-century United States.]  

**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 in charge.  

**SOC 408 Qualitative Methods (also SOC 508)**  
Spring. 4 credits. P. Becker.  
This course will cover a range of qualitative methods, from fieldwork to cultural/interpretive methods. The course is designed to give students an introduction to a range of methods and techniques. Students will be required to engage in an ongoing research project on which they will report periodically throughout the course of the semester, in class discussions and in short papers that concentrate on solving concrete research problems.]  

**SOC 410 Comparative Societal Analysis (also SOC 510)**  
This course examines contending analytic strategies for comparing institutions (and institutional configurations) across societies and social systems. How, for example, does the institutions of the socialist economy contribute to our understanding of the specificity of modern capitalism? Special emphasis will be given to comparing transitions from state socialism (in Eastern Europe and elsewhere) with transitions from authoritarianism in Latin American and Southern Europe.]  

**SOC 429 Culture and Agency (also SOC 529)**  
This course will look at the development of sociological theory on questions of culture and agency. Starting with various reflection or materialist approaches to culture that decenter agency, we will then follow the development of theories that explicitly link culture to actors and events in an attempt to account for both social reproduction and social change. The readings will cover a broad time span and a variety of intellectual approaches, including critical theory and cultural studies, but will center on the sociology of culture.]  

**SOC 434 The Sociology of Reproduction (also Women's Studies 435)**  
4 credits. Not offered 1997–98. Women's biological potential to bear children and their childbearing experiences are socially constructed. The social context of women's reproductive capacity is one area in which women themselves are socially defined, and therefore within this realm exists the potential to control women through the control of reproduction and childbirth. We will examine the social construction and control of reproduction using both empirical findings and theoretical arguments. Specific topics include: historical trends in fertility; the medicalization and medical control of conception and childbirth; biological versus social definitions of women as mothers; the role of state policy, and theoretical explanations of reproduction and gender stratification.]  

**SOC 438 Immigration and Ethnic Identity**  
Spring. 4 credits. V. G. Nee.  
Immigration has been a central process in the peopling of American society. The early immigration to the United States involved primarily the migration and settlement of European national groups. Since 1965, the mix of immigration has shifted to include increasing diversity of ethnic groups, especially from Latin America and Asia. As American society moves into a era of increasing ethnic diversity, the issue of ethnic boundaries and identity become increasingly complex and problematic. This course seeks to examine the causes of international migration, the dynamics of immigrant incorporation into American society, and the making of new ethnic groups and identities.]  

**SOC 439 Philosophy of Social Sciences (also SOC 539)**  
In this course, we will discuss issues related to science. We will first survey different approaches to science (positivism, realism, conventionalism, instrumentalism, pragmatism, and relativism), and then discuss questions such as: What is the purpose of science? What is the difference between science and engineering? Are there any differences between natural sciences and social sciences? What is theory? How do we evaluate theory? What is the relationship between theory and experiment? Does the difference between the social sciences and natural sciences make a difference? How can we construct true theories from unrealistic assumptions? What is the difference between methodological individualism and methodological holism? What is the future of general theories in social sciences? Can one theory explain all human behavior at all times? Can social sciences ever be as good as natural sciences? This course will be ideal for graduate students in all fields of natural
and social sciences, and advanced undergraduate students who plan to go on to graduate school in natural or social sciences.

**SOC 444 Contemporary Research in Social Stratification**  
Spring. 4 credits. R. L. Breiger.  
Stratification and mobility as paired concepts, requiring mutual articulation. The interplay of structure (occupational groups, labor markets, organizational demographics, social classes) and process (tracking, career trajectories, socioeconomic attainment). Recently formulated log-linear models of mobility and structure provide a central focus of the course.

**SOC 480 Simulating Social Dilemmas (also SOC 580)**  
Fall. 4 credits. M. Macy.  
This course introduces students to the use of computer simulation to study emergent properties of nonlinear systems. The course will focus on applications involving problems of cooperation among interdependent agents trapped in a social dilemma. Readings will consist of articles based on theoretical research using computer simulation of social dilemmas. Students will learn how to write a computer simulation program, and then use these skills to replicate one or more published studies in the social dilemma literature. Assignments will include source-code exercises during the first few weeks, and a final seminar-length paper reporting results of the student's experiments. Previous programming experience would be helpful but is not expected or required.

**SOC 491 Independent Study**  
Fall or spring. 1–4 credits. For undergraduates who wish to obtain research experience or to do extensive reading on a special topic. Permission to enroll for independent study will be granted only to students who present an acceptable prospectus and secure agreement of a faculty member to serve as supervisor for the project throughout the term. Graduate students should enroll in 891–892.

**SOC 495 Honors Research**  
Fall or spring. 4 credits. Limited to sociology majors in their senior year. Prerequisite: permission of instructor.

**SOC 496 Honors Thesis: Senior Year**  
Fall or spring. 4 credits. Prerequisite: Sociology 495.

**SOC 497 Social Relations Seminar (also Anthropology 495)**  
Spring. 4 credits. Limited to seniors majoring in social relations.

**Graduate Core Courses**

These courses are primarily for graduate students in sociology but may be taken by other graduate students with permission of the instructor. Graduate students in sociology will normally take each of the five courses listed below, but with the concurrence of the instructor special committees other arrangements may be made.

**SOC 501 Basic Problems in Sociology I**  
Fall. 4 credits. V. Nee.  
Analysis of theory shaping current sociological research. Examination of several central problems in sociological inquiry provides an occasion for understanding tensions and continuities between classical and contemporaneous approaches, for indicating the prospects for unifying microsociological and macrosociological orientations, and for developing a critical appreciation of efforts to integrate theory and research.

**SOC 502 Basic Problems in Sociology II**  
Spring. 4 credits. Continuation of Sociology 501. Emphasis is on the logical analysis of theoretical perspectives, theories, and theoretical research programs shaping current sociological research. The course includes an introduction to basic concepts used in the logical analysis of theories and examines their application to specific theories and theoretical research programs. Strategies include functionalism, social exchange, and interactionism.

**SOC 505 Research Methods I: Logic of Social Inference**  
Fall. 4 credits. Prerequisite: a first course in statistics and probability. S. B. Caldwell. This course is an introduction to techniques of social inference. We will cover research methods, sources of evidence, model design, and questions of empirical validity.

**SOC 506 Research Methods in Sociology II**  
Spring. 4 credits. Prerequisite: Sociology 505 or equivalent. V. Nee.  
A survey of methods for analyzing sociological data, including measurement error models, confirmatory factor analysis, panel models, and general structural equation methods. Readings from the sociological research literature will illustrate various methods. Periodic assignments on micro and mainframe computers will integrate theory, method, and data.

**SOC 507 Research Methods in Sociology III**  
Fall. 4 credits. Prerequisite: Sociology 506. D. Strang.  
 Models and methods for the quantitative and formal analysis of social dynamics. The course focuses on event history analysis in the case of discrete outcomes and pooled cross-sectional and time-series analysis in the case of continuous outcomes.

**Graduate Seminars**

These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates who have permission of the instructor. Which seminars are to be offered any term is determined in part by the interests of the students, but it is unlikely that any seminar will be offered more frequently than every other year. The list below indicates seminars that are likely to be offered, but others may be added and some may be deleted. Students should check with the department before each term.

**SOC 508 Qualitative Methods (also SOC 408)**  
Spring. 4 credits. P. Becker.  
This introductory graduate course will cover a range of qualitative methods, from fieldwork to cultural/interpretive methods. The course is designed to give students an introduction to a range of methods and techniques. Students will be required to engage in an ongoing research project that will report periodically throughout the course of the semester, in class discussions and in short papers that concentrate on solving concrete research problems.

**SOC 510 Comparative Societal Analysis (also SOC 410)**  
For description, see SOC 410.

**SOC 513 Social Networks and Social Structure (also SOC 313)**  

**SOC 524 Rational Choice Theory**  
Rational choice perspective has gained popularity in all social sciences. The main focus in this course will be sociological rational choice, although we will discuss the work of economists, political scientists, psychologists, and others where relevant. We will first discuss the foundations of rational choice as a macro-sociological perspective, and emphasize the deductive derivation of various rational choice theories from this perspective. We will discuss the pioneering work of Coleman Hechter and Willer as well as the more recent work by Heckathorn, Macy, Jasso, and others. We may have some guest speakers to talk about their current research.

**SOC 526 Social Policy (also SOC 326)**  
Spring. 4 credits. S. B. Caldwell.

**SOC 529 Culture and Agency (also SOC 429)**  
For description, see SOC 429.

**SOC 530 Social Organization of Economic Action**  
The issue of organizational boundary has been a central concern for both organizational sociology and economic sociology. The seminar approaches the issue, although it covers many other relevant literatures, mainly by playing two lines of argument against each other: transaction cost economics and transfer pricing problem. Meta-analytic techniques are also introduced, which are to be used for the final team project reviewing the empirical research on vertical integration.

**SOC 539 Philosophy of Social Sciences (also SOC 439)**  
For course description, see SOC 439.

**SOC 551 Modes of Institutional Analysis (also SOC 351)**  

**SOC 558 Modes of Institutional Analysis (also SOC 480)**  
Fall. 4 credits. M. Macy.

**SOC 560 Simulating Social Dilemmas (also SOC 480)**  
Fall and spring. 4–8 credits.  
These graduate seminars will be offered irregularly. Topics, credit, and instructors will vary from semester to semester. Students should look at the sociology department bulletin board at the beginning of each semester for possible offerings.

**SOC 606-607 Sociology Colloquium**  
Fall and spring. No credit. Required of all sociology graduate students.  
A series of talks representative of current research interests in sociology, given by distinguished visitors and faculty members.
Voluntary Work: Discussions on the current state of sociology and on the research interests of the members of the field, given by members of the field.

Related Courses
HDFS 150 Families and the Life Course
E. Wellington.

HDFS 457 Health and Social Behavior
E. Wellington.

HDFS 655 Work Families and Gender
P. Moen.

ILROB 325 Organizations and Social Inequality
P. Tolbert.

ILROB 421 Regulating the Corporation
R. Stern.

ILROB 425 Sociology of Industrial Conflict
R. Stern.

ILROB 427 Professions: Organization and Control
P. Tolbert.

ILROB 470 Group Processes
E. Lawler.

ILROB 521 Macro Organizational Behavior and Analysis Staff.

ILROB 525 Conflict, Power, and Negotiation
E. Lawler.

ILROB 722 Advanced Macro Organizational Behavior Staff.

SPANISH LANGUAGE
See Language Courses under Languages and Linguistics.

SPANISH LITERATURE
See Department of Romance Studies.

SWAHILI
See Africana Studies and Research Center.

SWEDISH
See Language Courses under Languages and Linguistics.

TAGALOG
See Language Courses under Languages and Linguistics.

TAMIL
See Language Courses under Languages and Linguistics.

THAI
See Language Courses under Languages and Linguistics.

THEATRE, FILM & DANCE

Through its courses and production laboratories, the department provides students with a wide range of opportunities in theatre, film, and dance. It offers a theatre arts major with concentration in theatre or film and a major in dance. These majors educate students in accordance with the general liberal arts ethic of the college. The programs in dance and film and the advanced undergraduate theatre program give some measure of professional preparation in those arts as well. The department encourages academic and studio participation by students from all disciplines and also provides the Cornell community with an opportunity to take part in its productions on an extracurricular basis.

Theatre Arts Major
Theatre Concentration
The theatre concentration 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).

Course requirements for the concentration:

1) THETR 240 and THETR 241 (two-semester introduction to theatre) 8
THETR 250 Introduction to Theatre Design and Technology 4
THETR 280 Introduction to Acting 3

2) Four laboratory courses distributed as follows:

THETR 151 Production Lab I 1-3
THETR 153, THETR 253, or
THETR 353 Stage Management
Lab I, II, or III 1-3
THETR 155 Rehearsal and Performance or
THETR 151 in a different area 1-3
THETR 251 or THETR 351
Production Lab II or III 1-4

3) Four courses in the area of Theatre Studies (see Theatre Studies section of theatre courses) chosen in the following manner:
one course must be at 300 level one course must be at 400 level two additional courses 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 advisor. Course taken to qualify for admission to the Advanced Undergraduate Theatre Program (described below) may also be used to fulfill this requirement.

5) Courses in which a student receives a grade below "C" cannot be used to fulfill the requirements for a Theatre Arts major.

The Advanced Undergraduate Theatre Program
The department offers advanced study in directing, playwriting, design/technology and stage management to students who qualify on the basis of outstanding achievement in course work. Admission to the AUTP is by invitation of the area faculty supervisor and the completion of a recommended "track" of courses or equivalent experience. (For recommended course 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.

Film
The study of film began in this department in the 1930s and continues to be based here. In the interim 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, and romance 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. In addition, courses in film production and the history and theory 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 four ways currently being used are as follows: 1) concentrating on 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); 3) focusing on film as a College Scholar; and 4) concentrating in Visual Studies. Students interested in option 4 should consult Marilyn Rivchin (Theatre, Film & Dance). Students interested in options 2 or 3 should consult Don Fredericksen (Theatre, Film & Dance) and Lynne Abel (director, College Scholar and Independent Major programs). Students interested in the first option should consult Don Fredericksen (Director, Film Studies, Theatre, Film & Dance).
The department offers advanced study in film analysis, filmmaking and screenwriting. Acceptance to the AUPF and admission to the advanced film production course (THETR 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 of these 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 colleges and universities, offers up to a full year of study at the Inter-University Center for Film and Critical Studies in Paris, France. The center's program is theoretical, critical, and historical. It is most useful to students pursuing a major in film studies and serves as an intensive supplement to their Cornell film courses. Fluency in French is required, and Theatre Arts 274 and 375 are prerequisites. Inquiries should be addressed to Professor Fredericksen, Cornell's liaison with the center.

**The Dance Program**
The dance program offers courses in dance technique, improvisation, composition, performance, anatomical analysis of movement, and the history, theory, and criticism of dance. Technique courses include modern dance at four levels and ballet at three levels. Other dance forms, such as historical dances, Japanese Noh, Indian and Javanese, dance are offered on a rotating basis. Courses in African, jazz and ballet dance, taken through the Physical Education program, supplement these offerings. Technique classes 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 classes. Students may also satisfy the physical education requirement by taking dance technique classes in the dance program. The schedule for all dance technique classes is available in the main office of the Center for Theatre Arts. Students planning technique for academic credit must also register through their own colleges.

The faculty offer rehearsal and performance workshops in which they choreograph and rehearse original dances, performed in public concert. Admission to rehearsal and performance classes is by audition. Students may receive one academic credit (S-U grades only) when performing in student-faculty concerts by registering for THETR 155.

**The Dance Major**
To be admitted to the major, students must have completed two technique courses in modern dance or ballet at level II or above, Theatre Arts 233 or 305 (Explorations in Movement and Performance) and Theatre Arts 210 (Beginning Dance Composition and Music Resources). It is also recommended that Theatre Arts 201 (Dance Improvisation), Theatre Arts 250 (Fundamentals of Theatre Design and Technology) and Music 105 (Introduction to Music Theory) be taken before the junior year. The following requirements are expected of the major.

**Prerequisites for the Major:**

**THETR 210** Beginning Dance Composition and Music Resources

THETR 233 or 305 Explorations in Movement and Performance

Two technique courses in modern dance or ballet at level II or above

**Requirements for the Major:**

**Music 105** Introduction to Music Theory (or substitute at the appropriate level)

**Theatre 201** Dance Improvisation

**Theatre 250** Fundamentals of Design and Technology

**Credits**
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.

Department Courses:
See individual sections for: Freshman Writing Seminars, General Survey Courses; Theatre Studies; Acting; Directing; Playwriting; Design; Technology; Stage Management; Independent Study, Internships and Honors; Film; Dance.

Freshman Writing Seminars

**THTHR 115 Staging Shakespeare**  
Fall and spring. 3 credits. M. Gay. Considering various stage and screen productions of Shakespeare's plays, from Elizabethan English to the present, this seminar will examine the ways in which staging choices-acting, setting, costumes, text-fundamentally affect a play's meaning. Students will learn to critically interpret productions, analyze texts, and also participate in acting workshops. Occasional screenings. No previous acting experience is required.

**THTHR 125 Deviance**  
Fall and spring. 3 credits. R. Saunders. This class will explore the interplay among the performance of the abnormal, its audience, and society. Creative and analytical exercises will explore the social politics and functions of deviance, both conscious and involuntary. Representative texts will include the play Ubu Roi and the film Trainspotting.

**THTHR 165 Theatre Behind Bars**  
Fall and spring. 3 credits. M. Mitchell. The United States has the highest per capita incarceration rate. This course will discuss the ethical, cultural and political aspects of imprisonment today through the lens of theatre by and about the imprisoned. A direct link with prisoners studying theatre will be maintained; recent inmates may be guest speakers.

**THTHR 178 Desire (also English 178)**  
Fall. 3 credits. E. Hanson. For description, see English 178 in the Fall Freshman Writing Seminar listings, available in August for the fall term.

**THTHR 185 Secret Stages: The Theatre of Living Dangerously (also English 185)**  
Fall. 3 credits. C. Burroughs. For description, see English 185 in the Fall Freshman Writing Seminar listings, available in August for the fall term.

**THTHR 190 When a Girly Girl Meets a Manly Man: Gender & Tales of Love**  
Fall and spring. 3 credits. T. Rhys. Romantic love remains one of the most persistent themes of popular entertainment. By examining selected plays and films that depict men and women in the search for love, we will explore questions of gender construction in popular culture.

**General Survey Courses**

**THTHR 230 Creating Theatre**  
Spring. 3 credits. Limited to 25 students. K. Goetz and faculty. An introduction to theatrical production for the non-major. Students will develop a new critical perspective of the performing arts by examining the creation of theatre onstage and backstage through lectures, demonstrations, discussions with various faculty and staff at the Center for Theatre Arts, and by attending department productions. Some writing is required.

**THTHR 301 Mind and Memory: Explorations of Creativity in the Arts and Sciences (also English 301)**  
4 credits. Limited to 40 students. Not offered 1997–98. For description, see English 301.

**THTHR 430 Introduction to Theatre Management**  
Fall. 4 credits. Limited to 15 students. J. E. Gainor. This class is designed to introduce students to the profession of theatre management. The class will be a project-oriented study of components of the field, such as marketing, fundraising, contracts, organizational structures, personnel management, accounting, and box office.

**Theatre Studies Courses**

**THTHR 220 The Comic Theater (also Comparative Literature 223 and Classics 223)**  
Summer. 3 credits. Next offered summer 1998 and spring 1999. J. Rusten. For description, see Classics 223.

**THTHR 240 Introduction to World Theatre I #**  
Fall. 4 credits. R. Schneider. A survey of the roots of theatrical representation around the world from ritual practice to classical Greek and Roman theatre as well as Indian, Chinese, Japanese, African, and European theatre. A charting of modern and postmodern theories of performance and the roles of theatre in society. It may also examine Western style theatre in other settings.

**THTHR 241 Introduction to World Theatre II #**  
Spring. 4 credits. R. Schneider. A survey of the major developments and innovations in world theatre since 1900, engaging with the evolution of naturalism, the birth of the director as well as the emergence of the avant-garde in the West and its supposed demise today. This course will examine the impact of colonialism on theatre practices around the world.

**THTHR 325 Classic Plays of the American Theatre (also English 323 and American Studies 325)**  
Summer. 3 credits. J. E. Gainor.

This class will examine major plays from the 20th century in America, and discuss how they intersect with issues in American culture and American history. We will read, and see film versions of, plays by Eugene O'Neill, Tennessee Williams, Arthur Miller, Lillian Hellman, David Mamet, August Wilson, and Sam Shepard, among others.

**THTHR 322 Russian Drama and Theatre (also Russian Literature 332)**  

**THTHR 333 European Drama 1660-1900: Moliere to Ibsen (also English 335 and Comparative Literature 336)**  
Spring. 4 credits. R. Parker. For description, see English 335.

**THTHR 335 The Modern and Contemporary Theatre (also Comparative Literature 337)**  
4 credits. Prerequisites: THTHR 240 or permission of instructor. Not offered 1997–98. Faculty.

A study of the drama and its cultural contexts from the late nineteenth century to the present. This course will raise questions about modern as well as postmodern theories of performance and the role of theatre in society. It may also examine Western style theatre in non-Western settings.

**THTHR 336 American Drama and Theatre (also English 336)**  
Spring. 4 credits. Limited to 25 students. Prerequisite: permission of instructor. J. E. Gainor. A survey of American theatre from 1900–1960. Emphasis will be placed on the relationship between theatre, culture, and history.

**THTHR 337 Contemporary American Theatre (also English 337)**  

A survey of American drama and theatre post-1960. Particular emphasis will be placed on plays by women and dramatists of color to explore questions of identity and theatrical responses to contemporary American culture.

**THTHR 339 Theories and Techniques of 20th Century Western Theatre**  
Fall. 4 credits. Prerequisite: permission of instructor. R. Schneider.

A look at Western performance across the 20th century emphasizing theatre theory and directing technique rather than drama. Beginning with symbolism, naturalism and the avant-garde we’ll move on to explore Meyerhold, dada, Brecht, Artaud, Happenings and performance art, Boal, theatre images, feminist theatre, multicultural theatre, theatre of AIDS, and other theatre issues and innovations. Students will engage in performance projects.

**THTHR 345 The Tragic Theater (also Classics 345 and Comp. Literature 344)**  
Spring. 4 credits. Limited to 40 students. Prerequisite: permission of instructor. See Classics 345 for description.

**THTHR 372 English Drama to 1700 (also English 372) #**  
Fall. 4 credits. S. McMillin.

For description, see English 372.

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**THTHR 410 Advanced Dance Composition**  
4 credits.

**THTHR 430 Advanced Dance Composition**  
4 credits.

**THTHR 481 Seminar in History of Dance (or other 400-level academic dance course)**  
4 credits.

**THTHR 491 Senior Project**  
4 credits.
[THETR 373 English Drama from 1700 to the Present (also English 373)] 4 credits. Not offered 1997–98. S. McMillin. See English 373 for description.


[THETR 425 Introduction to Dramaturgy and Dramatic Criticism] 4 credits. Prerequisite: THETR 240 & 241, or their equivalents. Limited to 15 students. Not offered 1997–98. J. E. Gainor. What is dramaturgy? What does a dramaturg do? We will examine this position in the theatre in both historical and practical modes. The class will be primarily a practicum, involving dramaturgical work on departmental productions, participation with student playwrights on new script development, and practice in the writing of dramatic criticism.

[THETR 431 Theory of the Theatre and Drama (also Comparative Literature 433)] 4 credits. Prerequisite: some theatre history and dramatic literature work at the 300 level or permission of instructor. Not offered 1997–98. A survey of dramatic theory and theories of theatrical representation from Aristotle to the present.


[THETR 435 Special Topics: Theories of Contemporary Performance (also Comparative Literature 436)] 4 credits. Limited to 15 students. Prerequisite: permission of instructor. Not offered 1997–98. Faculty.

[THETR 436 The Female Dramatic Tradition (also Women's Studies 433)] 4 credits. Not offered 1997–98. J. E. Gainor. Is there a "female dramaturgy"? What is the female tradition in the theatre? The course will explore 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 German Studies 438 and Theatre 640)] 4 credits. Not offered 1997–98. D. Bathrick. 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, Brain, Kroetz, Handke, and others) will be 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] Fall. 4 credits. Prerequisite: THETR 240 or THETR 281 or THETR 250 or THETR 398, and 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 454 American Musical Theatre (also English 454)] Spring. 4 credits. S. McMillin. See English 454 for description.


[THETR 471 Japanese Theatre (also Asian Studies 471)] Fall. 4 credits. K. Brazell. For description, see Asian Studies 471.

[THETR 600 Seminar: Seminar in Dramaturgy] Spring. 4 credits. Limited to Theatre Arts graduate students. J. E. Gainor. An introduction to the theory and methods involved in the study of the theatre. Attention will focus on pedagogy and the profession in Part I. Part II will explore current scholarly trends.

[THETR 637 Seminar in Dramatic Theory (also Comparative Literature 638)] Spring. 4 credits. Prerequisite: Permission of instructor. R. Schneider. Topic for 1998: Theatre and Postmodernity: Appropriation, Adaptation, and Simulation. Exploration of the craft of postmodern theatre artists who appropriate and replay "classic" drama or art against itself. This is sometimes called adaptation, sometimes parody, sometimes "performativity." Examination of the development of avant-garde of representation about representation, laying some historical groundwork. Cultural critical theory will accompany the readings of plays or viewing of video.


[THETR 660 Visual Ideology (also Comparative Literature 660 and German Studies 660)] 4 credits. Not offered 1997–98. G. Waite. For description, see German Studies 660.

[THETR 679 Bertolt Brecht in Context (also German Studies 679 and Comparative Literature 679)] 4 credits. Requirements: seminar paper that will form the basis for an oral presentation for class discussion. Not offered 1997–98. D. Bathrick. See German Studies 679 for description.

[THETR 682 The Politics of Criticism (also Comparative Literature 682 and German Studies 692)] Fall. 4 credits. Not offered 1997–98. D. Bathrick. See German Studies 692 for description.

[THETR 703 Theorizing Film (also English 695 and French Lit 695)] Fall. 4 credits. T. Murray. See English 703 for description.

**Acting**

[THETR 155 Rehearsal and Performance] Fall or spring. 1–2 credits. 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned roles after tryouts at the department's scheduled auditions. Students should add this course only after they have been assigned roles. S-U grades only. The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

[THETR 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 will enable students participating in a particular production to gain expertise and/or knowledge to contribute to that production. The focus of the class will depend on the needs of a particular production (history, choreography, textwork, dramaturgy, etc).

[THETR 280 Introduction to Acting] Fall or spring. 3 credits. Each section is limited to 16 students. Registration only through roster in the department office, Center for Theatre Arts. A. Van Dyke and 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 will be on physical and vocal exercises, improvisation, and text and character. There is required play reading, play attendance, and some scene study.

[THETR 281 Acting I] Fall or spring. 3 credits. Each section is limited to 14 students. Prerequisites: THETR 280 and audition. Registration only through roster in department office, the Center for Theatre Arts. 281 is restricted to sophomores and above. B. Levitt and S. Cole. Practical exploration of the actor's craft through improvisation and exercises in physical and psychological action. Scene study utilizing the plays of Williams, Inge, and Miller.

[THETR 283 Voice and Speech for Performance] 2 credits. Limited to 12 students. Primarily for department majors. Prerequisite: permission of instructor. Not offered 1997–98. Faculty. Registration only through department roster in the main office of the Center for Theatre Arts.
Development of the speaking voice with  
additional emphasis on dramatic interpretation.]

[THETR 284 Speech and Dialects for Performance  
3 credits. Limited to 12 students. Primarily  
for department majors or advance  
undergraduate training program candidates. Prerequisites: THETR 281 and  
permission of instructor. S. Cole.  
A study of the art of acting in its historical and  
cultural context from the Greeks to the early  
20th Century, with an emphasis on an  
analytical understanding of acting methodol­ogy  
in relation to social context. Lectures and  
film showings, with student papers and  
presentations required.

THETR 454 American Musical Theatre  
(also English 454)  
Spring. 4 credits. Prerequisite: ENGL 272  
and THETR 240 and 241 and ability to read  
music at the level of MUSIC 105  
S. McMillin.  
See English 454 for description.

Directing:

THETR 177 Student Laboratory Theatre Company  
Spring. 1 credit.  
The Student Laboratory Theatre Company is a  
group of student-actors who earn credit by  
acting in three scenes directed by students  
taking THETR 498. Students enrolling in SLTC  
for credit will earn 1 credit for 2 projects and  
2 credits for 3 projects. SLTC also meets with  
directors once a week.

THETR 285 Creativity and the Actor  
Summer. 3 credits. Limited to 10 students.  
Although this course is focused particularly  
on the actor, creativity training is equally  
applicable to any area of performance (for  
example, sports, dance, music) and those  
areas relying on individual creativity such  
as writing and the visual arts. No previous  
experience or course work in the main  
area of theatre is required. D. Feldshuh.  
Using mime, physical and vocal exercises,  
karaté, Gestalt therapy, theatre games, and  
Zen meditation, this course will attempt to  
make the student more aware of how he/she  
participates in and can influence the creative  
process of acting and to assist the student  
toward a greater capacity for stage presence.

THETR 287 Summer Acting Workshop  
Summer. 3 credits. Limited to 16 students in  
a section. Levitt and staff.  
An introduction to the processes of acting.  
Practice in training techniques, rehearsal  
procedures, and methodology.

THETR 298 Fundamentals of Directing II  
Fall. 3 credits. Prerequisite: THETR 280 and  
and audition. Limited to 12 students.  
R. Wilson.  
A continuation of Acting I. Special considera­ 
tion will be given to a physical approach to  
characterization utilizing the plays of Chekhov  
and Ibsen.

THETR 263 Computer-Aided Design for  
Design and Technology

THETR 250 Fundamentals of Theatre  
Design and Technology  
Fall and spring. 4 credits. Not open to  
first term freshman. Limited to 12  
students. Registration only through  
department roster in CTA 225. A minimum  
of one credit of Production Lab (THETR  
151 or 251) is strongly recommended  
concurrently. K. Goetz, R. Archer,  
J. Johnson, C. Hatcher, C. Orr Brookhouse,  
and E. Intemann.  
An introduction to design and technology in  
the theatre. 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, $40).

THETR 281 Acting III: Advanced  
Scene Study  
Spring. 3 credits. Prerequisite: THETR 380  
and audition. Limited to 10 students.  
L. Levitt.  
This course focuses on advanced problems in  
language and period style (movement, bows,  
curtises, and period dances). Monologues and  
scenes will be drawn from these playwrights:  
Shakespeare and Moliero.

THETR 398 Fundamentals of Directing II  
Spring. 4 credits. Enrollment strictly  
limited. Prerequisite: THETR 280 and 398,  
and permission of instructor. Special  
consideration is given to students who  
have completed THETR 280 or are  
tending to continue in the area of stage  
and screen directing. Recommended:  
THETR 250 and 281. D. Feldshuh.  
This course builds on the staging techniques  
learned in Fundamentals of Directing I. In  
this course each student will direct a series of  
project and public presentations focusing on  
specific directorial challenges.

THETR 399 Practicum in Directing  
Fall or spring. 1–4 credits. Prerequisites:  
THETR 240, 250, 280, 398, 498, and 499,  
and permission of instructor. D. Feldshuh.  
This course will allow the student who has  
completed the appropriate prerequisites the  
option 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 in directing a  
faculty or student production.
discussions. In addition to twice-weekly class meetings the course requires a laboratory period of fifty hours for the semester. Laboratory II

Production Laboratories

THEATRE 151 Production Laboratory I Fall and spring. 1–3 credits. May be repeated for credit. Prerequisite: admittance to Advanced Undergraduate Theatre Program. P. Lillard.

Stage Management

THEATRE 153 Stage Management Production Laboratory I Fall and spring. 1–2 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard.

THEATRE 255 Theatrical Make-up Studio Fall. 3 credits. Students are required to purchase materials which the instructor will provide (approximate cost: $50.00). Limited to 12 students. J. Johnson.

- Basic techniques of make-up for the stage including corrective, old age, and fantasy use of prosthetics, wigs, hair and hairpieces.

THEATRE 256 Costume Design Studio Fall. 3 credits. Students are required to purchase materials which the instructor will specify (approximate cost: $50.00). Limited to 10 students. J. Johnson.

- 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.

- Stage Lighting and Sound Technology: The practical aspects of lighting and sound technology including equipment setup, engineering, electrics, organization, recording techniques, and production paperwork will be explored through projects, lectures, and class discussions. In addition to twice-weekly class meetings the course requires a laboratory commitment of fifty hours for the semester.

- THEATRE 252 Technical Production Studio I Fall. 3 credits. Limited to 6 students. C. Hatcher and M. Williams.

- Stage Lighting and Sound Technology: The practical aspects of lighting and sound technology including equipment setup, engineering, electrics, organization, recording techniques, and production paperwork will be explored through projects, lectures, and class discussions. In addition to twice-weekly class meetings the course requires a laboratory commitment of fifty hours for the semester.

- THEATRE 254 Teatrade Makeup Studio Fall. 3 credits. Students are required to purchase materials which the instructor will provide (approximate cost: $50.00). Limited to 12 students. J. Johnson.

- Basic techniques of make-up for the stage including corrective, old age, and fantasy use of prosthetics, wigs, hair and hairpieces.

THEATRE 340 Theatrical Drafting and Technical Drawing Studio Fall. 3 credits. Limited to 6 students. Prerequisite: THEATRE 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. A series of projects to familiarize students with the convention and process of visualization and drafting.

THEATRE 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 will deal with planning and development aspects of large-scale entertainment projects including architecture, engineering, construction, and attraction installation. Focus will be on the specialized entertainment technologies that make these attractions work: audio and lighting design, ride and show control systems, and special effects.

THEATRE 354 Stagecraft Studio Fall. 3 credits. A minimum of one credit of production laboratory (THEATRE 151 or 251) is strongly recommended concurrently. Prerequisite: THEATRE 250 or permission of instructor. R. Archer.

- Exploration of the techniques and practice of theatre operation, scenic construction, stage mechanics, rigging, painting, and model building.

THEATRE 356 Costume Construction Studio Spring. 3 credits. A minimum of one credit of production laboratory (THEATRE 151 or 251) is strongly recommended concurrently. Prerequisite: THEATRE 250 or permission of instructor. Lab fee of $25 to be paid in class. C. Orr Brookhouse.

- A project/lecture/discussion class in costume research, patterning, cutting, construction, and fitting.

Stage Management

THEATRE 370 Stage Management Studio Fall and spring. 1–5 credits. May be repeated for credit. Prerequisite: admittance to Advanced Undergraduate Theatre Program. P. Lillard.

- Practical experience in theatrical production as Stage Manager for a Dance Theatre Concert, for an AUTP production or as Production Manager for the Black Box lab season under the supervision of the faculty Production Manager. THEATRE 370 complements this course.

THEATRE 453 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. THEATRE 453 complements this course.

THEATRE 456 Stage Management Laboratory V Fall and spring. 1–5 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA Proscenium Theatre. P. Lillard, S. Brookhouse, N. Cross, T. Honesty, C. Hatcer, M. Williams, C. Orr Brookhouse.

- This course provides practical experiences in theatrical production. Students can work on scenery, costumes, properties, lighting, or stage crew. No prerequisites or experience required.

THEATRE 461 Lighting Design Studio Fall and spring. 1–3 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA Proscenium Theatre at 7:30 p.m. 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. THEATRE 461 complements this course.

THEATRE 250 Technical Production Studio I Fall and spring. 1–3 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA Proscenium Theatre at 7:30 p.m. 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. THEATRE 250 complements this course.

THEATRE 251 Production Laboratory II Fall and spring. 1–4 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard, S. Brookhouse, D. Hall, C. Hatcher, C. Orr Brookhouse, M. Williams.

- Practical experience in theatrical production, as a light board operator, sound board operator, sound technician, head dresser 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, D. Hall, E. Intemann, M. Williams, C. Hatcher, J. Johnson, C. Orr Brookhouse.
Practical experience in theatrical production as a master electrician, assistant technical director, assistant costume shop manager or assistant to a faculty or guest director.

THETR 451 Production Laboratory IV
Fall and spring. 1-4 credits. May be repeated for credit. Prerequisite: permission to Advanced Undergraduate Theatre Program. P. Lillard, R. Archer, S. Brookhouse, K. Goetz, D. Hall, C. Hatcher, J. Johnson, E. Intemann, C. Orr Brookhouse.
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.

THETR 485 Undergraduate Internship
Fall, spring, or summer. 1-6 credits. To be eligible to enroll and receive credit for an internship, Theatre Arts students must either be majors or be admitted to the Advanced Undergraduate Theatre Program (AUTP). Students are responsible for arranging their own internships in consultation with the AUTP faculty in their area of choice prior to preregistration of the semester in which the internship is planned to take place. To receive credit for this course, it must be an unpaid internship; if it is a paid internship, it is possible to receive independent study (see THETR 300) credit for it.

THETR 495 Honors Research Tutorial
Fall or spring. 2-8 credits. Limited to Theatre Arts seniors only.
This course is the first of a two-semester sequence (the second is THETR 496). Up to eight credit hours and one grade will be given upon completion of second semester. The Theatre Arts 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 a part of the honors program the student must maintain an average of 3.5 in departmental courses and an average of 3.0 in all courses. Students should consult with their advisers in their junior year if deciding to do honors. Admissions to honors is at the discretion of the departmental committee.

THETR 496 Honors Thesis Project
Fall or spring. 2-8 credits. Limited to Theatre seniors only.
This course is the second of a two-semester sequence (the first is THETR 495). Up to eight credit hours and one grade will be given upon completion of second semester. See THETR 495 for further information.

Film

THETR 274 Introduction to Film Analysis: Meaning and Value
Fall. 4 credits. Limited to thirty-five 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. Prospective film majors should enroll in their sophomore year.

THETR 277 Video Production I
Spring, alternate years and occasionally in summer. 3 credits. Limited to 12 students. Permission of instructor. Open to sophomores, juniors, and seniors. M. Rivchin.
A hands-on, beginning video production course using Super-VHS cameras and editing equipment. Students will learn camera, lighting, sound recording, editing and digital effects through a series of technical exercises. Students will develop two short, original video projects to be shown publicly at the end of the semester. A $100 equipment maintenance fee per student will be collected in class. Cost for videocassette approximately $50-100.

THETR 291 Filming Other Cultures (also Anthropology 291) @ Spring.
3 credits. Limited to 20 students, with preference given to those who have taken either Anthropology 102 or Theatre Arts 274. R. Archer.
For description, see Anthropology 291.

THETR 313 Japanese and Asian Film (also Asian Studies 313 and Comparative Literature 313) @ Spring. 4 credits. B. de Bary.
For description, see ASIAN 313.

THETR 329 Political Theory and Cinema (also German Studies 330, Comparative Literature 330 and Government 370) @ Fall. 4 credits. G. Waite.
For description, see German Studies 330.

THETR 374 History and Theory of the Commercial Narrative Film
Fall. 4 credits. Fee for screening expenses, $10 (paid in class). Offered alternate years. A. Villarejo.
Consideration of the broad patterns of narration in the history of the commercial narrative film. Emphases placed upon the early articulation of a cinematic means of narration, realism as an artistic style, the nature and functions of popular film, and the modes of modernist and post-modernist "art cinema" narration.

THETR 375 History and Theory of Documentary and Experimental Film
Fall. 4 credits. Fee for screening expenses, $10 (paid in class). Offered alternate years. A. Villarejo.
First, the history and theory of documentary film up to the end of World War II. Second, the history and theory of the experimental and personal film forms in Europe and the United States.

THETR 377 Fundamentals of 16mm Filmmaking
Fall. 4 credits. Limited to 12 students. Intended for juniors and seniors (who may need to sign up a year or more in advance). Prerequisite: THETR 274 (or higher-level film studies course) and permission of instructor. Fee for maintenance costs, $100 (paid in class). The average cost to each student for materials and processing is $400. M. Rivchin.
A hands-on course in the basics of 16mm filmmaking techniques, requiring no prior production experience, emphasizing creative development of filmic ideas through critical discussion. Students may explore narrative, experimental, documentary, animation, and abstract genres, producing short exercises and a final sound film project (8-12 minutes) to be screened publicly.

THETR 378 Soviet Film of the 1920s and French Film of the 1960s
Spring. 4 credits. Fee for screening expenses, $10 (paid in class). Offered alternate years. Next offered spring 1999. D. Fredericksen.
An intensive treatment of two distinct periods of radical innovation in film theory and history. Emphasis on the vital relationship between theory and practice in these two periods. Major figures include Eisenstein, Pudovkin, Vertov, Dovzhenko, and Renoir, in the Soviet 1920's; Godard, Truffaut, Resnais, Rohmer, Tati, Rouche and Bresson in French 1960's.

THETR 379 Documentary Film from 1945 to present
Spring. 4 credits. Prerequisite: THETR 376 or permission of the instructor. Fee for screening expenses, $10 (this fee is paid in class). Offered alternate years. D. Fredericksen.
Emphasizes on the contemporary documentary film as a sociopolitical force, as an ethnographic tool within and without a filmmaker's own culture, and as an artistic form with a distinct history and set of theoretical questions.

THETR 383 Screenwriting
Spring. 3 credits. Prerequisites: THETR 274 and 377, and permission of instructor. Limited to 12 students. R. Wilson.
Exercises in various genres of screenwriting will be explored: the commercial narrative, documentary, experimental, and abstract. This class will culminate in the writing of a finished script for a ten to fifteen-minute film. Note: This class is an intensive writing experience that will demand a great deal of outside work.

THETR 386 Third Cinema
Spring. 4 credits. Prerequisite: previous course in film history or analysis helpful, though not mandatory. A. Villarejo.
This course explores postcolonial film and video through the rubric of "third cinema." We will investigate the diverse historical, national, political and generic commitments of films from Africa, South Asia, Latin America, the US and UK (Sembene, Ray, Brocka, etc.). Readings in film and postcolonial theory will guide our critical analyses of the films.
The Nature of Film, a seminar taught by M. Rivchin.

THETR 477 Intermediate Film and Video Projects
Spring. 4 credits. Limited to 8 students. Prerequisites: THETR 377 or 277, and 477; recommended: 383 (screenwriting) and 398 (Directing I). M. Rivchin.

This course will explore German film from the Weimar and Nazi periods to the present in relation to the cultural and sociopolitical context of which it was a part. Readings and lectures will be devoted to formal and cultural developments historically as well as interpretative analysis of selected individual films.

THETR 475 Seminar in the Cinema I (also College Seminar)
Fall. 4 credits. Limited to 20 students. Offered alternate years. Prerequisite: some analytic studies in film. D. Frederiksen.


THETR 474 Film and Performance
Spring. 4 credits. An interdisciplinary, collaborative course taught by M. Rivchin (Film/Video) with guest lectures by: David Borden (Music) Kent Hubbell (Architecture) Gail Scott-White (Fine Arts) Staff (Dance) Limited to 15–18 students (3–4 accepted from each area listed). Prerequisite: THETR 377 or 277, and 477; recommended: 383 (screenwriting) and 398 (Directing I). M. Rivchin.

This is a third-level film production course for those students who have already written and proposed a script, or are working on, a documentary treatment, or a storyboard. Experimental or animated film project. Working in two production crews, directing, cinematographers, and sound recordists, students will be responsible for editing and all completion costs of their projects, which will be screened publicly at the end of the semester.

THETR 398 Advanced Film and Video Projects
Spring. 4 credits. Limited to 4 students, those selected to the Advanced Undergraduate Film Program by application in December. Prerequisite: THETR 477 or 277, and 477; recommended: 383 (screenwriting) and 398 (Directing I). M. Rivchin.

This course is for selected advanced students who have already written and proposed a script or are working on, a documentary treatment, or a storyboard. Experimental or animated film project. Students will edit the films they write and direct, and will be individually responsible for editing and all completion costs of their projects, which will be screened publicly at the end of the semester.

THETR 423 Ballet I (also Physical Education 423)
Spring. 0 or 1 credit. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Chu; spring: J. Kovar.

The fundamentals of modern dance technique. Elementary dance movement phrases, with attention to rhythm, placement, and vitality of performance.

THETR 124 Modern Dance I (also Physical Education 424)
Fall and spring. 0 or 1 credit. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Chu; spring: J. Kovar.

The fundamentals of modern dance technique. Elementary dance movement phrases, with attention to rhythm, placement, and vitality of performance.

THETR 155 Rehearsal and Performance
Fall and/or spring. 1–2 credits. 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned roles after tryouts at the dance program's auditions. Students should add this course only after they have been assigned roles. S-U grades only.

The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

THETR 201 Dance Improvisation
Fall. 3 credits. Limited to 12 students. Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through department roster in the main office of the Center for Theatre Arts. Attendance at dance concerts is required. J. Self.

When the body knows where, when, and how to move without prior direction, we call that improvisation. This course offers the possibility of "training" one's movement instincts to respond with lightness, humor, grace, and spontaneity. Solo and group forms are covered. Includes some dance history.

THETR 210 Beginning Dance
Composition and Music Resources
Spring. 3 credits. Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through department roster in the main office of the Center for Theatre Arts. Attendance at dance concerts is required.

J. Chu and A. Fogelbarger.

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. Study of contemporary music and ways to combine movement and music. Informal showing at end of semester.

THETR 211 Dance Movement Workshop
Summer. 3 credits. Limited to 15 students. For students with varied levels of training, including those with no experience.

J. Kovar.

Students explore new ways of moving and creating dances and present short studies each week based on material covered in class.

Modern dance technique, improvisation, and composition are covered. Students observe and discuss the main concerns of contemporary dance and movement. Informal showing at end of semester.
An intermediate ballet class that is a continuation of Ballet I with intermediate work in the areas of port de bras, adage and petite and grande allegro. There is an emphasis on placement through muscular harmony.

**THETR 232 Modern Dance II (also Physical Education 432)**
Fall and spring. 0 or 1 credit. Prerequisite: Modern Dance I or permission of instructor. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Kovar; spring: J. Morgenroth.

A continuation of Modern Dance I, for students with at least a year of dance training. Practice of longer dance phrases, with attention to clarity of design, rhythm, and expression.

**THETR 233 Explorations in Movement and Performance A (also Physical Education 440)**
Fall. 0 or 1 credit. Limited to 16 students. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.

A physically demanding exploration into various movement realms. Specific subjects covered are 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.

**THETR 234 Ballet III (also Physical Education 434)**
Fall and spring. 0 or 1 credit. May be repeated for credit. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. B. Suber.

Study and practice of classical ballet at an advanced level. Work is done on strengthening the body through harmonic muscular control combining Russian, Danish and American techniques.

**THETR 305 Explorations in Movement and Performance B (also Physical Education 440)**
0 or 1 credit. Explorations A, dance improvisation or permission. May be repeated for credit. Limited to 16 students. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Not offered 1997-98. J. Self.

This course continues the investigations of Explorations A with special emphasis on performance and ritual. The class will create performance opportunities throughout the semester.

**THETR 306 Modern Dance III (also Physical Education 436)**
Fall and spring. 0 or 1 credit. May be repeated for credit. Prerequisite: Modern Dance II or permission of instructor. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. J. Chu.

Advanced work with rhythm, placement, and phrasing for students who are prepared to refine technical skills of dancing. Students will be physically and mentally challenged by lengthy, complex phrases and will be expected to bring the instructor's material to life.

**THETR 307 Asian Dance and Dance Drama (also PE 427)**

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Fall. 0, 1 or 3 credits. May be repeated for credit. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Morgenroth.

This course is designed to give the student a practical working knowledge of Indian classical dance, specifically in the indigenous style of Orissa known as Odissi. The technique strengthens the body and develops grace, rhythmic expression, and dexterity that can benefit all forms of dance.

**THETR 308 Modern Dance IV (also Physical Education 438)**
Fall and spring. 0 or 1 credit. May be repeated for credit. Prerequisite: Modern Dance III or permission of instructor. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Self; spring: J. Morgenroth.

A continuation of, and supplement to, Theatre Arts 306/Physical Education 436.

**THETR 310 Intermediate Dance Composition and Music Resources**
Fall and spring. 3-4 credits. Prerequisite: THETR 210 and concurrent enrollment in a technique class at the appropriate level is required. Registration only through department roster in 225 Center for Theatre Arts. Fall, J. Chu and A. Fogelsanger; spring, J. Morgenroth and A. Fogelsanger.

Intermediate choreographic projects will be critiqued in progress by faculty and peers. Consideration of design problems in costume and lighting. Weekly music sessions will aim to expand music vocabulary and skills through a survey of contemporary music for dance, the study of music and dance collaborations, and rhythm studies.

**THETR 311 Intermediate Projects in Dance Composition**
Spring. 3-4 credits. Prerequisite: THETR 310. Attendance at dance concerts is required. J. Chu.

A continuation of THETR 310.

**THETR 312 Physical Analysis of Movement**

This course is an examination of human movement with particular attention to dance movement. Readings in texts on human anatomy, physiology, and kinesiology and in Sweigard's *Human Movement Potential.* Guest lectures by experts in anatomy and health areas. Practical and laboratory work. Demonstration of dissection.

**THETR 314 Western Dance History I: Classical Ballet History as a Reflection of Western Ideology**
Fall. 4 credits. Attendance at dance concerts is required. B. Suber.

A critical survey of the history of classical ballet defining elements of classicism and determining why ballet is defined as classical. Texts, videotapes, and through live performance, the class will explore how ballet has perpetuated or confronted social issues of race, class, gender, sexuality, the body, and abuse.

**THETR 315 Western Dance History II: History of Modern Dance**
Spring. 4 credits. Attendance at dance concerts is required. J. Chu.

This class will study the course of modern dance in the twentieth-century United States. We will examine each generation of dancers starting with Isadora Duncan and ending with performers emerging today. Issues of gender, cultural identity, elitism, and democracy will be discussed.

**THETR 317 Asian Dance II**
Spring. 0, 1 or 3 credits. Prerequisite: THETR 307 or previous training in Odissi Classical Dance. Theatre Arts and Physical Education Registration at Teagle Hall only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. D. Bor.

The continuation of THETR 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. We will meet twice weekly for movement classes; an extra class will be arranged to learn the art of makeup.

**THETR 410 Advanced Dance Composition I**
Fall and spring. 3-4 credits. Prerequisite: THETR 310 and 311. Attendance at dance concerts is required. Fall: J. Chu and A. Fogelsanger; Spring: J. Morgenroth and A. Fogelsanger.

Students work on advanced choreographic problems, to be presented in performance. Work in progress will be critiqued by faculty on a regular basis.

**THETR 411 Advanced Dance Composition II**
Fall and spring. 3-4 credits. Attendance at dance concerts is required. Fall: J. Chu and A. Fogelsanger.

A continuation of THETR 410.

**THETR 418 Seminar in History of Dance**
Spring. 4 credits. Attendance at dance performances required. B. Suber.

Topic for 1998: Cyberdance. Considers the dynamic body as it has interfaced with technology in performance and within a social context, beginning with tools of primitive agriculture and warfare and continuing through industrialism to computer technology.

**THETR 490 Senior Paper in Dance**
Spring. 4 credits. Prerequisite: THETR 418, senior standing. Attendance at dance concerts is required. Under faculty direction, the student will write a senior paper in dance history, criticism, or theory.

**THETR 491 Senior Project in Dance**
Fall or spring. 4 credits. Prerequisite: THETR 410 or permission. This course is limited to senior dance majors only. Students who take this course will create a project in choreography and performance, dance film or video, dance pedagogy, or other appropriate area agreed upon with a member of the dance faculty. Senior projects that are to be performed, must be presented within one of the three regularly scheduled department concerts.
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 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 340 Advanced Playwriting
Students in the advanced undergraduate theatre program may also elect to take THETR 485 (Undergraduate Internship) in addition to or in place of one production assignment.

TURKISH
See Department of Near Eastern Studies.

UKRAINIAN
See Language Courses under Languages and Linguistics.

URDU
See Language Courses (under "Hindi") under Languages and Linguistics.

VIETNAMESE
See Language Courses under Languages and Linguistics.

WELSH
See Language Courses under Languages and Linguistics.

WOMEN'S STUDIES MAJOR
See "Special Programs and Interdisciplinary Studies."

WRITING PROGRAM
See John S. Knight Writing Program in the section, "Special Programs and Interdisciplinary Studies."

YIDDISH
See Department of Near Eastern Studies.

YORUBA
See Language Courses under Languages and Linguistics.

THEAVER STUDIES AND INTERDISCIPLINARY STUDIES

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 including Mandinka, Swahili, and Yoruba.

The center offers a unique and specialized program of study that leads to an undergraduate degree through the College of Arts and Sciences and a graduate degree, the Master of Professional Studies (African and African-American), through the university's Graduate School.

A student may major in Africana studies; however, another attractive alternative is the center's 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 (H) and geographical breadth (G) requirements, such as freshman writing seminars, language (Mandinka, Swahili, Yoruba), 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 comprehensive nature of the program, it is to the students' advantage to declare themselves Africana majors as early as possible. The following are prerequisites for admission to the major.

Students should submit:

1) a statement of why they want to be an Africana studies major;
2) a tentative outline of the area of study they are considering (African or African-American) for the undergraduate concentration; and
3) a full transcript of courses taken and grades received.

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 cumulative average in the center's courses while completing the major program. The Africana major must complete 36 credits in courses offered by the center, to include the following four core courses: AS&RC 205, 231, 290, and 422. Beyond the core courses, the student must take 8 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 Adams, will assist students in the design and coordination of joint major programs. However, in any joint major program, the center will require at least 15 credits be taken in Africana studies courses, including AS&RC 290.

**Double Majors**

In the case of double majors (as distinct from joint majors) students undertake to carry the full load of stipulated requirements for a major in each of the two departments they have selected.

**Certificate in African Studies**

In conjunction with the Institute for African Development, the Africana Studies and Research Center administers an undergraduate Certificate in African Studies program. The certificate is offered as a minor concentration available to students in all of the undergraduate colleges at Cornell. Many of the courses in the program might be used to fulfill other course distribution requirements. By pursuing this certificate, students acquire an interdisciplinary understanding of Africa. After developing a foundation of knowledge on the culture, society, and development of Africa in the core course “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 Adams (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 of the field experience, or a project or experiment designed by the student. The requirements for admission to the honors program for all students—regular majors, joint majors, and double majors—are a B cumulative average in all courses and a B+ cumulative average in the center's courses. Each student accepted into the honors program will have an honors faculty commit-

tee 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.

**Distribution Requirement**

Two Africana Studies and Research Center courses from the appropriate group may be used in fulfillment of the following distribution requirements:

- Freshman writing seminars: AS&RC 100.

**Language Requirement**

Courses in Mandinka, Swahili, and Yoruba may be used to satisfy the College of Arts and Sciences language requirement. Successful completion of the Mandinka or Yoruba series AS&RC/DMLL 121, 122, 123 provides qualification, and study through 203 in either language provides proficiency. In Swahili, successful completion of AS&RC 131, 132, 133, and 134 provides qualification, and the addition of 204 provides proficiency. AS&RC majors are not required to take an African language, but the center recommends the study of one to complete the language requirement.

**Courses**

AS&RC 122 Sec 01 Continuing Yoruba Fall. V. Carstens and staff. For description, see YORUB 123.


AS&RC 132 Swahili Spring. 4 credits. A. Nanji. Advanced study in reading and composition.

AS&RC 133 Swahili Fall. 4 credits. Prerequisites: Swahili 131 and 132. A. Nanji.

AS&RC 134 Swahili Spring. 4 credits. Prerequisite: Swahili 133. A. Nanji.

In this course of the sequence 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
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 well-being. Among the major topics considered will be male/female relationships, childbearing and parental roles, the extended family, economic and health issues. The contribution of the course focusing on youth will primarily cover child and adolescent development.

AS&RC 172 The Education of Black Americans: Historical and Contemporary Issues
Spring. 3 credits. Staff. This course will be devoted to the history of educating Black Americans. Considerable attention will be given to contemporary issues. The major topics of focus will 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, re-segregation debates and new initiatives in education including vouchers, and charter schools.

AS&RC 191 Africa: The Continent and Its People
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; 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 will also be explored.

AS&RC 202 Swahili Literature
Fall. 4 credits. A. Bekerie. 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
Spring. 4 credits. L. Edmondson. The primary focus of this course will be on the historical and contemporary significance of racialisation in the United States and South Africa with regard to societal development and inter-relations. It will include an analysis of the historical development of racialised barriers as an instrument of power and privilege. The ways with which racialisation is used as an instrument of ideology to social status, cultural hierarchy and economic positions will also be examined. Particular emphasis will be given to the development and perpetuation of scientific racism in both places. The apparent success against Jim Crow form of racism in 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 will be further analyzed.

AS&RC 290 Swahili Language
Fall. 3 credits. A. Nanji. For description, see YORUB 123.

AS&RC 302 Swahili Literature
Fall. 4 credits. A. Nanji. Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.
AS&RC 205 African Cultures and Civilizations
Spring. 3 credits. D. Ohadike.
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 systems, cross-cutting ties, rites of passage, gender relations, arts (including music, dance, folklore, architecture, sculpture, painting, and body decoration).

AS&RC 210 Major Works of Black World Writing
Fall. 3 credits. A. Adams.
This course surveys classic texts by African American, Caribbean, and African writers. The focus is on literary texts by authors such as Langston Hughes, Toni Morrison, James Baldwin, Maryse Conde, and Chinua Achebe, with a view toward analyzing common experiences, references, themes, and literary strategies across the Black world. The works of fiction, poetry, and drama that constitute the central material of the course are supplemented by essays and biographies from other authors who have influenced the creative vision and the movement of the peoples of Africa and the Diaspora, e.g., W.E.B. DuBois and Marcus Garvey, Nelson and Winnie Mandela.

AS&RC 231 African American Social and Political Thought
Spring. 3 credits. J. Turner.
This is an introductory course that will review and analyze the major theoretical and ideological formulations developed and espoused by African-Americans in the struggle for liberation. This semester we will focus specifically on the political philosophy and historical significance of Malcolm X, and the writings and movements 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 will be discussed. Black political thought will be viewed in its development as responses to concrete conditions of oppression and expression.

AS&RC 271 Introduction to African Development (also CRP and Government 271) @
For description, see CRP 271.

AS&RC 280 Racism in American Society
This course will be a topical treatment of the psychological aspects of race relations in America, with specific reference to the differences and intersections of race, class, gender, and ethnicity.

AS&RC 285 Black Theater and Dramatic Literature
Fall. 3 credits. K. Bowman.
This course is an introduction to the history and literature of African American Drama at times in conjunction with other parts of the African diaspora. It also provides an opportunity for students to cultivate an interest in individual and group presentation of Black dramatic materials. Students who successfully complete this course will be granted preference for the limited enrollment in AS&RC 425 (Advanced Seminar in Black Theatre and Dramatic Literature), which produces a public performance in the spring.

AS&RC 290 The Sociology of the African-American Experience
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 classification of people in world civilization and the making of early culture. The course treats issues in the humanities, social sciences, and history. This course is required for all undergraduate students majoring at the Africana Center.

AS&RC 304 African American Art
Spring. 3 credits. S. Hassan.
This course investigates the different forms of African American visual artistic traditions in relation to their historical origins and sociocultural context from the early days of slavery to the present time. The course will start with an overview of African art and the experiences of the Middle Passage and slavery in relation to African American traditions in the decorative arts including: pottery, architecture, ironwork, quilting, basketry. This is followed by a fine art survey starting with the eighteenth and nineteenth centuries, continuing through the early twentieth-century Harlem Renaissance up to the present. Certain issues related to African American arts and creativity such as "improvisation," "Black Aesthetic," and "Black Arts" will also be explored. Slides, films, film strips will be 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 @
Fall. 3 credits. S. Hassan.
This course is a survey of the visual art and material cultural traditions of sub-Saharan Africa. It aims at investigating the different forms of visual artistic traditions in relation to their historical and sociocultural context. The symbolism of traditional African art will be explored through the analysis of myth, ritual, and cosmology. In-depth analysis of particular African societies will be used to examine the relationship of the arts to indigenous time, space, color, form, and sociopolitical order. New and contemporary art forms associated with major socioeconomic changes and processes of assimilation and acculturation will also be explored. These include tourist art, popular art, and elite art.

AS&RC 311 Government and Politics in Africa @
Power and political participation in Africa. The colonial background and its political consequences. The pre-colonial continuities in the post-colonial politics. Ethnicity and allegiance in the African polity. The monarchical tendency in African political culture. From the warrior tradition to the military coup in the post-colonial era. From the elder tradition to presidentialism in the 1970s. From the sage tradition to intellectual meritocracy. Class versus ethnicity in African politics. The one-party versus the multiparty state. Socio-cultural versus socio-economic ideologies. The gender question versus the economics of the polity. The soldier and the state. The African political experience in a global context.

AS&RC 362 Global Perspectives on Gender
The course will examine how forms of gender inequality have been shaped by international forces and structured by differences in national histories. The class will be taught by a rotating set of two faculty members from different departments. Contingent on the particular faculty member directing the course, the class will consider such issues as cross-cultural perspectives on gender; the history of work and family life in different societies; the formation of international labor in local, national, and international economies; the impact of colonialism; the organized efforts of women to define gender relations; the roles of the state in constructing an engendered economy and polity.

AS&RC 370 African American History: The Twentieth Century
Examines the transition of African Americans from countryside to city through the process of migration and urbanization and their transformation into industrial laborers. Probes the transition from segregation to civil rights through the process of protest and the transformation of African Americans from second-class into first-class citizens. The purpose is to understand historical experiences of the African American experience and its meaning for the current socioeconomic political, and cultural status of African Americans.

AS&RC 380 African History: Earliest Times to 1800 #
Fall. 3 credits. A. Bekerie.
This course covers the history of Africa from the origins of humankind, through the emergence of small-scale societies and state systems, such as Egypt, Meroe, Mali, Bunyoro, the Swahili city-states and the Luba-Lunda complex, that had regional and international significance. Emphasis is placed on understanding the way in which different ecological conditions, political developments, and religious change affected gender, class, and ethnic relations within these societies and their relations with other societies. The course also examines the interaction with Islamic and European cultures up to 1800.

AS&RC 381 African History, 1800-Present @
Spring. 3 credits. D. Ohadike.
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 in the 1860s; the politics of the abolition; European scramble and partition of Africa; resistance to European colonial conquest; African societies in the colonial period; Christian missionaries and
Western educated Africans, colonial administration, French and British styles, Pan-Africanism and the politics of decolonization, liberation movements in Africa, the armed struggles in Algeria, Angola, Mozambique, Zimbabwe, Namibia and South Africa; Neocolonialism, the rise and decline of military regimes the World Bank, the IMF, African debt crisis, and the Structural Adjustment Programs.

AS & RC 404 Afrocentricity: Paradigm and Critical Readings
Fall. 4 credits. A. Bekerie. What is Afrocentricity? It is a theoretical framework designed to study and interpret the histories and experiences 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 will examine—through the writings of Asante, Kerto, Clarke, Jean, Myers, Amín, Mzumi, Gates, Appiah, Richards, Schlesinger and Thiongo—the conception and depth of the paradigm, its relevance in the production and utilization of knowledge, particularly emanicipatory 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. Not offered 1997–98. Next offered spring 1999. 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 political legacy. This course will conduct 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 will be analyzed. Critical historical stages in the process of Black politics will be examined. The development of electoral offices in federal and state-wide politics, and the significant urban political power bases giving rise to African American mayoral politics in critical industrial centers, as well as rural centers will center the course. Presidential politics—the Jesse Jackson campaigns—and new political formations including Black Republicans/conservatives will constitute the emphasis on contemporary events. The course will review the development of the literature on 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 will be the central focus of the course. Community development models will be explored in relationship to the social needs of the African American population. The changing configuration of internal organization of the African American community nationally will be examined.

AS & RC 422 African Literature
Spring. 4 credits. P. E. I. Lecky. 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, daily lives faced by African people? Or does African literature concern itself with philosophical ideas and ideals that transcend those realities to embrace the general human condition? Or, does it do both? The texts that we will be reading this course will be approached in terms of these issues of “African development” and the universal human experience.

AS & RC 425 Advanced Seminar in Black Theater and Dramatic Literature
Spring. 4 credits. Enrollment limited. This course will be devoted to the study, rehearsal, production, and public performance of a play or plays drawn from the annals of Black American dramatic literature. Students will participate in all the various phases and categories of theatrical production, from acting to production crew to theater management. A field trip to a Black Theater attraction in New York City will also be arranged if possible. Students who have successfully completed AS & RC 285 (Black Theater and Dramatic Literature) will be granted preference for the limited enrollment in this course.

AS & RC 435 African Cinema (also Society for the Humanities 445)
Spring. 4 credits. S. Hassan. This course offers an overview of African cinema and filmmaking. It surveys historically the evolution of African cinema from its early days to the present. Through screening of selected African films, different trends within African cinema will be explored, such as “Return to the Sources” and the rediscovery of the pre-colonial “Social Reality” as a narrative and critique of post-independence Africa; reconstructing the story of colonialism from the perspective of the colonized; and the entertainment genre. Techniques, style, and aesthetics of African film will also be discussed. The course offers a unique opportunity of looking at African culture and society, and at issues of social change, gender, class, tradition, and modernization through African eyes.

AS & RC 451 Politics and Social Change in the Caribbean
Fall. 4 credits. E. D. Richardson. A study of the historical, geostrategic, political, economic, and social (including racial and cultural) forces bearing on the domestic and international experiences of Caribbean societies. Special attention will be 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 will examine 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 will 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 will be analyzed in their varying manifestations across the linguistic and other boundaries to uncover the underlying shared experience.

AS & RC 459 Educational Innovations in Africa and the African Diaspora (also Social Sciences 459 and Women's Studies 459)
Fall. 4 credits. N. Assié-Lumumba. This course deals with theories and concepts of planned change for social development and their application to educational innovations geared to promoting equal opportunity based on gender, race, and class in Africa and the African diaspora. The first part of the course will be concerned with the stage of innovations from their inception to their implementation, resistance, diffusion and impact on different social categories. The second part of the course will deal with different cases of educational innovations such as the creation of educational institutions and change in curriculum development and medium of instruction. Historical and contemporary cases of educational innovations will be presented and analyzed. The case studies include the development of African Studies as a discipline, the creation and expansion of historically black institutions such as Lincoln University in Pennsylvania, Tuskegee Institute in Alabama, Spelman College in Georgia, and the Westside Preparatory School of Chicago. The African cases to be studied include education for self-reliance in Tanzania, African languages as a medium of instruction in Nigeria and Mali, and television as a medium of instruction in Côte d'Ivoire. Gender will be a main focus in the analysis of the agents and beneficiaries of the innovations.

AS & RC 462 The Black Church: Resistance and Empowerment
Spring. 4 credits. Staff. The course will be devoted to the study of the Black Church historically as the most viable institution in African American life. Consideration will be given to the African spiritual heritage, development of the rural and metropolitan churches, leadership in the church, the African American worship experience, the range of issues and challenges confronting the church's future and the emergence of non-Christian Black churches. The instructor's lectures will be supplemented by audio-visuals and class discussion.

AS & RC 475 Black Leaders and Movements in African-American History
Fall. 4 credits. R. Harris. Analyzes the personalities, ideas, and activities central to the struggle for African-American liberation from the eighteenth-century to the present. 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 (also Women's Studies 478)
Fall. 4 credits. N. Assié-Lumumba. The family as a social institution is structured according to socio-economic, historical, political, and cultural specificities. The topics to be discussed include the concepts of nuclear and extended family, the place and role of different age-generations in the family, marriage and related issues, such as dowry, divorce, parenthood, child-rearing, gender roles, class differences, "family planning." The course also deals with the impact of westernization, urbanization, and modern economy on the structure of the family in Africa. Finally, the course addresses the legacy of African family values in the African diaspora. Examples will be drawn from urban and rural communities.
address these areas of Black comparison: Comparative Slavery—A Triple Heritage; Race and Race Mixture in Four Traditions; Comparative Emancipation from Slavery; Comparative Liberation from Colonialism; Comparative Struggle for Civil Rights; The Gender Question in Global Africa; Comparative Quest for Global Equality.

AS&R 502 Education and Development in Africa

Spring. 4 credits. N. Assié-Lumumba. In the 1950s and 1960s, the human capital theory that emphasizes the importance of formal education for achievement of full productive potential of individuals and countries enjoyed a renewed popularity. African countries promoted educational expansion with the expectation that it would lead to socio-economic development. The initial euphoria, however, was followed by skepticism and then disillusion. Education began to be perceived even as a hindrance to development. This course examines the relationship between formal education and individual and national development. In this seminar, different paradigms of development including modernization and dependency theories and Third World Forum are presented with an emphasis on the perceived and actual roles of education in individual and national development.

AS&R 503 African Aesthetics

Fall. 4 credits. S. Hassan. The goal of this course is to investigate in depth the principles of aesthetics and philosophy of African visual arts. The course will offer a critical survey of the different writings and the growing body of research on this relatively new area of inquiry. The objectives of the course are to review how African aesthetics has been studied to date, to provide a critical analysis of the different approaches to the subject and related issues, and to suggest future directions of research. In-depth analysis of particular African societies will be used to examine the relationship of arts and aesthetics to indigenous concept of time, space, color, form, and sociopolitical order. In addition, issues related to African aesthetics and arts such as style, gender, class, and social change will also be explored.

AS&R 504 Political Change in Africa

Fall. 4 credits. Not offered 1997-98. Next offered fall 1998. A. Mazrui. The study of Africa can be approached either diachronically (focusing on the tension between opposing forces) or thematically (focusing on themes as chapters of experience). This course will borrow from both those approaches. In their class assignments and examinations students are free to use either approach. The first approach will explore 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; socialism and capitalism. The thematic approach will examine 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&R 510 Historiography and Sources: The Development of African-American History

Spring. 4 credits. Prerequisite: upperclass or graduate standing or permission of instructor. Next offered 1998-99. Next offered spring 1999. K. Harris. Studies the way historians in particular have explained the African-American past. Examines the development of writing on African-American history from the earliest writers to the present. Seeks to determine the principles for interpreting African-American history. Acquaints participants with the methodologies and sources central to understanding the African-American experience.

AS&R 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 will complement literary texts. Gender issues, as manifested both at home and in emigrant situations abroad will be examined in texts by such writers as Sistren, Conde, Dangarembga, Allod, Warner-Vieya, Ba, Emetcha, Kincaid, W. Mandela. (Francophone works may be read in the original by individuals who so desire.)

AS&R 598-599 Independent Study

598-fall; 599-spring. Variable credit. For all graduate students.

AS&R 602 Research, Theory and Methodology in Africana Studies

Spring. 4 credits. Faculty. This course, which will be conducted as a seminar, is designed for first-year AS&R graduate students. It will cover basic research design, methodology and means of gathering and organizing data and will also address specific issues related to research and theoretical discourse in African, Caribbean, and African American humanities and social sciences.

The course will be coordinated and supervised by one professor (the Director of Graduate Studies or by rotation) but taught by three or four faculty per semester. Each participating faculty will be responsible for a topical segment of the course related to her/his areas of specialization or an area of interest pertaining to theory and methodology of Africana Studies.

Readings will be assigned and distributed in advance before each faculty presentation, to allow students to prepare for discussion. This course will allow first-year graduate students wider exposure to faculty and the field of Africana Studies early in their tenure in the program, and thus help them make an informed decision regarding faculty adviser and topic for their theses. Each student will be required to produce a bibliographic essay related to his/her thesis topic, and a fully developed thesis proposal as an end product of the course.

AS&R 698-699 Thesis

698, fall; 699, spring. Limited to Africana Studies and Research Center graduate students.
Agriculture, Food, and Society Concentration


Agriculture, Food, and Society is an interdisciplinary concentration that is designed to introduce students to the study of agricultural and food issues from diverse perspectives within the liberal arts. The Agriculture, Food, and Society concentration seeks to make available to students a coherent program of study in which the role of agriculture in modern or prehistorical-historical and developed or developing societies can be understood from biological, social, scientific, and humanistic perspective. The concentration draws upon courses in several colleges—in particular, the Colleges of Arts and Sciences, Agriculture and Life Sciences, and Human Ecology.

The work of the committee is supported from the faculty associated with the concentration. The members of this committee include faculty from each of the major colleges from which courses in the concentration are drawn. The work of the committee is supported administratively through the Biology and Society Major. The office of the Biology and Society Major (275 Clark Hall) also provides a central location for students to receive information about relevant course offerings, upcoming seminars and presentations, faculty interests, and so on.

Basic Requirements

The requirements for the Agriculture, Food, and Society concentration are designed to ensure a broad background in the biological, social, economic, and humanistic dimensions of agricultural and food issues. These requirements include foundation courses in biology; the Senior Seminar B&B/Soc/BioG/S&T 469, Food, Agriculture, and Society; plus a minimum of five electives totaling 15 credits drawn from the courses offerings. Students enrolling in the Agriculture, Food, and Society concentration should take the following foundation courses in biology to prepare themselves for course work in agricultural science: a two-semester introductory biology sequence selected from Biologica-l Sciences 109/110, 105/106, or 101–104. (Advanced placement in biology with a score of 4 or 5, or Biological Sciences 107/108, offered during the eight-week Cornell summer session, also satisfies the biological sciences requirement). These courses may be used to meet group 1 (physical or biological sciences) distribution sequence requirements in the College of Arts and Sciences.

It is recommended (but not required) that students in the Agriculture, Food, and Society concentration elect one or more freshman writing seminars with agriculturally related content to meet basic college requirements for graduation. The electives for the concentration, from which a minimum of five courses and 15 credits must be taken, are organized into three groups: agricultural and nutritional science; humanities, and social science/history. Students must select one agricultural and nutritional science course, one humanities course, and three social science or history courses. A maximum of six of the 15 credits may be earned in 100-level courses.

In addition, students are required to take the senior seminar, B&B/Soc/BioG/S&T 469, Food, Agriculture and Society. Adjustments to these and other requirement of the concentration may be made with the approval of the student's Agriculture, Food, and Society faculty adviser.

American Studies


The Major

The major in American Studies, appropriate for a wide variety of future professions, is basically a program of coordinated study in the history, literature, and politics of the United States. The prerequisites are two courses from the following: American Studies 101, American Studies 102, English 275, English 268, Government 111, History 101, History 102. Students contemplating becoming American Studies majors are encouraged to speak with the chair as early as possible to arrange for a major adviser.

In consultation with their advisers, American Studies majors elect, in addition to the prerequisites, 36 credits (or nine courses) of work in American history, American literature, and American government. Their work must include courses in all of the three large periods into which the nation's development can be divided (defined for the purposes of the program as colonial, nineteenth century, and twentieth century). Students must take no fewer than 4 courses before 1900. At least one of these courses must be in the period before 1800. Each student must also take one of the adviser-approved seminars in the 400 or 600 level. When the subject matter is appropriate, such a seminar may count toward the satisfaction of the period requirements. Students divide their work among history, literature, and politics in whatever proportion serves their interests, so long as their advisers consider their programs to be well-balanced. No more than 18 credits may be in any one department.

Beyond the basic core requirements for the major, 8 credits of work in the history or literature or both of another culture are required, students are also encouraged to take at least 4 credits in American thought, society, or culture studies from the perspective of another discipline such as anthropology, economics, history of art, or sociology. (This last 4-credit supplement may be satisfied outside the college.)

Courses in American history that will satisfy the 36-credit requirement are offered by the Department of History; those in American literature are offered by the Department of English, the Department of Theatre Arts, and the Africana Studies and Research Center; those in American government are offered in the Department of Government. Occasionally a course that fits an individual student's program may be offered elsewhere. Substitution will depend on the adviser's approval. Advisers determine what courses count for the interdisciplinary seminars.

Honors. Candidates for honors must maintain an average of B+ in courses pertinent to the major. To be eligible for a degree with honors in American Studies, a student must in the senior year write an honors essay for American Studies 493, Honors Essay Tutorial, and take an oral examination in the declared area of special interest.

Cornell-in-Washington Program. American Studies majors may apply to the Cornell-in-Washington program to take courses and participate in a closely supervised externship during a fall or spring semester. For further information, see Interdisciplinary Centers, Programs, and Studies or inquire at 471 Hollister Hall, 255-4090.

AM ST 101 Introduction to American Studies: American Revolution to the Beginning of the 20th Century Fall. 4 credits. G. Altschuler and D. McCall.

In this interdisciplinary course we will analyze American values and behavior as the intersection of culture, politics, literature, and society. Among the topics explored in the course will be the democratization of American society and politics, the formation of the middle class, the Civil War, the rise of industrialization, the Victorians and sexuality, the Pragmatic revolt against Formalism. Intensive examination of Hawthorne's Scarlet Letter, Melville's Moby-Dick, James's Portrait of a Lady, and Mark Twain's Huckleberry Finn will help illuminate the relationship between literature and American values.

AM ST 102 Introduction to American Studies: Progressive Era to the Present Spring. 4 credits. G. Altschuler and D. McCall.

In this interdisciplinary course we will analyze American values and behavior as the intersection of culture, politics, literature, and society. Among the topics explored in the course will be the death of the West and the rise of the Western, the Roaring Twenties, the New Deal and Writers on the Left, the Great War, the ideology of anti-Communism, the Civil Rights Movement, Vietnam, the Reagan Revolution, Post-Modernism and the politics of multiculturalism. Intensive examination of the works of Ernest Hemingway, F. Scott Fitzgerald and William Faulkner will help illuminate the relationship between literature and American values.

AM ST 201 Popular Culture in the United States 1900-1945 Fall. 4 credits. Not offered 1997-98. Next offered fall 1998. American Studies 201 will deal 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 will try to better understand the ways in which popular culture shapes and reflects American values. The course will also depict 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; Guns and G-Men; Jackie Robinson and the American Dilemma.

[AM ST 202] Popular Culture in the United States 1945 to Present
Spring. 4 credits. Not offered 1997–98.

Next offered spring 1999. American Studies 202 will treat the period from 1945 to the present. As we examine best-sellers, films, sports and television, radio, ads, newspapers, magazines and music, we will try to better understand the ways in which popular culture shapes and/or reflects American values. The course will also depict 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 202 include: the "Trekkies" and "Star Wars," and "Survivor" television; soap operas; "Gross-out" movies; Elvis, The Beatles, and Guns 'n Roses; Gothic Romances; People Magazine and USA Today.

[AM ST 251] Black Religious Traditions from Slavery to Freedom (also History 251 and Religious Studies 251)
For description, see HIST 251.

[AM ST 258] Historical Development of Women as Professionals, 1800 to the Present (also Human Development and Family Studies 256, History 238, and Women Studies 238)
Spring. 3 credits. J. Brumberg.

[AM ST 260] Introduction to American Indian Literature (also English 260)
Fall. 4 credits. D. Moore.
For description, see ENGL 260.

[AM ST 267] American Literary Identities: Nineteenth Century (also English 267)

[AM ST 275] The American Literary Tradition (also English 275)
Fall, spring. 4 credits. Fall, B. Maxwell; spring, D. Moore.
For description, see ENGL 275.

[AM ST 291] American 1920s: Literature and Culture (also English 291)

[AM ST 302] Social Movements in American Politics (also Government 302)
Fall. 4 credits. E. Sanders.
For description, see GOVT 302.

[AM ST 304] American Culture in Historical Perspective (also History 304)

[AM ST 311] Structure of American Political History (also History 311)
Fall. 4 credits. J. Silbey.
For description, see HIST 311.

[AM ST 312] Structure of American Political History (also History 312)
Spring. 4 credits. J. Silbey.
For description, see HIST 312.

[AM ST 316] The American Presidency (also Government 316)
Spring. 4 credits. E. Sanders.
For description, see GOVT 316.

[AM ST 320] Understanding Work in America 1800–1990 (also History 320)
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 will be the effects of technological change, its impact on the experience of work across numerous occupational categories, and the changing perceptions of work as reflected in contemporary cultural expression, literature, and commentary across the century.

[AM ST 324] Varieties of American Dissent, 1880–1980 (also History 324)
Fall. 4 credits. N. Salvatore.
The idea of dissent in American society raises a variety of images. Civil rights activists, striking workers, and student radicals of the 1960s are familiar enough symbols of dissent. But might we understand a Pentecostal believer, filled with the spirit of his or her God in critiquing contemporary society, as an example of American dissent? This course will explore the varieties of economic, political, and cultural dissent in America between 1880 and 1990, and will examine how understanding dissent in its specific historical context illuminates major aspects of American life and culture.

[AM ST 330] The Age of Jackson, 1815–1850 (also History 330)

[AM ST 331] American Civil War and Reconstruction, 1860–1877 (also History 331)

[AM ST 332] The Urbanization of American Society: 1600 to 1860 (also History 332)

[AM ST 333] The Urbanization of American Society: 1860 to 2000 (also History 333)

[AM ST 336] The American Ethos of Entrepreneurialism: Capitalism and Society in Developing America, 1607–1877 (also History 336)

[AM ST 337] Entrepreneurialism and Organization in the Age of the Corporation: Capitalism and Society in Modern America, 1840–2000 (also History 337)

[AM ST 345] Intellectual/Cultural Life of Nineteenth-Century Americans (also History 345 and Religious Studies 345)
Fall. 4 credits. R. L. Moore.
For description, see HIST 345.

[AM ST 346] Modernization of the American Mind (also History 346)
Spring. 4 credits. R. L. Moore.
For description, see HIST 346.

[AM ST 359] American Families in Historical Perspective (also Human Development and Family Studies 359, Women Studies 357, and History 359)

[AM ST 360] Painting and Everyday Life in Nineteenth-Century America (also History of Art 360)

[AM ST 361] Early American Literature (also English 361)
Fall. 4 credits. S. Samuels.
For description, see ENGL 361.

[AM ST 362] The American Renaissance (also English 362)
Spring. 4 credits. J. Porte.
For description, see ENGL 362.

[AM ST 366] The Nineteenth-Century American Novel (also English 366)

[AM ST 367] The Modern American Novel (also English 367)

[AM ST 369] Survey of African American Literature to 1917 (also English 375)
Fall. 4 credits. J. Goldsby.
For description, see ENGL 375.

[AM ST 371] American Poetry to 1950 (also English 371)

[AM ST 374] 19th-Century American Women Writers (also English 374 and Women's Studies 374)
Spring. 4 credits. B. Maxwell.
For description, see ENGL 374.

[AM ST 378] American Political Thought from Madison to Malcolm X (also Government 366)

[AM ST 392] Asian American Literature (also English 392 and Asian American Studies 392)
Fall. 4 credits. S. Wong.
For description, see ENGL 392.

[AM ST 394] Topics in American Indian Literature: Native Cultural Studies (also English 394)
Spring. 4 credits. D. Moore.
For description, see ENGL 394.

[AM ST 398] Independent Research
Fall and spring. 1–4 credits. By permission only. J. Porte.
This is a course of individualized research for junior or senior students. Topics, readings, and writing requirements will be designed through consultation between the student and the instructor.
AM ST 399 Readings in American Studies
Fall and spring. 1-4 credits. By permission only. J. Porte.
This is a course of individualized readings for junior or senior students. Topics, readings, and writing requirements will be designed through consultation between the student and the instructor.

AM ST 411 Seminar: American Political History [also History 411]
4 credits. Not offered 1997-98.

AM ST 417 History of Female Adolescence [also Human Development and Family Studies 417; Women Studies 410 and History 458]
Spring. 3 credits. J. Brumberg.
For description, see HDFS 417.

AM ST 419 Seminar in American Social History [also History 419]
Spring. 4 credits. N. Salvatore.
For description, see HIST 419.

AM ST 421 Cultural Taste Levels in Historical Perspective [also History 421]
4 credits. Prerequisite: permission of instructor. Not offered 1997-98.

AM ST 431 Cultural Taste Levels in the American Civil War (also History 431)
Fall. 4 credits. J. Porte.
For description, see HIST 431.

AM ST 465 Proseminar in American Studies [also English 465]
Spring. 4 credits. J. Porte.
Selected topics in American history, literature, the arts, politics, and popular culture. Recommended for American Studies majors.

AM ST 467 Studies in American Fiction: 1870-1915 [also English 467]
Fall. 4 credits. J. Porte.
For description, see ENGL 467.

AM ST 471 American Indian Women's Literature [also English 471]
Fall. 4 credits. K. Shanley.
For description, see ENGL 471.

AM ST 479 Jewish-American Writing [also English 479 and Jewish Studies 478]
4 credits. Not offered 1997-98.

AM ST 485 American Modernist Writing [also English 485]
4 credits. Not offered 1997-98.

AM ST 492 Honors Seminar II, Writing the Civil War [also English 492]
Spring. 4 credits. Permission by instructor. S. Samuels.
For description, see ENGL 492.

AM ST 493-494 Honors Essay Tutorial 493, Fall; 494, Spring. Up to 4 credits each semester. See J. Porte for appropriate advisers.

AM ST 500 Research Seminar in American Studies [also History 500]
Fall or spring. Offered in Cornell-in-Washington Program only. J. H. Silbey and others.
For description, see HIST 500.

AM ST 521 Seminar in American Cultural Studies [also History 521]
4 credits. Not offered 1997-98.

AM ST 665 American Political Thought [also Government 665]
4 credits. Not offered 1997-98.

Center for Applied Mathematics
The Center for Applied Mathematics administers a broadly based interdisciplinary graduate program that provides opportunities for study and research over a wide range of the mathematical sciences. This program is based on a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of 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."

Archaeology Program

Archaeology is an interdisciplinary field at Cornell, which is one of the few universities in the United States to offer a separate archaeology major. 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 initial course will not be counted toward the major requirements.

Because the major draws on the teaching and research interests of faculty from many departments to present a broad view of the archaeological process, interested students should discuss their course of study with a participating faculty member as early as possible. In some areas of specialization, intensive language training should be coordinated with other studies as early as the freshman year.

Once admitted to the major, students must take an additional 32 credits from the courses listed below, selected in consultation with a major adviser of their choosing. These courses should provide exposure to a broad range of archaeologically known cultures and the methods of revealing and interpreting them. Sixteen of the credit hours should be at the 300 level or above. At least two courses must be taken from each of categories B-E.

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 in geology are also recommended.

Honor.
Honors in archaeology is awarded on the basis of the quality of an honors essay and the student's overall academic record. Prospective honors students should have a 3.5 grade point 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 in consultation with a faculty adviser during the senior year; students may enroll in Archaeology 481, fall, 492, 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, at least three of which must be basic courses, or (2) five courses from categories B-D, at least four of which must be basic courses. Concentrators are encouraged to gain some fieldwork experience. They are eligible on the same basis as majors for Hirsch Scholarships in support of fieldwork.

Freshman Writing Seminars
For course descriptions, see the freshman writing seminar brochure.

A. Introductory Courses and Independent Study Courses

ARKEO 100 Introduction to Archaeology
Spring. 3 credits. Staff.
A broad introduction to archaeology—the study of material remains to answer questions about the human past. Case studies illustrate current methods and interpretive frameworks. Guest lectures by members of the Cornell Archaeology Program are an integral part of the course.

ARKEO 300 Individual Study in Archaeology and Related Fields
Fall and spring. Credit to be arranged. Prerequisite: Archaeology 100 or permission of instructor.
Students pursue topics of particular interest with the guidance of a faculty member.
ARKEO 481-482 Honors Thesis
481. Fall, 482. Spring. S-U only. Prerequisite: admission to Honors Program. The student, under faculty direction, will prepare 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. 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.

B. Theory and Interdisciplinary Approaches

ARKEO 202 Interpretive Archaeology
(also Anthropology 202) #
Fall. 3 credits. Basic. Limited to 50 students. For description, see ANTHR 202.

ARKEO 203 Early Peoples: The Archaeological and Fossil Record
(also Anthropology 203)

ARKEO 317 Stone Age Archaeology
(also Anthropology 317)
Fall. 4 credits. T. P. Volman.
For description, see ANTHR 317.

ARKEO 409 Approaches to Archaeology
(also Archaeology 609 and Anthropology 409/609)
For description, see ANTHR 409.

ARKEO 494 Seminar in Archaeology:
The Archaeology of Human Origins
(also Anthropology 494) @ #
Spring. 4 credits. T. P. Volman.
For description, see ANTHR 494.

[LA 261 Urban Archaeology
(also CRP 261)
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.

C. Old World Archaeology

ARKEO 221 Minoan-Mycenaean Art and Architecture
(also Classics 221 and History of Art 221) #
For description, see CLASS 221.

ARKEO 233 Archaeology in Action II
(also History of Art 225 and Classics 233) #
Spring. 3 credits. Prerequisite: permission of instructor. Not offered spring 1998. P. I. Kuniholm.

ARKEO 262 Laboratory in Landscape Archaeology
(also Landscape Architecture 262)
For description, see LA 262.

ARKEO 263 Introduction to Biblical History and Archaeology
(also NES 263, Jewish Studies 263, and Religious Studies 264) # @
Fall. 3 credits. J. Zorn.
For description, see NES 263.

ARKEO 275 Ancient Seafaring
(also Near Eastern Studies 261) # @
For description, see CLASS 275.

ARKEO 351 The City of Rome
(also Classics 351 and History of Art 321) #
Fall. 3 credits. M. Landon.
For description, see CLASS 351.

ARKEO 360 Introduction to the Arts of China
(also History of Art 360) # @
Fall. 4 credits. S. Oertling.
For description, see ART H 360.

ARKEO 417 Early Medieval Archaeology and Literature
(also Archaeology 617; English 417 and 617)
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 1997-98; next offered 1998-99. R. T. Farrell.
For description, see ENGL 417.

ARKEO 425 Seminar on the Bronze Age Architecture of Asia Minor
(also Art History 425 and Classics 430)
4 credits. Prerequisite: permission of instructor. Not offered 1997-98. P. I. Kuniholm.

ARKEO 432 Sardis and the Cities of Asia Minor
(History of Art 424 and Classics 432) #
4 credits. Prerequisite: permission of instructor. Not offered 1997-98. A. Ramage.

ARKEO 434 The Rise of Classical Greece
(also History of Art 434 and Classics 434-434) #
Spring. 4 credits. Recommended. Classics 220 or 221 or History of Art 220 or 221, or permission of instructor. P. I. Kuniholm.
For description, see ART H 434.

ARKEO 435 Seminar on Roman Art and Archaeology
(also Classics 435 and History of Art 427) #
Spring. 4 credits. Prerequisite: permission of instructor. A. Ramage.
For description, see ART H 427.

ARKEO 520 Seminar in Classical Archaeology
(also History of Art 520 and Classics 630)
Fall. 4 credits. P. I. Kuniholm.
For description, see ART H 520.

ARKEO 617 Early Medieval Archaeology and Literature
(also Archaeology 417; English 417 and 617)
For description, see ENGL 417.

ARKEO 628 The Prehistoric Aegean
(also Classics 629) #
4 credits. For graduate students, and advanced undergraduates with permission of instructor. Not offered 1997-98; next offered spring 1999. J. E. Coleman.
For description, see CLASS 628.

CLASS 220 Introduction to Art History:
The Classical World
(also History of Art 220) #
Fall. 4 credits. A. Ramage.
For description, see ART H 220.

CLASS 322 Greeks and Their Neighbors
(also History of Art 328) #
4 credits. Prerequisite: Classics 200 or 221, or permission of instructor. Not offered 1997-98; next offered 1998-99. J. E. Coleman.
For description, see CLASS 322.

CLASS 326 Greek Cities and Towns
(also History of Art 326) #
For description, see CLASS 326.

CLASS 329 Greek Sculpture
(also History of Art 329) #
For description, see CLASS 329.

CLASS 333 Greek and Roman Mystery Cults and Early Christianity
(also Religious Studies 333) #
For description, see CLASS 333.

ART H 322 Arts of the Roman Empire
(also Classics 350) #
For description, see ART H 322.

ART H 325 Greek Vase Painting
(also Classics 325) #
Spring. 4 credits. A. Ramage.
For description, see ART H 325.

ART H 327 Greek and Roman Coins
(also Classics 327) #
Fall. 4 credits. A. Ramage.
For description, see ART H 327.

[NES 367 History and Archaeology of Ancient Egypt @ #

B. New World Archaeology

ARKEO 355 Ancient Mexico and Central America
(also Anthropology 355) # @
For description, see ANTHR 355.

ARKEO 403 Seminar in Archaeology
(also Anthropology 403) @ #
Fall. 4 credits. Not offered 1997-98.

[ANTHR 456 Mesoamerican Religion, Science, and History @ #
Fall. 4 credits. Not offered 1997-98.]

LA 360 Pre-Industrial Cities and Towns of North America
(also CRP 360)
Fall. 3 credits. S. Baugher.
For description, see LA 360.
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 America. The course of study stresses developments within the United States, but also underscores the transnational and comparative aspects 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 fifteen (15) units of credits as follows: (a) AAS 110 and two (2) additional courses in Asian American Studies; (b) one (1) course in African, American Indian, Latino Studies, or Women’s Studies; and (c) one (1) course in East Asian, South Asian, or Southeast Asian Studies. 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 twenty-five undergraduate student organizations of the Cornell Asian Pacific Student Union and the graduate student Asian Pacific Graduate Association. It also holds a modest print collection of books, periodicals, and newspapers; a current news clip file; a comprehensive data base of publications on Asian Americans since 1977; and a sizable collection of videotapes 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 exhibitions. 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.

Affiliated Faculty

Gary Y. Okhiro, director, B. Anderson (Government), T. Chakravarti (Human Development), V. P. Kayastha (Kroch Library), J. V. Koschmann (History), L. C. Lee (Human Development), V. Munasinghe (Anthropology), V. Nee (Sociology), G. Okhiro, (History), R. E. Ripple (Economics), N. Sakai (Asian Studies), S. Samuels (English), P. S. Sangren (Anthropology), A. M. Smith (Government), K. W. Tayse (Asian Studies), S. Tien (Gannett Health Center), S. Wong (English), D. Yeh (Vice President Student/ Academic Services).

Courses

AAS 110 Introduction to Asian American Studies

Fall and spring. 3 credits. Interdisciplinary, cross-cultural introduction to Asian American Studies focusing on contemporary issues. Major themes include: identity and stereotypes, gender, family, community, education, migration and labor, and anti-Asianism. Coverage will be given to both Hawaii and the U.S. mainland, and to Asian Indians, Chinese, Filipinos, Hawaiians, Japanese, Koreans, and Southeast Asians.

AAS 213 Asian American History

For description, see HIST 213.

AAS 303 Asians in the Americas: A Comparative Perspective

Fall. 4 credits. The common perception of ethnicity is that is a “natural” and an inevitable consequence of cultural difference. “Asians” overseas, in particular, have won repute as a people who cling tenaciously to their culture and refuse to assimilate into their host societies and cultures. But, who are the “Asians”? On what basis can we label Asians an ethnic group? Although there is a significant Asian presence in the Caribbean, the category “Asian” itself does not exist in the Caribbean. What does this say about the nature of categories that label and demarcate groups of people on the basis of alleged cultural and phenotypical characteristics? This course will examine the dynamics behind group identity, namely ethnicity, by comparing and contrasting the multicultural experience of Asian populations in the Caribbean and the United States. Ethnographic case studies of the East Indian and Chinese experiences in the Caribbean and the Chinese, Korean, Japanese, Filipino, and Indian experiences in the United States.

AAS 350 The Art and Politics of Defining the Self in Media Images

Fall. 4 credits. Spring. 3 credits. Not offered 1997–98. The focus of this course is an exploration of the way films deal with the representation of people of poor within the American experience. Through the analysis of selected films and class discussions we will explore filmic representations of history, culture, class, gender, and identity.

AAS 392 Asian American Literature

For description, see ENGL 392.

AAS 412 Undergraduate Seminar in Asian American History

Spring. 4 credits. Reading and research seminar that will cover various topics in Asian American history. The topic will be the idea of the “yellow peril” in European and American thought.
The Biology and Society major, which involves faculty from throughout the university, is offered by the Department of Science & Technology Studies. Students in the College of Arts and Sciences and the College of Human Ecology are eligible for the major. In addition, students in the College of Agriculture and Life Sciences can develop an approved sequence of courses from the Biology and Society curriculum under general studies. The major is coordinated for students by the Biology and Society office. Students can get information, specific course requirements, and application procedures for the major from the undergraduate records office in 275 Clark Hall, 255–6047.

Because the major is multidisciplinary, students must attain a basic understanding of the several disciplines it comprises. The curriculum includes courses in ethics; mathematics; statistics; history, philosophy, and social studies of science and biology; and basic biology (e.g., genetics and development; biochemistry and molecular-cell biology; ecology; evolutionary biology) as well as integrative courses offered through Biology and Society. In addition, majors are required to take a core course and must develop a theme: an intellectually coherent grouping of courses representative of their special interest in Biology and Society. Recommended themes in the Biology and Society major include biology, behavior, and society; biology, and humanities; population; biology and public policy; environment and society; food agriculture, and society; and health and society. Students may also develop their own individually tailored themes (which in recent years have included topics such as biotechnology and society, and agriculture, environment, and society). In consultation with their faculty advisor, students select courses that meet the foundation and core course requirements so as to build a coherent theme. Sample curricula for the recommended themes and for several student-developed themes are available in the Biology and Society office.

There are student advisers and faculty available (according to posted office hours or by appointment) in the Biology and Society offices, 275 Clark Hall or 279 Clark Hall, to answer questions and to provide assistance.

Admission to the Major
All students should have completed a year of college-level biology and submit 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. The application includes (1) a one-page statement explaining the student's intellectual interests in the Biology and 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 and Society requirements, including courses 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. Sophomore year is 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 on 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 in the first semester. Human Ecology students should also consult the current Human Ecology Guide and meet with the college advising coordinator, Kay Obendorf, 202 Martha Van Rensselaer Hall, 255–3151.

Major Requirements

1) Basic courses
A. Biological sciences 101–104 or 105–106 or 107–108 (prerequisite for admission to Biology and Society)

B. College calculus (one course)* Math 106, 111, 112 or any other higher level calculus

Recommended but not required:
- General chemistry (one year sequence)
- Biochemistry and other chemistry courses:
  - Chemistry 103–104, 207–208, or 215–216

2) Foundation Courses (should be completed by end of junior year)
A. Ethics: One course; B&SOC 205 (also S&TS 205) or B&SOC 206 (also S&TS 206)

B. Social sciences/humanities foundation:
  - Two courses; one from any of the following subject areas: History of Science; Philosophy of Science; Sociology of Science; Politics of Science; and Science Communication*

C. Biology foundation (Breath requirement):
  - Three courses; one from each of the following subject areas:
    - Ecology (BIO ES 261); Evolutionary Biology (BIO ES 278); Biochemistry, Molecular and Cell Biology (BIO BM 251 or 350 or 351 or 353); Microbiology (BIO BM 290); Genetics and Development (BIO GD 281 or 282 or Plant Breeding 225); Neurobiology and Behavior (BIO NB 221 or 222); Botany (BIO PL 241); and Anatomy and Physiology (BIO AF 311 or NS 341 but NOT BIO AF 212)

D. Biology foundation (Depth requirement):
  - One biology course for which one of the above (B.C.) is a prerequisite

E. Statistics: One course selected from BTRY 200, ILR 210, BTRY 215, AG EC 310, EDUC 353, Soc 301, Psych 350, Econ 319, ORIE 370, BTRY 601, CRP 326

3) Core Course: (one course). Should be completed by end of junior year
B&Soc 301 Biology and Society: The Social Construction of Life (also S&TS 401); or Phil 286 Science and Human Nature (also S&TS 286)

4) Theme (five courses that correspond to the theme selected by the student). These courses must be above the 200- level, at least 3 credit hours and taken for a letter grade)
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, BIOTECHNOLOGY, FOOD, HPDS, NS, NTRES, PL BR, PL PA, PSYCH, VTMED.

B. Humanities/social sciences electives** (Two courses. Courses from the list of Senior Seminars may be used as theme electives if not used to meet another requirement).

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, and 4.C), a minimum of two social science courses and two humanities courses must be chosen. History of science and philosophy of science courses may be counted toward the humanities requirement for the major.

** Independent Study

Projects under the direction of a biology and 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 Biology and Society 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 and Society office, 275 Clark 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 and 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 who participate in the program should find the experience intellectually stimulating and rewarding whether or not they intend to pursue a research career.

Biology and Society majors are considered for entry into the honors program at the end of the spring semester before their senior year. Application forms for the honors program are available in the Biology and Society office, 275 Clark Hall. The honors program is available to Biology and Society majors from the College of Arts and Sciences. Biology and 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 and Society honors project, students must have an overall Cornell cumulative grade-point average not lower than 3.50, have formulated a research topic, and have found a project supervisor (with a Cornell appoint-

HIST 282 Science in Western Civilization (also Science and Technology Studies 282)
Spring. 4 credits. P. Dear.
For description, see HIST 282.

[S&TS 233 Agriculture, History, and Society: From Squanto to Biotechnology
Fall. 4 credits. Not offered 1997-98. M. Rossiter.]

[S&TS 332 From Hippocrates to HMO’s: An Introduction to the History of Medicine
Summer. 4 credits. J. Harkness.

S&T 355 Computers: From Babbage to Gates
Fall. 4 credits. M. Dennis.

S&T 390 Science in the American Polity: 1800-1960 (also GOVT 308)
Fall. 4 credits. M. Dennis.
For description, see S&TS 390.

S&T 433 Comparative History of Science
Spring. 4 credits. M. Rossiter.

S&T 444 Historical Issues of Gender and Science (also Women’s Studies 444)
Fall. 4 credits. M. Rossiter.
For description, see S&T 444.

2. Philosophy of Science

PHIL 286 Science and Human Nature (also Science and Technology Studies 286)
Spring. 4 credits. May be used to meet the philosophy of science requirement if not used to meet the core course requirement.
For description, see PHIL 286.

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also Science and Technology Studies 381)
Fall. 4 credits. Limited to 30 students. R. Boyd.
For description, see PHIL 381.

3. Sociology of Science

B&SOC 301 Biology and Society: The Social Construction of Life (also Science and Technology Studies 401)
Fall. 4 credits. Prerequisite: two semesters of social science or humanities and one year of introductory biology. Limited to 75 students. May be used to meet the sociology of science requirement if not used to meet the core course requirement. C. Cussins.
See Core Courses for description.

B&SOC 342 Sociology of Science (also Science and Technology Studies 442 and City and Regional Planning 442)
For description, see S&TS 442.

HSS 246 Major Determinants of Human Behavior (also PAM 201)
Fall. 3 credits.

[R SOC 208 Technology and Society
Fall. 3 credits. Not offered 1997-98.]

[SO 434 The Sociology of Reproduction (also Women’s Studies 435)
Spring. 4 credits. Not offered 1997-98.
For description, see SOC 434.]
BIOBM 330 Principles of Biochemistry, Individual Instruction
Fall or spring. 4 credits.

BIOBM 331 Principles of Biochemistry, Lectures
Fall. 4 credits. (2 credits if taken after Biological Sciences 231.)

NS 262 The Cell and the External World
Spring. 3 credits.

2. Ecology

BIOES 261 Ecology and the Environment
Fall. 4 credits.

3. Genetics and Development

BIOGD 281 Genetics
Fall, spring, or summer. 3 credits.

BIOGD 282 Human Genetics
Spring. 3 credits. (2 credits if taken after Biological Sciences 281.)

PL BR 225 Plant Genetics
Spring. 4 credits. Offered alternate years.

4. Evolutionary Biology

BIOES 278 Evolutionary Biology
Spring. 4 credits.

5. Microbiology

BIOMI 290 General Microbiology
Lectures
Fall, spring, or summer. 3 credits.
Prerequisites: BIOMI 101-102 and 103-104 and CHEM 104 or 208, or equivalent.
Recommended: concurrent registration in BIOMI 291.

6. Neurobiology and Behavior

BIONB 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits (4 credits with discussion and written projects). Not open to freshmen.

BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits. (4 credits with discussion and written projects). Not open to freshmen. Limited to 20 students.

7. Botany

BIOPL 241 Introductory Botany
Fall. 3 credits. Prerequisite: one year of introductory biology or permission of instructor.

8. Physiology and Anatomy

BIOAP 214 Biological Basis of Sex Differences
Fall. 3 credits. Not offered 1997-98.

BTRY 215 Introduction to Statistical Methods
Fall. 3 credits.

BTRY 601 Statistical Methods I
Fall. 4 credits.

CRP 320 Introduction to Statistical Reasoning for Urban and Regional Analysis
Fall. 3 credits.

ECON 319 Introduction to Statistics and Probability
Fall or summer. 4 credits. Prerequisites: Economics 101-102 and Mathematics 111-112.

ILRST 210 Statistics: Statistical Reasoning
Fall and spring. 4 credits.

PSYCH 350 Statistics and Research Design
Fall. 4 credits.

SOC 301 Evaluating Statistical Evidence
Fall. 4 credits.

III. Core Courses

B&SOC 301 Biology and Society: The Social Construction of Life (also Science and Technology Studies 401)
Fall. 4 credits. Prerequisite: two semesters of social science or humanities and one year of introductory biology or permission of instructor. Limited to 75 students. C. Cussins. 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.

PHIL 286 Science and Human Nature (also Science and Technology Studies 286)
Spring. 4 credits.

For description, see PHIL 286.

IV. Themes

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 intro biology as a prerequisite from: ALS, AN SC, BIOSCI, ENTO, FOOD, HDFS, NS, NTRES, PL BR, PL PA, PSYCH, VTMED.

ASTRO 202 Our Home in the Solar System
Spring. 3 credits.

[BIOAP 214 Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214)]
Fall. 3 credits. Not offered 1997-98.

For description, see BIOAP 214.]
[BIOES 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)] Fall. 3 credits. Offered alternate years. Not offered 1997-98.

BIOPL 247 Ethnobiology Fall. 3 credits.

[HDFS 347 Human Growth and Development: Biological and Behavioral Interactions (also Biology and Society 347 and Nutritional Sciences 347)] Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and Human Development and Family Studies 115 or Psychology 101. Offered alternate years. Not offered 1997-98.

HDFS 370 Experimental Psychopathology Spring. 3 credits.

NS 222 Maternal and Child Nutrition Spring. 3 credits.

NS 361 Biology of Normal and Abnormal Behavior (also Psychology 361) Fall. 3 credits. For description, see NS 361.

NTRES 201 Environmental Conservation Spring. 3 credits.

Examples of biology electives

AN SCI 300 Animal Reproduction and Development Spring. 3 credits.


NS 331 Physiological and Biochemical Bases of Human Nutrition Spring. 3 credits.

B. Humanities/Social Science elective (two courses)

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

Examples of social science electives

ARME 464 Economics of Agricultural Development Spring. 3 credits.

ANTHRO 211 Nature and Culture Spring. 3 credits.

[BIOES 673 Human Evolution: Concepts, History, and Theory (also Anthropology 673)] Fall. 3 credits. Not offered 1997-98. For description, see BIOES 673.

CRP 480 Environmental Politics Spring. 4 credits.

CRP 451/551 Environmental Law Fall. 4 credits.

[HDFS 241 History of Childhood in the United States Spring. 3 credits. Not offered 1997-98.]

[HDFS 258 The Historical Development of Women as Professionals, 1800 to the Present (also Women’s Studies 238 and History 230) Fall. 3 credits. Limited to 120 students. Not offered 1997-98.]

HSS 315 Human Sexuality Spring. 3 credits.

HSS 325 Health Care Services and the Consumer Fall. 3 credits. Offered alternate years.

HSS 330 Ecology and Epidemiology of Health Spring. 3 credits.

HSS 335 Contemporary Issues in Women’s Health Fall. 3 credits.

HSS 634 Health Care Organization—Providers and Reimbursement Fall. 3 credits.

HSS 688 Long-Term Care and the Aged: Alternative Health and Social Services Delivery Systems Spring. 3 credits.

NS 245 Social Science Perspectives on Human Nutrition Fall. 3 credits.

NS 457 National and International Food Economics (also Economics 374) Spring. 3 credits.

NTRES 400 International Environmental Issues Fall. 4 credits.

PSYCH 326 Evolution of Human Behavior Fall. 4 credits.

R SOC 201 Population Dynamics (also Sociology 205) Spring. 3 credits.

R SOC 205 Rural Sociology and International Development Spring. 3 credits.

R SOC 324 Environment and Society Spring. 3 credits.

[R SOC 490 Society and Survival Fall. 3 credits. Not offered 1997-98.]

Examples of humanities electives

NTRES 407 Religion, Ethics, and the Environment Spring. 4 credits.

PHIL 241 Ethics (by petition for breadth requirement) Spring. 4 credits.

PHIL 368 Global Climate and Global Justice (also Government 468) Fall. 4 credits.

[PHIL 681 Philosophy of Science (also Science & Technology Studies 681) Spring. 4 credits. Not offered 1997-98. For description, see PHIL 681.]

[S&T&S 626 Workshop on Law, Science, and Technology (also GOVT 626) Spring. 4 credits. Enrollment limited. Permission of the instructor required. Not offered 1997-98.]

C. Senior Seminars

BIO G 467 Seminar in the History of Biology (also Biology & Society 447, History 415, and Science & Technology Studies 447) Summer. 4 credits. For description, see BIO G 467.

BIO G 469 Food, Agriculture, and Society (also Biology & Society 469 and Science & Technology Studies 469) Spring. 3 credits. For description, see BioG 469.

BIOES 661 Environmental Policy (also Biology & Society 461 and Agriculture and Life Sciences 661) Fall, spring. 6 credits. For description, see BIOES 661.

[CEH 444 Housing for the Elderly: A Service Learning Experience Spring. 3 credits. Not offered 1997-98.]


[HDFS 470 Advanced Experimental Psychopathology Fall. 3 credits. Not offered 1997-98.]

HDFS 473 Schizophrenia Fall. 3 credits. Permission of instructor required.

[HDFS 610 Processes in Human Development Spring. 3 credits. Not offered 1997-98.]

HDFS 660 Social Development Spring. 3 credits. Permission of instructor required for undergraduates.

[HDFS 685 Seminar on “Critical Issues in Human Development: Research and Reality Spring. 3 credits. Not offered 1997-98. Permission of instructor required for undergraduates.”]

HSS 335 Contemporary Issues in Women’s Health Fall. 3 credits.

HSS 625 Health Care Services: Consumer and Ethical Perspectives Fall. 3-4 credits. Permission of instructor required. If using this course as a senior seminar, B&SOC majors must take it for 4 credits by writing a major paper. Enrollment limited—preference given to HSS students.

HSS 631 Managed Health Delivery Systems: Primary-Ambulatory Care Spring. 3 credits.

NS 349 Geriatric Nutrition Fall. 3 credits.

NS 421 Nutrition and Exercise Spring. 2-3 credits.

[R SOC 408 Human Fertility in Developing Nations (also Biology & Society 404)] Spring. 3 credits. Not offered 1997-98. For description, see R SOC 408.

[R SOC 418 Population Policy (also Biology & Society 414)] Spring. 3 credits. Not offered 1997-98. For description, see R SOC 418.]
write an honors thesis. The project must begin during the first semester. At the end of the first semester, 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. Students who do not complete the honors 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 and Society office, 275 Clark Hall.

Cognitive Studies Program

J. Halpem (computer science), B. Lust (human development and family studies, modern languages and linguistics), codirectors. C. Cardie, R. Constable, B. Donald, J. Halpem, D. Huttenlocher, R. Rubinfeld, R. Zabih (computer science); A. Hedge (design and environmental analysis); J. Dunn, J. Novak, R. Ripple, D. Schrader (education); R. Canfield, S. Ceci, B. Koslowski, B. Lust, M. Potts, S. Rossiter, G. Suci, E. Wethington (human development and family studies); J. Russo (Johnson Graduate School of Management), J. Bowers, A. Cohn, M. Diesing, J. Hair, W. Harbert, H. Hodes, B. Lust, J. Novak, R. Ripple, D. Schrader (education); J. Halpem (computer science), B. Lust (human development and family studies); J. Russo (Johnson Graduate School of Management), J. Bowers, A. Cohn, M. Diesing, J. Hair, W. Harbert, H. Hodes, B. Lust, J. Novak, R. Ripple, D. Schrader (education).

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 as represented by an individual department. It is considered crucial that students gain a strong background in their major, independent of their work in the concentration. The Cognitive Studies Program faculty have designed five structured "tracks" that offer students different ways of satisfying the concentration. In addition, students are always able to construct their own programs of study subject to approval by their concentration adviser. In all cases, however, it is expected that students in the concentration will take Cognitive Studies 101, Cognitive Studies 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). The five tracks are as follows:


Students may take 3–5 credits per semester up to a maximum of 8 credits in B&SOC 499, Honors Project. Students should note that B&SOC 499 is to be taken in addition to those courses that meet the regular major requirements. 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 the first semester, 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. Students who do not complete 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 and Society office, 275 Clark Hall.
cation 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.

The Cognitive Studies in Context track consists of the following required courses:

- COGST 101, Introduction to Cognitive Science
- COGST 201, Cognitive Science in Context
- Laboratory Explorations of Cognitive Science in Ecological Settings.

In addition, three more upper-level approved courses in Cognitive Studies areas will normally be expected. The other four tracks are structured and customized curriculum. In all of the following, COGST 101 and COGST 201 are required and a set of three additional courses would be selected. Please note, many of these courses have substantial prerequisites.

2. Perception and Cognition

This track focuses on psychological, computational, and neurobiological approaches to the interface between perception and cognition. Students will develop a grasp of the continuum between sensory impressions and complex thought.

- COGST 101, Introduction to Cognitive Science
- COGST 201, Cognitive Science in Context
- COM S 462, Robotics and Machine Vision
- BIOND 326, The Visual System
- PSYCH 309, Development of Perception and Representation
- PSYCH 316, Auditory Perception
- PSYCH 418, Psychology of Music
- PSYCH 412, Laboratory in Cognition and Perception
- PSYCH 416, Modeling Perception and Cognition
- PSYCH 419, Neural Networks Laboratory

3. Language and Cognition

This track focuses on the representation, processing, 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, Introduction to Cognitive Science
- COGST 201, Cognitive Science in Context
- COM S 411, Programming Languages and Logic
- LING 203, Introduction to Syntax and Semantics
- LING/PHIL/COGST 270, Truth and Interpretation
- LING 301–302, Phonology I & II

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, Introduction to Cognitive Science
- COM S 211, Computers and Programming
- COM S 212, Structure and Interpretation of Computer Programs
- COM S 472, Foundations of Artificial Intelligence
- COM S 473, Practicum in Artificial Intelligence
- PHIL 262, Philosophy of Mind
- PHIL 362, Philosophy of Mind
- PSYCH 309, Development of Perception and Representation
- PSYCH 311, Introduction to Human Memory
- PSYCH 412, Laboratory in Cognition and Perception
- PSYCH 413, Information Processing: Conscious and Non-conscious
- PSYCH 414, Comparative Cognition
- PSYCH 415, Concepts, Categories, and Word Meanings
- PSYCH 416, Modeling Perception and Cognition
- PSYCH 417, The Origins of Thought and Knowledge

5. Cognitive Neuroscience

This track focuses on neurobiological and computational approaches to understanding how perception and cognition emerge in the human brain. Students will acquire knowledge of what neural structures subserve what perceptual/cognitive processes, and how they interact.

- COGST 101, Introduction to Cognitive Science
- COGST 201, Cognitive Science in Context
- COM S 410, Data Structures
- COM S 401, Programming Languages and Software Engineering
- PSYCH 328, Biopsychology of Learning and Memory
- PSYCH 395, Introduction to Sensory Systems
- PSYCH 416, Modeling Perception and Cognition
- PSYCH 419, Neural Networks Laboratory
- LING 303–304, Syntax I & II
- LING 309–310, Morphology I & II
- LING 319–320, Phonetics I & II
- LING 325, Pragmatics
- LING 350/COGST 270, Representing Language: Knowledge Taught and Untaught
- LING 403, Introduction to Applied Linguistics
- LING 409, Psycholinguistics of Second Language Reading
- LING 421–422, Semantics I & II
- PHIL 332, Philosophy of Language
- PSYCH 215/LING 215, Psychology of Language
- PSYCH 370/LING 370, Language and Cognition
- PSYCH 415, Concepts, Categories, and Word Meanings
- PSYCH 416, Modeling Perception and Cognition
- PSYCH 436/LING 436/HDFS 436, Language Development
- PSYCH 425, Cognitive Neuroscience
- PSYCH 440, The Brain and Sleep

Students in any major of the College of Arts and Sciences are eligible to apply for any of the above versions of the concentration as well as to construct their own. Independent majors and College Scholars may also apply. Students from other colleges may apply, but colleges vary in their procedures for formal recognition of this concentration (contact the Cognitive Studies office for details). To enter the concentration formally, the student should consult with a member of the Cognitive Studies Undergraduate Concentration Committee (see below), who will assist the student with selection of a concentration advisor with expertise in the student's main areas of interest.

In addition to assisting in and approving the student's selection of courses, the concentration advisor serves as a general source of information about the field of cognitive studies, relevant resources around the university, and job and graduate school opportunities. Often, the advisor can help the student develop independent research experience.

A Cognitive Studies undergraduate laboratory and computer facility is available for all students with 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 toward completing the requirements for the concentration will be eligible for enrollment in the Graduate Proseminar in Cognitive Studies during their senior year (COGST 773–774).

Concentration Application Procedures. The selection of courses will be individually tailored according to the student's interests. The Cognitive Studies Program faculty have designed five structured "tracks" (listed above) that offer students different ways of satisfying the concentration. In addition, students are always able to construct their own programs of study subject to approval by their concentration advisor. In all cases, however, it is strongly expected that students in the concentration will take COGST 101, COGST 201, and approved courses at the 400 level.

The student must gain approval for the selection of courses from his or her concentration advisor. 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.

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.
 Initial inquiries concerning the undergraduate concentration should be made to the Cognitive Studies Program coordinator, Sue Wurster, cogst@cornell.edu, 255-6431, who will provide application materials and set up a meeting with a relevant member of the Undergraduate Concentration Committee.

The Committee for Undergraduate Concentration in Cognitive Studies consists of: Ramin Zahib, computer science, 5-8413, 4119C Upson Hall, RDZ@cs.cornell.edu; Draga Zec, linguistics, 5-0728, 217 Morrill Hall, DZ17@cornell.edu; Jason Stanley, philosophy, 5-6601, 216 Goldwin Smith, JCS72@cornell.edu; Beena Khurana, psychology, 5-6434, 222 Uris Hall, BK14@cornell.edu

Graduate Minor
For information, consult the program office (255 Uris Hall, 255-6431, cogst@cornell.edu or the director of graduate studies, Carol Rosen 255-0722, cgr1@cornell.edu).

Courses
Cognitive Studies

COGST 101 Introduction to Cognitive Science (also COM S 101, LING 170, PHIL 191, PSYCH 102)
Fall. 3 credits. M. Spivey-Knowlton. This course surveys the study of how the mind/brain works. We will examine how intelligent information processing can arise from biological and artificial systems. The course draws primarily from five disciplines that make major contributions to cognitive science: philosophy, psychology, neuroscience, linguistics, and computer science. The first part of the course will introduce the roles played by these disciplines in cognitive science. The second part of the course will focus on how each of these disciplines contributes to the study of five topics in cognitive science: language, categorization, memory, vision, and action.

COGST 201 Cognitive Science in Context: Laboratory Explorations of Cognitive Science in Ecological Settings (also PSYCH 201)
Fall or spring. 4 credits. Prerequisites: Introduction to Cognitive Science COGST 101 or written permission of the instructor. Fall: B. Halpem and staff. Spring. D. Field and staff.
A laboratory-oriented course designed to teach the theory and techniques 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. Lecture time is used to present laboratory exercise results, to supplement laboratory topics, and for discussion of primary research papers. State of the art computing, display (visual, auditory, and other perceptual/sensory systems), digital communication, and simulation approaches, including virtual reality models when relevant, are used to apply cognitive science principles and concepts to the analysis, exploration, and direct testing of human-machine interfaces that are intended to permit effective and efficient exchange of information and control of functions or operations. This approach is applied to real-life settings such as fixed and mobile offices, libraries, laboratories, point-of-sale locations, Internet and World Wide Web communications, manufacturing, storage and distribution facilities and systems, on-site maintenance and repair procedures, and personal and group transportation vehicles and systems.

COGST 301 Cognitive Studies in Context: Advanced Laboratory Investigations
Fall or spring. 4 credits. Staff. Designed for students who successfully complete COGST 201. This course offers intensive investigations into one of the topic modules covered in COGST 201. All students must have prior approval from the Cognitive Studies office before registering for this course.

COGST 470 Undergraduate Research in Cognitive Studies
Fall or spring. 1-4 credits. S-U grades optional. Prerequisite: permission of major adviser; written permission of Cognitive Studies faculty member who will supervise the research and assign the grade. Hours to be arranged. Cognitive Studies faculty.
Experience in planning, conducting, and reporting independent laboratory, field, and/or library research in an interdisciplinary area relevant to cognitive studies.

PHIL 270 Truth and Interpretation (also LING 270 and COGST 270)
Spring. 4 credits. J. Stanley and M. Diesing.
In this course, with the use of classic papers in the philosophy of language and linguistics, we will motivate and introduce the basic concepts behind the project of giving a rigorous theory of meaning for natural language. Our goal will be to understand how philosophers and linguists have used concepts such as reference and truth to explain linguistic content. We will also discuss how issues of learnability and language processing raise constraints for this project.

Computer Science

COM S 211 Computers and Programming
Fall or spring. 3 credits.

COM S 212 Structure and Interpretation of Computer Programs
Fall or spring. 4 credits.

COM S 280 Discrete Structures
Fall or spring. 4 credits.

COM S 381 (or 481) Introduction to Theory of Computing
Fall. 3 or 4 credits.

COM S 410 Data Structures
Fall or spring. 4 credits.

COM S 411 Programming Languages and Logics
Fall. 4 credits. Not offered every year.

COM S 462 Robotics and Machine Vision
Spring 1997. 3 credits. Not offered every year.

COM S 463 Robotics and Machine Vision Lab
Spring 1997. 2 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 482 Introduction to Analysis of Algorithms
Spring. 4 credits.

COM S 486 Applied Logic (also Mathematics 486)
Fall or spring. 4 credits.

Education (College of Agriculture and Life Sciences)

EDUC 210 Psychology of Learning and Memory
Fall. 3 credits.

EDUC 212 Psychological Foundations of Education
Spring. 2-3 credits.

EDUC 311 Educational Psychology
Fall. 3 credits.

EDUC 402 Knowing and Learning in Science and Mathematics
Fall. 4 credits.

EDUC 472 Philosophy of Education
Fall. 3 credits.

Human Development and Family Studies (College of Human Ecology)

HDFS 115 Human Development
Fall or summer. 3 credits.

[HDFS 334 The Growth of the Mind
Spring. 4 credits. Not offered 1997-98.]

HDFS 344 Infant Behavior and Development
Fall. 3 credits.

HDFS 347 Human Growth and Development: Biological and Behavioral Interactions
Spring. 3 credits.

HDFS 436 Language Development (also Psychology 436 and Linguistics 436)
Spring. 4 credits.

HDFS 438 Thinking and Reasoning
Fall. 3 credits.

[HDFS 439 Cognitive Development: Infancy through Adolescence
Spring. 3 credits. Not offered 1997-98.]

Linguistics

LING 101 Theory and Practice of Linguistics
Fall, spring or summer. 4 credits.

LING 115 Language and Culture
Spring. 3 credits.

LING 201 Introduction to Phonetics and Phonology
Spring. 4 credits.

LING 203 Introduction to Syntax and Semantics
Fall. 4 credits.

LING 204 Language, Mind, and Brain
Fall. 4 credits. Not offered 1997-98.

LING 301-302 Phonology I, II
Fall and spring. 4 credits each term.

LING 303-304 Syntax I, II
Fall and spring. 4 credits each term.

LING 309 Morphology I
Spring. 4 credits.

LING 310 Morphology II
Fall. 4 credits. Not offered 1997-98.
LING 319-320  Phonetics I, II
Fall. 4 credits each term.

[LING 325  Pragmatics
Spring. 4 credits. Not offered 1997-98.]
[LING 334  Non-Linear Syntax
Fall. 4 credits. Not offered 1997-98.]
LING 350  Representing Language: Knowledge Taught and Untaught
(also COGST 350)
Fall. 4 credits.

[LING 370  Language and Cognition (also Psychology 370)
Spring. 4 credits. Not offered 1997-98.]
[LING 400  Semiotics and Language (also Comparative Literature 410)
Spring. 4 credits. Not offered 1997-98.]
LING 401  Approaches to Language Typology I
Fall. 4 credits.
LING 402  Approaches to Language Typology II
Spring. 4 credits.
LING 421-422  Semantics I, II
Fall and spring. 4 credits each term.
LING 436  Language Development (also Psychology 436 and HDFS 436)
Spring. 4 credits.

[LING 450  Mathematical Methods for Linguistics
Fall. 4 credits. Not offered 1997-98.]

Mathematics

[MATH 481  Mathematical Logic (also Philosophy 431)
Spring. 4 credits. Not offered 1997-98.]
MATH 483  Intensional Logics and Alternatives to Classical Logics
(also Philosophy 436)
Fall. 4 credits.
MATH 486  Applied Logic (also Computer Science 486)
Spring. 4 credits.

Neurobiology and Behavior (Division of Biological Sciences)

BIONB 221  Neurobiology and Behavior I: Introduction to Behavior
Fall. 3, 4, or 5 credits.
BIONB 222  Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits.
BIONB 326  The Visual System
Spring. 4 credits.
BIONB 329  Biopsychology of Learning and Memory (also Psychology 332)
Spring. 3 credits.
BIONB 396  Introduction to Sensory Systems (also Psychology 396)
Spring. 3 or 4 credits.
BIONB 421  Effects of Aging on Sensory and Perceptual Systems (also PSYCH 431 and 631)
Fall. 3 or 4 credits.
BIONB 424  Neuroethology (also Psychology 424)
Spring. 3 credits.
BIONB 492  Sensory Function (also Psychology 492)
Spring. 3 or 4 credits.

[BIONB 496  Bioacoustic Signals in Animals and Man
Spring. 3 credits. Not offered 1997-98.]

Philosophy

PHIL 231  Introduction to Formal Logic
Fall. 4 credits.
PHIL 261  Knowledge and Reality
Spring. 4 credits.
PHIL 262  Philosophy of Mind
Fall. 4 credits.
PHIL 286  Science and Human Nature
(also Science and Technology Studies 286)
Spring. 4 credits.
PHIL 318  Twentieth-Century Philosophy
Spring. 4 credits.
PHIL 331  Formal Logic
Spring. 4 credits.
PHIL 332  Philosophy of Language
Fall. 4 credits.
PHIL 361  Metaphysics and Epistemology
Fall. 4 credits.
PHIL 381  Philosophy of Science: Knowledge and Objectivity
(also Science and Technology Studies 381)
Fall. 4 credits.

[PHIL 382  Philosophy and Psychology
4 credits. Not offered 1997-98.]
[PHIL 389  Philosophy of Science: Evidence and Explanation
4 credits. Not offered 1997-98.]
[PHIL 431  Deductive Logic (also Mathematics 481)
4 credits. Not offered 1997-98.]
[PHIL 433  Philosophy of Logic
4 credits. Not offered 1997-98.]
PHIL 436  Intensional Logic (also Mathematics 483)
4 credits.

[PHIL 437  Problems in the Philosophy of Language
Spring. 4 credits. Not offered 1997-98.]
PHIL 461  Metaphysics
Spring. 4 credits.

Psychology

PSYCH 205  Perception
Spring. 3 credits.
PSYCH 209  Development
Spring. 4 credits.
PSYCH 214  Issues in Cognitive Psychology
Fall. 3 credits.
PSYCH 215  Psychology of Language
Spring. 3 or 4 credits.
PSYCH 305  Visual Perception
Fall. 4 credits.

[PSYCH 309  Development of Perception and Representation
Fall. 3 credits. Not offered 1997-98.]
[PSYCH 311  Introduction to Human Memory
Spring. 3 credits. Not offered 1997-98.]

PSYCH 316  Auditory Perception
Fall. 3 or 4 credits.
PSYCH 332  Biopsychology of Learning and Memory (BIONB 328)
Spring. 3 credits.
PSYCH 342  Human Perception: Applications to Computer Graphics, Art, and Visual Display
Fall. 3 credits.
PSYCH 361  Biopsychology of Normal and Abnormal Behavior (also Nutritional Sciences 361)
Fall. 3 credits.

[PSYCH 396  Introduction to Sensory Systems (also BIONB 396)]
Spring. 3 or 4 credits. Not offered 1997-98.

PSYCH 412  Laboratory in Cognition and Perception
Spring. 4 credits.
PSYCH 413  Information Processing: Conscious and Non-conscious
Spring. 4 credits.

[PSYCH 414  Comparative Cognition
Spring. 3 credits. Not offered 1997-98.]
PSYCH 415  Concepts, Categories, and Word Meanings
Fall. 4 credits.

[PSYCH 416  Modeling Perception and Cognition
Spring. 3 credits. Not offered 1997-98.]
[PSYCH 417  The Origins of Thought and Knowledge
Fall. 4 credits. Not offered 1997-98.]
PSYCH 418  Psychology of Music
Spring. 3 or 4 credits.

[PSYCH 425  Cognitive Neuroscience
Fall. 4 credits. Not offered 1997-98.]
PSYCH 436  Language Development (also Linguistics 436, HDFS 436 and COGST 436)
Spring. 4 credits.

[PSYCH 492  Sensory Function (also BIONB 492)]
Spring. 3 or 4 credits. Not offered 1997-98.

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’s use of any of these for satisfying the concentration requirements.

COGST 773-774  Proseminar in Cognitive Studies I and II (also Com S 773/774; Ling 773/774; Phil 773/774; Psy 773/774)
Fall. B grade; spring: S-U only. 4 credits. T 1:25-2:40. Staff.
The Cognitive Studies Proseminar consists of two semesters of meetings with the graduate faculty in the field of Cognitive Studies. The proseminar will provide a general introduction to the field of Cognitive Studies including an introduction to each of the major disciplines that comprise the minor: i.e., computer science, linguistics, philosophy, and psychology. In each of these disciplines, faculty from the field will introduce the theoretical and methodological issues that underlie the field.
and its relation to Cognitive Studies; in addition, they will introduce various lab students in which active research is being conducted in their field at Cornell.

The proseminar will include suggestions from faculty in each field for further advanced interdisciplinary research that can be pursued at Cornell during a Cognitive Studies minor. It will conclude (end of second term) with individual student presentations in which students initiate a critique of some interdisciplinary research, after consultation with a faculty member of their choice.

Although suitable to entering graduate students, the proseminar is also open to graduate students beyond their first year. Advanced undergraduates with a Cognitive Studies concentration may also be admitted. This is a year-long lecture and discussion course. The year-long commitment is mandatory. An "R" grade will be assigned in the fall semester, and an S-U grade will only be assigned in the spring semester.

**COGST 600/700 Graduate Seminars**

**EDUC 614 Epistemological Development and Reflective Thought**
Fall. 3 credits.

**EDUC 714 Moral Development and Education**
Spring. 3 credits.

**HDFS 600/700 Graduate Seminars**

**LING 637 Experimental Research for Language Sciences**
Fall. 4 credits. A. Jongman, J. Lantolf.

**LING 700 Graduate Seminars**

**MATH 581 Logic**

**MATH 655 Mathematical Foundations of Computer Modeling and Simulation**

**MATH 684 Recursion Theory**

**MATH 688 Automated Theorem Proving**

**PHIL 700 Graduate Seminars**

**PSYCH 500-700 Graduate Seminars**

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**College Scholar Program**

L. Abel, director, 55 Goldwin Smith Hall, 255–3386.

The College Scholar program is described in the introductory section of Arts and Sciences.

**COLLS 297 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.

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**East Asia Program**

140 Uris Hall


East Asian studies at Cornell is led by thirty-five faculty members from five colleges, who participate in a program of research and teaching on the civilizations and cultures of East Asia. Courses are offered through various departments in most of the humanities and social science disciplines, as well as in the fields of business, regional planning, international and comparative labor relations and rural sociology. Language courses in Mandarin, Cantonese, Korean, and Japanese are offered, 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 major in M.A. or M.A./M.A. degrees in East Asian studies, a dual M.B.A./M.A. degree, or an M.A./Ph.D. degree in a discipline such as agricultural economics, anthropology, city and regional planning, government, history, history of art, linguistics, literature, rural sociology, or sociology. A variety of fellowships, travel grants, awards, and assistantships are available for graduate students concentrating on East Asia.

The formal program of study is enriched by a variety of extracurricular activities, including a Japanese and Chinese language house, film series, career workshops, art exhibits, and numerous lectures, symposia and performances related to East Asia. The Wason Collection in Olin Library is a comprehensive collection of books on East Asia in Western languages, Japanese, Chinese, and Korean. The Mary Rockwell Galleries of the Herbert F. Johnson Museum of Art have an excellent collection of East Asian art.

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**Freshman Writing Seminars**

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, see the John S. Knight Writing Program section, and consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in late October for the spring term.

**Human Biology Program**


Human biology integrates the methods and theories of many disciplines, such as biological anthropology, nutrition, neurobiology, physiology, psychology, demography, ecology, genetics, and paleontology, into a comprehensive study of biological diversity in Homo sapiens. A central focus of this interdisciplinary approach to the study of the human organism is an understanding of evolutionary processes that explain our biological variation through space and time. The program 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 program is of particular relevance to undergraduate students in premedical and prenursing programs, biological anthropology, nutrition, human development, ecology and systematics, 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 related to human evolution and biological diversity.

Human biology is not a major but a curriculum of study that provides majors in various departments with a program for selecting elective courses that deal with the biology of the human species. Students in their junior year may develop a program of study in human biology while majoring in a number of different departmental fields.

**Basic Requirements**

The requirements for a program of study in human biology are designed to ensure sufficient background in physical sciences and mathematics to enable the student to pursue a wide range of interests in the fields of modern biological sciences, anthropology, and fields related to the evolution and physical diversity of the human species. Adjustments may be made in these requirements, depending upon the student’s academic background and affiliation with colleges and schools within the university.

The basic requirements are one year of introductory biology (Biological Sciences 101–105 plus 102–105 or 105–106 or Biological Sciences 107–108 offered during the eight-week Cornell Summer Session); one year of general chemistry (Chemistry 103–104 or 207–208 or 215–216); one year of college mathematics (Mathematics 111–112 or 105–106 or 111–105); one course in genetics (Biological Sciences 281 or 282); one course in biochemistry (Biological Sciences 231, 330 or 331). 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 shall 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 below are representative of the offerings in human biology and are included to assist the student in organizing a curriculum of study. They are

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**SPECIAL PROGRAMS AND INTERDISCIPLINARY STUDIES 543**
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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO AP 214</td>
<td>Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214)</td>
<td>Fall. 3 credits.</td>
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<tr>
<td>BIO AP 311</td>
<td>Introductory Animal Physiology, Lectures (also Veterinary Physiology 346)</td>
<td>Fall. 4 credits.</td>
</tr>
<tr>
<td>BIO AP 319</td>
<td>Animal Physiology Experimentation</td>
<td>Fall. 4 credits.</td>
</tr>
<tr>
<td>BIO AP 458</td>
<td>Mammalian Physiology</td>
<td>Spring. 3 credits.</td>
</tr>
<tr>
<td>BIO ES 274</td>
<td>The Vertebrates: Structure, Function, and Evolution</td>
<td>Spring. 4 credits.</td>
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<tr>
<td>BIO ES 275</td>
<td>The Vertebrates: Structure, Function, and Evolution</td>
<td>Spring. 4 credits.</td>
</tr>
<tr>
<td>BIO ES 278</td>
<td>The Vertebrates: Structure, Function, and Evolution</td>
<td>Spring. 4 credits.</td>
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<tr>
<td>BIO NB 421</td>
<td>Effects of Aging on Sensory and Perceptual Systems (also Psychology 431 and 631)</td>
<td>Fall. 3 or 4 credits.</td>
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<tr>
<td>BIO NB 427</td>
<td>Animal Social Behavior</td>
<td>Fall. 4 credits.</td>
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<tr>
<td>HDFS 344</td>
<td>Infant Behavior and Development</td>
<td>Fall. 3 credits.</td>
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<tr>
<td>HSS 315</td>
<td>Human Sexuality</td>
<td>Spring. 3 credits.</td>
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<tr>
<td>NS 245</td>
<td>Social Science Perspectives of Food and Nutrition</td>
<td>Spring. 3 credits.</td>
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<tr>
<td>NS 247</td>
<td>Human Growth and Development: Biological and Behavioral Interactions (also Human Development and Family Studies 347 and Biology and Society 347)</td>
<td>Spring. 3 credits.</td>
</tr>
<tr>
<td>PSYCH 326</td>
<td>Evolution of Human Behavior</td>
<td>Fall. 4 credits.</td>
</tr>
<tr>
<td>PSYCH 425</td>
<td>Cognitive Neuroscience</td>
<td>Fall. 3 or 4 credits.</td>
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<tr>
<td>R SOC 408</td>
<td>Human Fertility in Developing Nations</td>
<td>Spring. 3 credits.</td>
</tr>
<tr>
<td>R SOC 438</td>
<td>Social Demography</td>
<td>Fall. 3 credits.</td>
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<tr>
<td>ANTHR 101</td>
<td>Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind</td>
<td>Fall. 3 credits.</td>
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<tr>
<td>ANTHR 203</td>
<td>Early People: The Archaeological and Fossil Record (also Archaeology 203)</td>
<td>Spring. 3 credits.</td>
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<tr>
<td>ANTHR 390</td>
<td>Primate Behavior and Ecology</td>
<td>Spring. 4 credits.</td>
</tr>
<tr>
<td>ANTHR 391</td>
<td>The Evolution of the Human Life Cycle</td>
<td>Spring. 3 credits.</td>
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<tr>
<td>BIO G 207</td>
<td>Evolution (also History 287, and Science and Technology Studies 287)</td>
<td>Fall or summer. 3 credits.</td>
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<tr>
<td>BIO ES 261</td>
<td>Ecology and the Environment</td>
<td>Fall or summer. 4 credits.</td>
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<tr>
<td>BIO ES 272</td>
<td>Functional Ecology of Vertebrates</td>
<td>Spring. 4 credits.</td>
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<tr>
<td>BIO ES 275</td>
<td>Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)</td>
<td>Fall. 3 credits.</td>
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<tr>
<td>BIO ES 278</td>
<td>Evolutionary Biology</td>
<td>Fall or spring. 3 or 4 credits.</td>
</tr>
<tr>
<td>BIO ES 371</td>
<td>Human Paleontology (also Anthropology 371)</td>
<td>Fall. 4 credits.</td>
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<tr>
<td>BIO ES 461</td>
<td>Population and Evolutionary Ecology</td>
<td>Spring. 4 credits.</td>
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<tr>
<td>BIO ES 464</td>
<td>Macroevolution</td>
<td>Spring. 4 credits.</td>
</tr>
<tr>
<td>BIO ES 470</td>
<td>Ecological Genetics (also Entomology 470)</td>
<td>Spring. 4 credits.</td>
</tr>
<tr>
<td>BIO ES 471</td>
<td>Mammalogy</td>
<td>Fall. 4 credits.</td>
</tr>
<tr>
<td>BIO GD 481</td>
<td>Population Genetics</td>
<td>Fall. 4 credits.</td>
</tr>
<tr>
<td>BIO GD 482</td>
<td>Human Genetics and Society</td>
<td>Fall. 3 credits.</td>
</tr>
<tr>
<td>BIO GD 484</td>
<td>Molecular Evolution</td>
<td>Spring. 3 credits.</td>
</tr>
<tr>
<td>BIO ES 673</td>
<td>Human Evolution: Concepts, History and Theory (also Anthropology 673)</td>
<td>Fall. 3 credits.</td>
</tr>
<tr>
<td>B&amp;SOC 447</td>
<td>History of Biology-Evolution (also History 447)</td>
<td>Fall. 4 credits.</td>
</tr>
<tr>
<td>HSS 330</td>
<td>Ecology and Epidemiology of Health</td>
<td>Spring. 3 credits.</td>
</tr>
<tr>
<td>NS 306</td>
<td>Nutritional Problems of Developing Nations</td>
<td>Fall. 3 credits.</td>
</tr>
<tr>
<td>PSYCH 326</td>
<td>Evolution of Human Behavior</td>
<td>Fall. 4 credits.</td>
</tr>
<tr>
<td>R SOC 201</td>
<td>Population Dynamics</td>
<td>Spring. 3 credits.</td>
</tr>
<tr>
<td>VET MI 431</td>
<td>Medical Parasitology</td>
<td>Fall. 2 credits.</td>
</tr>
<tr>
<td>VET CS 664</td>
<td>Introduction to Epidemiology</td>
<td>Fall. 3 credits.</td>
</tr>
</tbody>
</table>
Independent Major Program

L. Abel, director, 55 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.

Intensive English Program

305 Morrill Hall

This noncredit, nondegree program provides full-time intensive English language instruction as well as academic, social, and cultural orientation to the United States and its institutions. The aim of the program is for participants to acquire proficiency in the language in order to pursue goals in English for academic, business, professional, or personal purposes.

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 weekly 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.

Students who have gained full admission to or who are already registered in degree-granting programs at Cornell should consult the section "Modern Languages" for information regarding courses in English for Academic Purposes (series ENGLP).

The Intensive English Program is administered by the Department of Modern Languages, Cornell University, Morrill Hall, Ithaca, New York 14853-4701, U.S.A. Information and application materials are available directly from the program by writing to the above address, calling 607-255-4863, or faxing 607-255-7691. Internet e-mail is CUEP@cornell.edu. Web page is http://dml.cornell.edu/languages/IEP/cueip.html.

International Relations Concentration

Matthew Evangelista, director

Integral to international relations is a focus on global issues and processes and an understanding of their impact on particular countries or geographic regions. Cornell's several undergraduate colleges and many departments offer courses that provide a strong grounding in the field as well as an opportunity to study more than 60 languages.

The concentration in international relations provides a curricular structure for undergradu-
The program has grown out of the conviction that Judaic civilization merits its own comprehensive treatment and that proper understanding of any culture is inconceivable without adequate knowledge of the language, literature, and history of the people that created it. Accordingly, the offerings in the field of Jewish languages and literatures have been considerably expanded, and courses in ancient, medieval, and especially modern Jewish history and culture have been added to the program.

It is a broadly based, interdisciplinary program, bringing together faculty from various Cornell departments and colleges. The Program of Jewish Studies supports teaching and research in the many areas of Jewish Studies. It is a secular, academic program, the interests of which are diverse and cross-cultural. The program recognizes its special relationship to teaching and research in classical Judaica and Hebraica pursued by the members of the Department of Near Eastern Studies.

It presently enables students to obtain basic instruction and specialization in the fields of Semitic languages; the Hebrew Bible; medieval and modern Hebrew literature; ancient, medieval, and modern Jewish history; and Holocaust studies. In some of these fields students may take courses on both graduate and undergraduate levels. Faculty throughout the university provide breadth to the program by offering courses in related areas of study.

Courses Offered

JWST 105-106 Elementary Modern Hebrew I and II (also NES 101-102) 105 fall; 106 spring. 6 credits. S. Shoer.

JWST 197 Introduction to Near Eastern Civilization (also NES 197 and RELST 197) # Fall. 3 credits. D. Owen.

JWST 201-202 Intermediate Modern Hebrew I and II (also NES 201-202) 201 fall; 202 spring. 4 credits. N. Scharf.

JWST 223 Introduction to the Bible (also NES 223 and RELST 223) # Spring. 3 credits. C. Baker.

JWST 239 Cultural History of the Jews of Spain (also COMP LIT 239, NES 239, RELST 239 and SPAN LIT 239) # Fall. 4 credits. R. Brann.

JWST 248 Introduction to Classical Jewish History (also RELST 248 and NES 248) # Fall. 3 credits. Staff.

JWST 252 Modern European Jewish History 1798-1948 (also HIST 252) Spring. 4 credits. V. Caron.

Study Abroad

IR Concentrators are strongly 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 study abroad.

All courses used to fulfill the concentration requirements must be taken for a letter grade. Transcripts will reflect successful completion of the requirements for the concentration. In addition, students will receive a special certificate signed by the faculty coordinator of the international relations concentration. Students interested in pursuing the concentration should discuss it with their faculty advisor. To enroll and for further information, contact Christoph Kunkel, Administrative Coordinator, IRC, at the Mario Einaudi Center for International Studies, 170 Uris Hall (255-8943/272-1417/cmke5@cornell.edu) or contact the director, Prof. Mathew Evangelista (Government), (255-8672/mae10@cornell.edu).

Center for International Studies

See Interdisciplinary Centers, Programs, and Studies.

Program of Jewish Studies

D. I. Owen, director (Ancient Near Eastern and Biblical History and Archaeology), L. Adelson (German-Jewish Literature and Culture), C. Baker (Judaism and Christianity in Late Antiquity), R. Brann (Judeo-Arabic Studies), D. Brenner (German-Jewish Literature and Culture), V. Caron (Modern French and European-Jewish History), M. Diesing (Yiddish Language and Linguistics), N. Farman (French Holocaust Literature), P. Hyams (Medieval Jewish History), D. LaCapra (Holocaust Studies), M. Litvak (Modern History of the Middle East), D. Polachek (Holocaust Studies), R. Polenberg (American-Jewish History), J. Porte (American-Jewish Writers), D. S. Powers (Arabic and Islamic Studies), G. Rendsburg (Biblical and Semitic Studies), N. Scharf (Hebrew Language), D. Schwarz (Anglo-Jewish Literature), G. Shapiro (German-Jewish History and Culture), S. Shoer (Hebrew Language), M. Steinberg (German-Jewish History and Culture), Y. Szekely (Judaica Bibliography), 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.
John S. Knight Writing Program

The director of the John S. Knight Writing Program is Jonathan Monroe, associate professor in the Department of Comparative Literature and George Elliott Reed Professor of Writing and Rhetoric. Katherine Gottschalk, senior lecturer in the Department of English, is the Walter C. Teagle Director of Freshman Writing. The program's offices are in 159 Goldwin Smith Hall, 255-4061.

The John S. Knight Writing Program 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 administrators writing seminars for freshmen and upperclass students, tutorial writing classes, and seminars in the teaching of writing. More than thirty academic departments and programs participate in the program.

Advanced Writing Seminars

For upperclass students, the program collaborates with the Department of English in offering English 288-89, "Expository Writing." This course helps students write with more confidence and skill in all disciplines, while provoking inquiry into particular areas of study, forms or uses of writing, or topics intimately related to the written medium. Students may choose among a variety of sections focusing on such themes as "Writing about the Social World," "Writing in the Humanities," "Issues and Audiences," "Understanding the News," and "The Languages of Science."

Freshman Writing Seminars

For freshmen the program offers the freshman writing seminars—more than 125 different courses in the humanities, social sciences, expressive arts, and sciences. Through introductory work in a particular field of study, seminars help students write good English expository prose—prose that, at its best, is characterized by clarity, coherence, intellectual force, and stylistic control. All seminars pursue this common aim through small classes, with a maximum of seventeen students, and adherence to a program-wide set of guidelines:

- Seminars require at least six—and at most twelve—formal writing assignments on different topics, totaling a minimum of thirty pages. (Some of the 30-page total may include major drafts.)
- A minimum of two of the required essays (see above) are developed through several stages of revised drafts under the instructor's guidance so that the revisions stand as substantially improved essays.
- All seminars spend ample classroom time on work directly related to writing.
- Reading assignments in the course subject are kept under 75 pages per week to permit regular, concentrated work on writing.
- All students meet in at least two individual conferences with the instructor.
- Offerings change from semester to semester. Each term's freshman writing seminars are described in a brochure available from college registrars.

To ensure that students will enjoy the benefits of small writing classes, freshman writing seminars are limited to no more than seventeen students. Instead of pre-enrolling in their writing courses, students request placement in one of five writing seminars by filling out ballots available from their college registrars. Over ninety percent receive one of their top three choices. In the fall, students may change their writing seminars at the Freshman Writing Seminar Exchange, and in the spring, students may change their writing seminars at the University Course Exchange. Changes can also be made at special Freshman Writing Seminar add/drop sessions held during the first two weeks of each semester.

The colleges and the school served by the program accept freshman writing seminars in fulfillment of their individual graduation requirements in categories referred to variously as "freshman writing," "oral and written expression," and the like. The program 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 freshman writing seminars. Architecture majors, however, need only one. Hotel students fulfill their require-
ment through Hotel Administration 165, which should be taken with Hotel Administration 265 during the first two semesters at Cornell.

Agriculture and Life Sciences students can take freshman 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 Writing Program or the Department of English is necessary. How these credits may be applied to freshman 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 towards 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 freshman writing seminar, or who score "4" or "5" on the Princeton AP exam, or "700" or better on the English Composition or CEEB tests, may enroll, space permitting, in the following upper-level freshman writing seminars:

- English 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 freshman 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 thirty-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 freshman writing seminar to satisfy part of their writing requirement. The John S. Knight Writing Program must approve all such petitions in advance.

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in late October for the spring term.

Teaching Writing

Each summer and fall, the program offers instruction in the teaching of writing to new staff members in the freshman writing seminars and some other instructors. Teaching Writing I, offered in the summer, is primarily a course for graduate students; the same course is offered in the fall as Teaching Writing II. 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.

Writing Workshop

The John S. Knight Writing Program offers An Introduction to Writing in the University for freshmen (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.

Writing 137 and 138 are graded S-U only, and students receiving a grade of S are granted credit toward their college writing requirements. Students who think this course might be appropriate including non-native speakers of English scoring less than 600 on the Test of English as a Foreign Language (TOEFL), should attend the assessment sessions offered by the Writing Workshop during orientation week each fall. The workshop also offers a Walk-In Service (see below) to help students with problems in essay writing. The director is Joe Martin, senior lecturer in the Writing Workshop. The workshop offices are in 174 Rockefeller Hall, 255-6349.

The Walk-In Service

Through the Walk-In Service, the Writing Workshop offers tutoring assistance in writing to any student who needs help with a writing project. The Walk-In Service has tutors available during the academic year in 174 Rockefeller and north- and west-campus residential areas. The director is Mary Gilliland. For information contact the Writing Workshop, 174 Rockefeller Hall, 255-6349.

WRT 137-138, 134 An Introduction to Writing in the University

137, fall, 138, spring, 134, summer.
3 credits each term. Each section limited to 12 students in the fall and spring, 6 students in the summer. S-U grades only.
Prerequisite: permission of instructor.

This writing seminar is designed for students who need more focused attention to order 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 with weekly student/teacher conferences, coursework is shaped to respond to the needs of students in that particular class.

WRT 139-239 Special Topics in Writing

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, and instruction is in weekly tutorials. Interested students should come to 174 Rockefeller for more information.

Latin American Studies

190 Uris Hall

D. Castillo, director; M. J. Dudley, associate director; L. Beneria, R. Blake, D. Block, C. Castillo-Chávez, M. L. Cook, D. Cruz de Jesús, and S. E. Dozier.

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, College of Arts and Sciences, College of Human Ecology, 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 190 Uris Hall.

Latin American Studies Program

434 Rockefeller Hall

The Latin American 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; (3) to enhance the Latino academic environment on campus through support of such activities as lectures, conferences, seminars, exhibits, and research activities.

Undergraduate Concentration

The program's undergraduate concentration affords students an opportunity to develop a multidisciplinary approach to the study of Latinos in the United States. To complete an undergraduate concentration in Latin American Studies, students must earn at least 15 credits including LSP 201/205: Latinos in the United States (offered each spring semester), and at least four other courses from the course list. Students should make an attempt to achieve breadth and depth in the concentration and should include courses at the 300 and 400 level. Students pursuing the concentration must meet with the LSP Advisor and file an application with the Latin American Studies Program office.

Resource Center

The Latino Studies Program Resource Center in 432 Rockefeller Hall serves Cornell students, faculty, staff, and the wider local community. The Resource Center holds and media material pertinent to U.S. Latino issues and also provides a meeting space for more than 25 Latino student organizations.
Courses

LSP 201/SOC 265 Latinos in the United States
Spring. 4 credits variable.

LSP 202/SPAND 200 Spanish for Bilinguals
Fall and spring. 3 credits.

LSP/SPANL 210 Introduction to Latino Studies
4 credits variable.

LSP/RSOC 220 Sociology of Health and Ethnic Minorities
Fall. 3 credits.

LSP/ANTHRO 221 Anthropological Representation: Ethnographies on Latin Culture
3 credits.

LSP/ENGL/SPANL 241 Introduction to Chicano/a Poetry and Politics
Spring. 3 credits.

LSP/ENGL/SPANL/COML 243 Poetry and Politics in the Americas
4 credits.

LSP/SPANL 246 Contemporary Narratives by Latina Writers
Spring. 3 credits.

LSP/SPANL 246 Spanish in the United States
4 credits.

LSP/ANTHRO 377 The United States
4 credits.

LSP/ENGL 393 Survey in U.S. Latina/o Literature
Spring. 4 credits.

LSP/SPANL 396 Modern Latino Prose Fiction
4 credits.

LSP/ENGL 442 Testimonial Narratives: U.S. Latinos at War
4 credits.

LSP 420/421 Independent Study
Permission of instructor. 2–4 credits variable.

LSP/ANTHRO 660 Latino Language, Ideology, and Practice
4 credits.

LSP/ENGL 696 Writing Resistance: U.S. Minority and Third World Prisoner Discourse

Law and Society

P. R. Hyams, director, 119 Stimson Hall, 255–8515, prh@cornell.edu; R. Breiger (sociology), C. Carmichael (comparative literature), D. A. Dunning (psychology), G. Hay (economics), P. Hyams (history), S. Jasanoﬀ (science and technology studies), M. Katzenstein (government), R. Miller (philosophy), M. B. Norton (history), R. Polenberg (history), D. Powers (Near Eastern studies), J. Rabkin (government), A. Ruten (government)

The Law and Society Program offers an interdisciplinary concentration for undergraduates who are interested in the law from the perspectives of the social sciences and the humanities: anthropology, comparative literature, economics, government, history, philosophy, psychology, science and technology studies, and sociology. In addition, undergraduates in the College of Arts and Sciences can major in law and society through the Independent Major Program. Students who wish to graduate with a concentration in law and society should consult the director of the program or one of the advisers listed above to plan a coherent program of study. Admission to the concentration has to be approved by the director of the program. Such a program should ordinarily include at least four courses from the following list. Particular attention is drawn to GOVT 313 and PSYCH 265, which past students have often taken. Other courses may be substituted with the approval of the advisor. Inquiries can be directed to: Mary Newhart, Administrative Assistant, 119 Stimson Hall, 255–8515, mj3@cornell.edu.

AM ST 336 Capitalism and Society in Developing America, 1607–1877 (also HIST 337)

AS&RC 280 Racism in American Society (also HIST 280)

ANTHR 328 Conﬂict, Dispute Resolution, and Law in Cultural Context

ASIAN 336 Democracy and War (also HIST 338)

B&SOC 406 Biotechnology and Law (also S&TS 406)

B&SOC 407 Law, Science, and Public Values (also GOVT 407 and S&TS 407)

COM L 326 Christianity and Judaism (also RELS 326)

COM L 328 Literature of the Old Testament (also RELS 328)

ECON 304 Economics and the Law

ECON 335 Public Finance and Resource Allocation

ECON 336 Public Finance: Resource Allocation and Fiscal Policy

GOVT 111 Introduction to Political Theory

GOVT 260 Social and Political Theory (also PHIL 242)

GOVT 294 Global Thinking (also PHIL 294)

GOVT 313 The Nature, Functions, and Limits of Law

GOVT 324 Legal Reasoning and Legal Adaptation

GOVT 327 Civil Liberties in the United States

GOVT 328 Constitutional Politics: The United States Supreme Court

GOVT 364 The Selfish Individual and the Modern World

GOVT 389 International Law

GOVT 407 Law, Science, and Public Values (also B&SOC 407 and S&TS 407)

GOVT 410 Legislatures, Courts and Public Policy

GOVT 428–429 Government and Public Policy: An Introduction to Analysis and Criticism

GOVT 462 Modern Political Philosophy (also PHIL 346)

GOVT 466 Feminism and Gender Discrimination (also WOMNS 466)

GOVT 499 Limiting War (also PHIL 399)

GOVT 474 Community, Nation, and Morality (also PHIL 446)

GOVT 489 International Law and Regime Development

HIST 318 American Constitutional Development

HIST 336 Capitalism and Society in Developing America, 1607–1877 (also AM ST 336)

HIST 338 Democracy and War (also ASIAN 338)

HIST 368 Marriage and Sexuality in Medieval Europe (also WOMNS 368)

HIST 436 Conflict Resolution in Medieval Europe


HIST 440 Undergraduate Seminar in Recent American History

HIST 457–657 Women, Men, and the Law in Muslim Court (also HIST 456–656, RELST 459 and WOMNS 458)

HIST 456–657 Sexuality, Society and the State in the Near East (also HIST 457–657 and WOMNS 455–655)

HIST 459–655 Women, Men, and the Law in Muslim Court (also HIST 457–657, RELST 459 and WOMNS 459)

PHIL 241 Ethics

PHIL 242 Social and Political Theory (by petition for breadth requirement) (also GOVT 260)

PHIL 294 Global Thinking (also GOVT 294)

PHIL 319 Philosophy of Marx

PHIL 346 Modern Political Philosophy (also PHIL 462)

PHIL 369 Limiting War (also GOVT 469)

PHIL 444 Contemporary Legal Thought

PHIL 446 Topics in Social and Political Philosophy (also GOVT 474)

PSYCH 265 Psychology and Law

RELST 326 Christianity and Judaism (also COM L 326)

RELST 328 Literature of the Old Testament (also COM L 328)

RELST 459 Women, Men, and the Law in Muslim Court (also HIST 457–657, WOMNS 459–655 and WOMNS 458)

S&TS 406 Biotechnology and Law (also B&SOC 406)

S&TS 407 Law, Science, and Public Values (also GOVT 407 and B&SOC 407)
Courses

ANTHR 200 Cultural Diversity and Contemporary Issues
Fall. 3 credits. J. Borneman.
For description, see ANTHR 200.

ANTHR 321 Sex and Gender in Cross-Cultural Perspective
(also WOMNS 321)
Fall. 4 credits. Staff.
For description, see WOMNS 321.

ENGL 355 Decadence (also WOMNS 355)
Fall. 4 credits. E. Hanson.
For description, see WOMNS 355.

[ENGL 377 Gay Fiction (also WOMNS 376)]
E. Hanson.

ENGL 401-601 Sexual Child (also S HUM 418)
Spring. 4 credits. E. Hanson.
For description, see S HUM 418.

[ENGL 424 Studies in Renaissance Lyric]
B. Correll.

[ENGL 654 Queer Theory (also WOMNS 564)]
E. Hanson.

[ENGL 655 Decadence (also WOMNS 656/COM L 655)]
E. Hanson.

ENGL 703 Theorizing Film: Race, Nation and Psychoanalysis
(also FRLIT 695)
Fall. 4 credits. T. Murray.
For description, see ENGL 703.

[FRLIT 493 French Feminisms (also WOMNS 493)]
4 credits. Next offered fall 1998.
N. Furman.

GERST 413 The Women Around Freud
(also WOMNS 413)
B. Martin.

[GOVT 362 Politics of Sexuality (also WOMNS 282)]
A. M. Smith.

GOVT 467 Radical Democratic Feminisms (also WOMNS 468)
Fall. 4 credits. A. M. Smith.
For description, see GOVT 467.

HDFS 284 Introduction to Sexual Minorities (also WOMNS 284)
Fall. 3 credits. R. Savin-Williams.
For description, see HDFS 284.

HDFS 464 Sexual Minorities and Human Development
(also WOMNS 467)
Spring. 3 credits. R. Savin-Williams.
For description, see HDFS 464.

HDFS 475 Clinical and Developmental Perspectives on HIV and AIDS
Spring. 3 credits. R. Savin-Williams.
For description, see HDFS 475.

[HIST 377 Gender and Early Modern Europe (also WOMNS 377)]
R. Well.

LING 244 Language and Gender (also WOMNS 244)
Spring. 4 credits. S. McConnell-Ginet.
For description, see LING 244.

LING 384 Language and Revolution
Spring. 4 credits. J. Piedra.

[SPAN L 400 Maricoteoria/Queer Theory]
J. Piedra.

THETR 336 American Drama and Theatre (also ENGL 336)
Spring. 4 credits. J. E. Gainor.
For description, see THETR 336.

THETR 339 Theories and Techniques of 20th-Century Western Theatre
Fall. 4 credits. R. Schneider.
For description, see THETR 339.

[THETR 433 The Female Dramatic Tradition (also WOMNS 433)]
4 credits. Next offered in 2-3 years.
J. E. Gainor.

THETR 637 Theatre and Postmodernity: Appropriation, Adaptation and Simulation
Spring. 4 credits. R. Schneider.
For description, see THETR 637.

WOMNS 210 Introduction to Feminist Theory
Fall. 4 credits. A. Villarejo.
For description, see WOMNS 210.

[WOMNS 465 Feminist Theory/Lebian Theory (also GERST 465 and COM L 465)]
B. Martin.

[WOMNS 621 Lesbian, Gay, Bisexual Studies (also GERST 621)]
B. Martin.

Medieval Studies


Undergraduates interested in Medieval Studies have an opportunity to take courses in the following areas of instruction: medieval Hebrew, Arabic, and Latin; Old English, Middle English, Old Irish, and Middle Welsh; Old Occitan (Provencal) and Old French; medieval Spanish and Italian; Old Saxo, Old High German, Middle High German, Gothic, and Old Norse; Old Russian and Old Church Slavonic; comparative literature; medieval archaeology, art, and architecture; medieval history; Latin paleography; medieval philosophy; musicology; comparative Slavic linguistics, comparative Romance linguistics, and comparative Germanic linguistics.

The field of Lesbian, Bisexual and Gay Studies is devoted to the interdisciplinary study of the social construction of sexuality. LGB Studies is founded on the premise that the social organization of sexuality is best studied from the perspectives offered by those positions that have been excluded from established cultural norms.

In addition to offering a graduate minor, the field of LGB Studies now offers an undergraduate concentration, which is administered under the auspices of the Women's Studies Program and which consists of four courses from the list below. Although most of the courses in LGB Studies (including those on men) will probably fall within the umbrella of the Women's Studies Program and hence be crosslisted with it, not all of the courses in Women's Studies are sufficiently focused enough on the social construction of sexuality per se to be part of the LGB 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 LGB Studies subset must identify their concentration as either LGB Studies or Women's Studies; they cannot double-count their credits and thereby use the same courses for both concentrations.

Students interested in the LGB Studies concentration should contact the Lesbian, Bisexual and Gay Studies Office in 379 Uris Hall.

Lesbian, Bisexual and Gay Studies


ARTS AND SCIENCES - 1997-1998

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Undergraduates who want to undertake an independent major or a concentration in Medieval Studies should consult the director of the program, 259 Goldwin Smith Hall, 255-8545, medievalst@cornell.edu.

Information for prospective graduate students is contained in the catalog of the Graduate School, in a brochure on Medieval Studies available from the field coordinator, and at Cornell's site on the World Wide Web: http://www.arts.cornell.edu/medieval.

Graduate Seminars
Courses in various aspects of medieval studies are offered each year in numerous cooperating departments, including Asian Studies, Classics, Comparative Literature, English, German Studies, History, History of Art, Linguistics, Music, Near Eastern Studies, Philosophy, Romance Studies, Russian Literature and by the Society for the Humanities. An up-to-date listing of courses and their descriptions is available at the Medieval Studies office, 259 Goldwin Smith Hall.

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 at least one course in each of the three areas listed below:

   a) European Politics, Society and Economics

      Anthr 350 Anthropology of Europe
      Econ 367 Comparative Economic Systems: East and West
      Econ 370 Socialist Economies in Transition
      Govt 325 Eastern European Politics
      Govt 332 Western European Politics
      Govt 333 Government and Politics of the Former Soviet Union
      Govt 342 The New Europe
      Govt 350 Comparative Revolutions
      Soc 366 Transitions from State Socialism
      Soc 410 Comparative Societal Analysis

   b) Modern European History

      Hist 253 Russian History Since 1800
      Hist 283 Europe in the Technological Age
      Hist 290 Twentieth-Century Russia and the Soviet Union
      Hist 355 Nineteenth-Century European Intellectual History
      Hist 354 Twentieth-Century European Intellectual History
      Hist 362 European Cultural History 1815-1870
      Hist 363 European Cultural History 1870-1945
      Hist 383 Europe 1900-1945
      Hist 384 Europe 1945-68
      Hist 385 Europe in the Twentieth-Century 1968-1992

   c) Humanities

      Any general course dealing with modern Europe (19th and 20th centuries) in one of the following departments: Comparative Literature, English, German Studies, History of Art, Music, Philosophy, Romance Studies, Theatre Arts. Examples of such courses include:

      Arth 260 Introduction to Art History: The Modern Era
      Arth 361 The Social History of Nineteenth-Century European Painting
      Arth 362 Impressionism and Society
      COML 202 Great Books
      COML 364 The European Novel
      Music 108 Bach to Debussy
      Music 274 Opera
      Music 383 Music of the Nineteenth Century
      Phil 212 Modern Philosophy
      Thetr 241 Introduction to Western Theatre I
      Thetr 322 Russian Drama and Theatre

   Under certain conditions, it may be possible to substitute other courses for those listed above.

3) Three additional courses in any of the three areas.

   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 completing a research project under the European Summer Research Program will receive a special commendation. 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: J. Borneman (Anthropology); C. Otto (Architecture); L. Abel (College Scholars, Independent Majors); S. Christopherson (CRP); G. Fields (Economics); D. Schwarz (English); I. Ezergailis (German Studies); J. Pontusson (Government); S. Christopherson (Sociology); M. Suner (Linguistics); C. Rosen (Modern Languages); N. Zaslaw (Music); S. Tarrow (Romance Studies); G. Gliban (Russian Literature); D. Stark (Sociology); D. Bathrick (Theatre Arts)

For a 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 255-7929).

Religious Studies


The program in Religious Studies is designed to meet the needs of three classes of students: those seeking interesting courses on religious topics as free electives or to fulfill distribution requirements; those desiring a more systematic exposure to the study of religion as a major component of their liberal arts experience; and those planning to pursue advanced academic or religious work in religious studies or allied disciplines or subdisciplines (e.g., history of religions, anthropology, religion and literature, religion and psychology, ethics, or theology, as well as certain geographical area studies). To all these students the program offers an opportunity to acquire a fuller understanding and appreciation of one of the most fundamental aspects of human thought and behavior.

The Major in Religious Studies

To graduate as a major in Religious Studies a student must (1) complete with letter grades the program's two core courses, Religious Studies 101 ("Understanding the Religions of the World") and Religious Studies 449 ("History and Methods of the Academic Study of Religion"); and (2) complete with letter grades eight 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, depth and depth (2b) of study.
A student is expected to prepare a brief faculty adviser early on. A current list of important for a prospective major to select a program in Religious Studies, it is especially recommended. Most courses approved for the major are under 2a and 2b.

This area of Religious Studies should be taken with care and consideration. Although not as firmly rooted in literary traditions, these courses are at least as important as those found in other religious studies programs. Students should be aware that many additional courses dealing with Buddhism, such as "Indian Buddhism" (Asian Studies 354) or "Japanese Buddhism" (Asian Studies 359), are required 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 requirement 2b.

The language 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); Hebrew or Arabic for Judaism; Sanskrit or Hindi for Hinduism; or Chinese or Japanese for Buddhism. Religious phenomena like shamanism or totemism, though less firmly rooted in literary traditions, have generated substantial bodies of 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. Courses used to satisfy this foreign-language proficiency requirement may not be applied to the course requirements described under 2a and 2b.

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, 259 Goldwin Smith Hall.

Given the multidisciplinary character of the program in Religious Studies, it is especially important for prospective majors to select a faculty adviser early on. A current list of advisers is available from the program director. Once an adviser has been selected, a student is expected to prepare a brief statement outlining his or her intended course of major study (including study of an appropriate foreign language) and to file it with the program director for review by the faculty committee responsible for overseeing the program.

The Major with Honors in Religious Studies

To be eligible for honors in Religious Studies, a student must maintain a GPA of 3.0 overall and 3.3 in courses other than language courses used to satisfy requirements for the major. In addition, he or she must enroll in Religious Studies 490 or 491 (Directed Study) and Religious Studies 495 (Honors Thesis), usually in the fall and spring of the senior year, respectively. Each course carries four credits but only the first may be counted as one of the eight additional courses required for the major. Religious Studies 490, 491, and 495 are supervised by cooperating faculty members assigned to individual honors students or small groups of honors students to help them complete substantial independent projects. These projects will be evaluated by the Religious Studies Honors Committee, which is responsible for awarding honors and determining the degree of honors awarded.

Courses Approved for the Major Sponsored by Religious Studies


This course provides an introduction to the academic study of religion through a survey of the major religions of the world. In each tradition covered, we study the different formulations of religious experience, expression, knowledge, and (where relevant) salvation, the dynamics of tradition formation and canon development, and the presentation of ideas about the human-divine relationship. While the lectures in the course are presented by the professor, guest speakers representing each of the major traditions will help students understand the category of "experience." Students will read primary and secondary sources pertaining to the traditions covered in class, and complete a semester-long project involving hands-on research and field study on a given religious tradition.

(RELST 111 Biblical Law (also Comparative Literature 111)) Spring. 3 credits. C. Cannamell. For description, see COM L 111.

(RELST 130 The Search for the Historical Jesus (also Near Eastern Studies 130)) Summer. 3 credits. S. Saggiard. Who was Jesus? What did he really say and do? In this course we are concerned with the ways in which scholars approach these questions and the often startling answers they obtain. We examine the social, political, economic and religious environments in which Jesus operated to provide a context for critical readings of the gospels and other early Christian texts. We then reconstruct the essential features of the original Jesus movement, which we compare and contrast with Cynic philosophy, the Greco-Roman gender system, the historical and practices of the early Church, and the social patterns and religious philosophies of small-scale societies.

(RELST 131 Elementary Pali (also Pali 131)) Fall. 3 credits. J. Gair. For description, see Modern Languages, PALI 131.

(RELST 150 Introduction to American Religion (also Sociology 150)) Fall. 3 credits. P. Becker. For description, see SOC 150.

(RELST 197 Introduction to Near Eastern Civilization (also Near Eastern Studies 197, Jewish Studies 197)) Fall. 3 credits. D. Owen. For description, see NES 197.

(RELST 201 Issues in Catholic Thought Spring. 3 credits. E. Ondrako. This course will explore fundamental dynamics for the development of Catholic Christian thought from the New Testament to the present. The students will investigate the historical and rational grounds of Catholic thought in the ideas of several thinkers from the Eastern and Western traditions, such as John Chrysostom, Augustine, Thomas Aquinias, Bonaventure, J. H. Newman, K. Rahner, Y. Congar, Paul VI and John Paul II. The course will include the main lines of thought from Vatican II. Since each historical era uncovers what it thinks to be new evidence and proposes new questions, the student will be expected to master the principal lines of thought from the past and critically utilize these arguments as they bear upon the contemporary era. The format will be lectures and discussion.

(RELST 202 The Greek New Testament (also Classics 202, Near Eastern Studies 220)) Spring. 3 credits. A. Gade. For description, see NES 213.

(RELST 213 Introduction to the Qur'an (also Near Eastern Studies 213)) Spring. 3 credits. Not offered 1997-98.

(RELST 214 Historical Issues in Christian Thought (also Philosophy 214)) Spring. 4 credits. Not offered 1997-98.

(RELST 223 Introduction to the Bible (also Near Eastern Studies 223, Jewish Studies 223)) Spring. 3 credits. C. Baker. For description, see NES 223.

(RELST 227 Introduction to the Prophets (also Near Eastern Studies 227, Jewish Studies 227)) Fall. 3 credits. Not offered 1997-98. G. Rendsburg.

(RELST 228 Genesis (also Near Eastern Studies 228/628, Jewish Studies 228)) Spring. 3 credits. Prerequisite: knowledge of Hebrew. G. Rendsburg.

(RELST 230 Monuments of Medieval Art (also History of Art 230)) Spring. 4 credits. For description, see ART H 230.

(RELST 231 The Quest for the Historical Jesus (also Near Eastern Studies 230)) Spring. 3 credits. C. Baker. For description, see NES 230.


RELST 239 Cultural History of Jews of Spain (also Near Eastern Studies 239, Jewish Studies 239, Spanish Literature 239) Fall. 3 credits. R. Brann. For description, see NES 239.

[RELST 244] Introduction to Ancient Judaism (also Near Eastern Studies 244, Jewish Studies 244) # Spring. 3 credits. Not offered 1997–98. G. Rendsburg.

RELST 248 Introduction to Classical Jewish History (also Near Eastern Studies 248, Jewish Studies 248) # Fall. 3 credits. C. Baker. For description, see NES 248.


RELST 251 Black Religious Traditions from Slavery to Freedom (also History 251, American Studies 251) Spring. 4 credits. M. Washington. For description, see HIST 251.

RELST 252 Introduction to Islam: Religion, Politics, and Society (also Near Eastern Studies 252) # Spring. 3 credits. A. Gade. For description, see NES 251.

RELST 257 Islamic History 600–1258 (also Near Eastern Studies 257, History 254) # Fall. 3 credits. D. Powers. For description, see NES 257.


RELST 262 Religion and Reason (also Philosophy 262) Spring. 4 credits. S. MacDonald. For description, see PHIL 262.

RELST 263 The Earlier Middle Ages (also History 263) # Fall. 4 credits. J. J. John. For description, see HIST 263.

RELST 264 Introduction to Biblical History and Archaeology (also Near Eastern Studies 263, Jewish Studies 263, Archaeology 263) # Fall. 3 credits. J. Zorn. For description, see NES 263.


RELST 320 Myth, Ritual and Symbol (also Anthropology 320) # Spring. 3 credits. J. Fajans. For description, see ANTHR 320.

RELST 322 Magic, Myth, Science and Religion (also Anthropology 322) # Fall. 4 credits. A. T. Kirsch. For description, see ANTHR 322.

RELST 325 The History of Early Christianity (also Near Eastern Studies 324, Jewish Studies 344) # Fall. 4 credits. C. Baker. For description, see NES 324.

RELST 328 Literature of the Old Testament (also Comparative Literature 328) # Fall. 4 credits. C. Carmichael. For description, see COM L 328.

[RELST 333] Greek and Roman Mystery Cults and Early Christianity (also Classics 333, Archaeology 333) # Fall. 4 credits. Not offered 1997-98. K. Clinton.

RELST 334 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also Near Eastern Studies 339/639, Jewish Studies 339, Comparative Literature 334, Spanish Literature 339/639) # Spring. 4 credits. R. Brann. For description, see NES 339.

RELST 337 The Medieval Illuminated Book (also History of Art 336) # Fall. 4 credits. Not offered 1997-98. R. G. Calkins.

[RELST 342] Flemish Painting (also History of Art 341) # Fall. 4 credits. Not offered 1997-98. R. G. Calkins.


[RELST 344] Seminar on Jewish Mysticism (also Near Eastern Studies 344) # Fall. 4 credits. Not offered 1997-98.

RELST 345 Intellectual and Cultural Life of 19th Century Americans (also History 345, American Studies 345) # Fall. 4 credits. R. L. Moore. For description, see HIST 345.


[RELST 350] Introduction to Islamic Law (also Near Eastern Studies 351/651, History 372/652) # Fall. 4 credits. D. Powers. For description, see NES 351.

RELST 351 The Religious Traditions of India (also Asian Studies 351) # Spring. 4 credits. D. Gold. For description, see ASIAN 351.

RELST 352 Art as Spectacle: The Italian Baroque (also History of Art 355) # Fall. 4 credits. K. Barzman. For description, see ART H 355.

RELST 354 Indian Buddhism (also Asian Studies 354) # Fall. 4 credits. C. Minkowski. For description, see ASIAN 354.


RELST 360 Religion and Images across the Early Modern World (also History of Art 358) Spring. 4 credits. K. Barzman. For description, see ART H 358.

RELST 362 The Culture of the Renaissance II (also Comparative Literature 362, English 325, History 364, History of Art 351, Music 390) # Fall. 4 credits. W. J. Kennedy and C. V. Kaske. For description, see COM L 362.

RELST 365 Medieval Culture, 400-1150 (also History 365) # Fall. 4 credits. Prerequisite: Religious Studies 263 or permission of instructor. J. J. John. For description, see HIST 365.

[RELST 368] Marriage and Sexuality in Medieval Europe (also History 368, Women's Studies 368) # Spring. 4 credits. Not offered 1997-98. P. Hyams.

RELST 393 Religion and Politics in the Middle East (also Near Eastern Studies 393) Fall. 4 credits. M. Litvak. For description, see NES 393.

[RELST 395] Classical Indian Philosophical Systems (also Asian Studies 395, Classics 395) # Fall. 4 credits. Prerequisite: some background in philosophy or in classical culture. Not offered 1997-98. C. Minkowski.

RELST 410 Latin Philosophical Texts (also Philosophy 410) # Fall and spring. Variable credit. Prerequisite: knowledge of Latin and permission of instructor. S. MacDonald. For description, see PHIL 410.

[RELST 418] Seminar in Islamic History: Muhammad and the Rise of Islam (also Near Eastern Studies 418/618, History 460/660) # Fall. 4 credits. Prerequisite: Religious Studies 257 or 258, or permission of instructor. Not offered 1997-98. D. Powers.]
RELST 420 Readings in Biblical Hebrew
Prose (also Near Eastern Studies 420, Jewish Studies 420) #
Fall. 4 credits. Not offered 1997-98.
G. Rendsburg.

RELST 423 Readings in Biblical Hebrew
Poetry (also Near Eastern Studies 421, Jewish Studies 421) #
Spring. 4 credits. Not offered 1997-98.
J. M. Law.

RELST 429 Readings in the New Testament (also Comparative Literature 429, Near Eastern Studies 429, English 429) #
Fall. 4 credits. J. Bishop.
For description, see COM L 429.

RELST 441 Mahayana Buddhism (also Asian Studies 441)
Spring. 4 credits. Not offered 1997-98.
J. M. Law.

RELST 442 Religion and Politics in American History (also History 442)
Fall. 4 credits. R. L. Moore.
For description, see HIST 442.

RELST 443 Religion and Ritual in Chinese Society and Culture (also Anthropology 443) #
Fall. 4 credits. S. Sangren.
For description, see ANTH 443.

RELST 449 History and Methods of the Academic Study of Religion (also Asian Studies 449) #
For description, see ASIAN 449.

RELST 451 Seminar in Islamic History
600-750 (also Near Eastern Studies 451/650, History 461/650) #
Spring. 4 credits. D. Powers.
For description, see NES 451.

RELST 459 Women, Men and the Law in Muslim Court (also Near Eastern Studies 459/655, Women’s Studies 458, History 457/657) #
Fall. 4 credits. L. Peirce.
For description, see NES 459.

RELST 476 Seminar in the Cinema II
(also Theatre Arts 476)
Spring. 4 credits. Not offered 1997-98.
D. Fredericksen.

RELST 490-491 Directed Study
490, fall; 491, spring. 2-4 credits each term.
Staff.

RELST 495 Senior Honors Essay
Fall or spring. 8 credits. Staff.

RELST 531 Problems in Medieval Art and Architecture (also History of Art 531) #
Spring. 4 credits. R. G. Calkins.
For description, see ART H 531.

RELST 580 Problems in Asian Art (also History of Art 580)
Fall. 4 credits. K. McGowan.
For description, see ART H 580.

Courses Approved for the Major Sponsored by Other Units
Additional courses offered by cooperating departments may also be approved for the major in Religious Studies. For details see the program director, Jane Marie Law, 259 Goldwin Smith Hall.

Russian and East European Studies Major

J. Bomerman (Anthropology); G. J. Staller (Economics); S. Beck (Field and International Studies Program); I. Ezerigalis, D. Batrkh (German Studies); V. Bunce, M. Evangelista, S. Tarrow (Government); P. Holquist; W. M. Pintner (History); U. Bartenbrenner (emeritus, Human Development and Family Studies); P. Carden, G. Gibian, N. Pollak, S. Senderovich, G. Shapiro (Russian Literature); W. Browne, S. Paperno (Slavic Linguistics); D. Stark (Sociology)

The major in Russian and East European studies has the following requirements:

1) Proficiency in Russian or an Eastern European language with one additional advanced (300-level) language or literature course, OR qualification in an Eastern European language and qualification in another language useful for research in the area.*

*These requirements, in the case of some languages, may require study abroad or coursework completed at another institution.

2) At least one course relating to Russia or Eastern Europe, at the 200 level or above, in four of the following five departments: Government, Economics, History, Russian Literature and Sociology. Appropriate courses offered in other departments may be substituted for one of the above courses with the consent of the major adviser.

3) At least three additional courses at the 300 level or above, all from one of the following three departments: Government, History (within the History Department courses may be at the 250 level or above), or Russian Literature. One of the three courses must be at the 400 level or above. The three courses must be approved by the major adviser in the department of concentration.

The student will complete the honors project by a date set by the major in Russian and East European Studies Program. Students should keep their committee members informed as their work progresses. Students will meet together with their whole honors committee to discuss the draft of the thesis or project and make recommendations for revision. When the project is completed, the committee will decide whether the project deserves honors, and, if so, after reviewing their academic record, will recommend students for a Bachelor of Arts cum laude, magna cum laude, or summa cum laude. The committee will also assign a grade for the honors research course.

Courses

[COM L 337 Modern and Contemporary Theatre (also Theatre Arts 335)]
Spring. 4 credits. Not offered 1997-98.

[COM L 367 The Russian Novel (also Russian Literature 367) #]
Fall. 4 credits.

[COM L 381 Marxist Cultural Theory (also German Literature 381 and Government 372)]
4 credits. Not offered 1997-98.

[COM L 385 Reading Nabokov (also Russian Literature 385 and English 379)]
Fall. 4 credits. Limited to 25.

[COM L 389 Modern Literature in Poland, Czechoslovakia, Hungary, and Yugoslavia (also Russian Literature 389)]
Fall. 4 credits. Not offered 1997-98.

[COM L 425 The Jew’s Body (also Comparative Literature 625, German Studies 422/622 and Jewish Studies 422/622)]
Spring. 4 credits. Readings will be primarily in English, though knowledge of another language (such as Hebrew and Yiddish or languages of the European Diaspora, such as German, Italian, French, Russian, Polish, etc.) could be helpful in certain contexts.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Credits</th>
<th>Notes</th>
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<tr>
<td>GOVT 350</td>
<td>Comparative Revolutions</td>
<td>Spring</td>
<td>4</td>
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<td>GOVT 359</td>
<td>Soviet Foreign Policy</td>
<td>4 credits</td>
<td>Not offered 1997-98</td>
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<td>GOVT 376</td>
<td>Rethinking Marx</td>
<td>4 credits</td>
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<td>GOVT 394</td>
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<td>GOVT 397</td>
<td>The United States and Russia</td>
<td>4 credits</td>
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<td>International Relations in the Former Soviet Union</td>
<td>Fall</td>
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<td>Post-Communism and Ethnic Mobilization</td>
<td>4 credits</td>
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<td>Comparative Communism</td>
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<td>GOVT 481</td>
<td>Foreign Policy of the U.S.S.R.</td>
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<tr>
<td>GOVT 491</td>
<td>Conflict, Cooperation, and Norms: Ethnic Issues in International Affairs</td>
<td>Fall</td>
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<td>GOVT 637</td>
<td>Peasantry, State, and Revolutionary Socialism</td>
<td>4 credits</td>
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<td>GOVT 639</td>
<td>Politics of the Soviet Union</td>
<td>Fall</td>
<td>4</td>
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<td>GOVT 642</td>
<td>The Future of European Security</td>
<td>4 credits</td>
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<td>GOVT 657</td>
<td>Comparative Democratization</td>
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<td>GOVT 660</td>
<td>Social Movements, Collective Action, and Reform</td>
<td>Fall</td>
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<td>Modern Social Theory I</td>
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<td>GOVT 670</td>
<td>Modern Social Theory II</td>
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<td>HIST 218</td>
<td>The Russian Military Effort and Foreign Policy #</td>
<td>Fall</td>
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<td>HIST 242</td>
<td>Europe Since 1789 #</td>
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<td>HIST 252</td>
<td>Russian History to 1800</td>
<td>4 credits</td>
<td>Fall</td>
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<td>HIST 253</td>
<td>Russian History Since 1800 #</td>
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<td>HIST 290</td>
<td>Twentieth-Century Russia and the Soviet Union</td>
<td>Spring</td>
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<td>HIST 352</td>
<td>The End of the Austro-Hungarian Monarchy, 1848-1919</td>
<td>4 credits</td>
<td>Fall</td>
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<td>HIST 383</td>
<td>Europe 1900-1945</td>
<td>Fall</td>
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<td>HIST 384</td>
<td>Europe, 1945-1968</td>
<td>Fall</td>
<td>4</td>
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<td>HIST 385</td>
<td>Europe in the 20th Century: 1968-1990</td>
<td>Spring</td>
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<td>HIST 415</td>
<td>The United States and Russia, 1780-1914 #</td>
<td>4 credits</td>
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<td>HIST 464</td>
<td>Russian Social History #</td>
<td>4 credits</td>
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<td>HIST 485</td>
<td>The Historical Origin of the Post-Soviet Successor States</td>
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<td>HIST 490</td>
<td>Social and Cultural History of the Russian Intelligents</td>
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<td>HIST 677</td>
<td>Seminar in Russian History</td>
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<td>HIST 678</td>
<td>Seminar in European Political History</td>
<td>Spring</td>
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<td>POLSH 131-132</td>
<td>Elementary Polish</td>
<td>131, fall; 132, spring</td>
<td>3 credits each term</td>
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<tr>
<td>POLSH 133-134</td>
<td>Continuing Polish</td>
<td>133, fall; 134, spring</td>
<td>3 credits each term</td>
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<tr>
<td>ROMAN 131-132</td>
<td>Elementary Romanian</td>
<td>131, fall; 134, spring</td>
<td>3 credits</td>
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<td>ROMAN 133-134</td>
<td>Continuing Romanian</td>
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<tr>
<td>RUSSA 103-104</td>
<td>Conversation Practice</td>
<td>103, fall; 104, spring</td>
<td>2 credits each term</td>
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<td>RUSSL 103</td>
<td>Freshman Writing Seminar: Classics of Russian Thought and Literature</td>
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<td>RUSSL 104</td>
<td>Freshman Writing Seminar: Nineteenth-Century Russian Literary Masterpieces</td>
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<td>RUSSL 105</td>
<td>Freshman Writing Seminar: Twentieth-Century Russian Literary Masterpieces</td>
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<td>RUSSL 108</td>
<td>Freshman Writing Seminar</td>
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<td>3</td>
<td>Not offered 1997-98</td>
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<tr>
<td>RUSSL 109</td>
<td>Russian Science Fiction</td>
<td>Spring</td>
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<td>RUSSA 121-122</td>
<td>Elementary Russian</td>
<td>121, fall or summer; 122, spring or summer</td>
<td>4 credits each term</td>
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<td>RUSSA 123</td>
<td>Continuing Russian</td>
<td>Fall</td>
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RUSSL 201-202  Readings in Russian Literature #
201, fall; 202, spring. G. Shapiro. 3 credits each term.

RUSSA 203-204  Intermediate Composition and Conversation
203, fall, spring, or summer; 204, spring. 3 credits each term.

RUSSA 205-206  Reading Russian Press
205, fall, 206, spring. 2 credits each term.

RUSSA 207-208  Russian Phonetics for Beginners
207, fall; 208, spring. 2 credits.

RUSSA 209-210  Themes from Russian Culture I #
Not offered 1997–98.

RUSSA 211-212  Themes from Russian Culture II
Spring. 3 credits. Not offered 1997–98.

RUSSA 301-302  Advanced Russian Grammar and Reading

RUSSA 303-304  Advanced Composition and Conversation
303, fall; 304, spring. 4 credits each term.

RUSSA 305-306  Directed Individual Study
305, fall; 306, spring. 2 credits each term.

RUSSA 309-310  Advanced Reading
309, fall; 310, spring. 4 credits.

RUSSL 311  Introduction to Russian Poetry #
Fall. 4 credits. Not offered 1997–98.

RUSSL 312  Russian Drama and Theatre (also Theatre Arts 332)
Fall. 4 credits. Not offered 1997–98.

RUSSL 313  Twentieth-Century Poetry
Spring. 4 credits. Not offered 1997–98.

RUSSL 314  The Russian Short Story #
Fall. 4 credits. Not offered 1997–98.

RUSSL 315  Gogol #
Spring. 4 credits. Not offered 1997–98.

RUSSL 316  Education and the Western Literary Tradition (also Comparative Literature 350 and College Scholar 350) #
Spring. 4 credits. Not offered 1997–98.

RUSSL 367  The Russian Novel #
Fall. 4 credits.

RUSSL 368  Russian Literature From 1917 to the Present
Fall. 4 credits.

RUSSL 369  Dostoevsky #

RUSSL 370  Literature of the Third Wave
Spring. 4 credits. Not offered 1997–98.

RUSSL 371  Chekhov in the Context of Contemporary European Literature and Art (also Comparative Literature 395) #
Fall. 4 credits. Not offered 1997–98.

RUSSL 372  Literature of the Soviet Period 1917–1945
Fall. 4 credits. Not offered 1997–98.

RUSSL 373  Literature of the Soviet Period 1945–1985
Spring. 4 credits. Not offered 1997–98.

RUSSL 374  The Russian Connection #
Spring. 4 credits.

RUSSL 375  Soviet Dissident Literature
Fall. 4 credits. Not offered 1997–98.

RUSSL 376  Reading Nabokov (also CompLit 385 and English 379)
Spring. 4 credits. Not offered 1997–98.

RUSSL 377  Ideas and Form in Novels of Social Inquiry (also Comparative Literature 380)

RUSSL 378  Contemporary Literature in Central and East Europe (also Comparative Literature 389)
Fall. 4 credits. Not offered 1997–98.

RUSSL 379  The Power of Nationalism: Expressions of National Feelings in Politics, Literature, History, and the Arts (also Comparative Literature 390)
Fall. 4 credits. Not offered 1997–98.

RUSSL 380  Honors Essay Tutorial
Fall and spring. 8 credits. Not offered 1997–98.

RUSSL 381  Directed Individual Study
Fall or spring. 1 credit.

RUSSL 382  Advanced Composition and Conversation
Fall or spring. 1–4 credits each term.

RUSSL 383  History of the Russian Language
401, fall; 402, spring. 4 credits each term.

RUSSL 384  Linguistic Structure of Russian
403, fall; 404, spring. 4 credits each term.

RUSSL 385  Russian Phonetics
407, fall; 408, spring. 2 credits each term.

RUSSL 386  Teaching Russian as a Foreign Language
Fall or spring. 1 credit.

RUSSL 387  Russian Stylistics
Fall. 4 credits. Not offered 1997–98.

RUSSL 388  Advanced Conversation and Stylistics
413, fall; 414, spring. 2 credits each term.

RUSSL 389  Postsymbolist Russian Poetry

RUSSL 390  Practice in Translation
Spring. 4 credits.

RUSSL 391  Contemporary Russian Prose
Spring. 4 credits. Not offered 1997–98.

RUSSL 392  Pushkin #
Spring. 4 credits. Not offered 1997–98.

RUSSL 393  Pushkin and Pasternak
Fall. 4 credits.

RUSSL 394  Short Works of Tolstoy and Dostoevsky
Spring. 4 credits.

RUSSL 395  Reading Course: Russian Literature in the Original Language
Fall or spring. 1 credit.

RUSSL 396  Supervised Reading in Russian Literature
Fall or spring. 1–4 credits each term.

RUSSL 397  Russian Symbolism

RUSSL 398  Research Modernism

RUSSL 400  Proseminar: Research Methods in Russian Literature
Fall. 4 credits. Not offered 1997–98.

RUSSL 401  Old Church Slavonic
Fall. 4 credits. Not offered 1997–98.

RUSSL 402  Old Russian Texts
Spring. 4 credits. Not offered 1997–98.

RUSSL 403  Graduate Seminar: Neglected Masterpieces of Short Russian Prose
Spring. 4 credits. Not offered 1997–98.

RUSSL 404  Supervised Reading and Research
Fall or spring. 2–4 credits.

RUSSL 405  Russian Stylistics I
Not offered 1997–98.

RUSSL 406  Russian Stylistics II
Not offered 1997–98.

RUSSL 407  Seventeenth-Century Russian Literature
Fall. 4 credits. Not offered 1997–98.

RUSSL 408  Twentieth-Century Russian Poetry
Spring. 4 credits. Not offered 1997–98.

RUSSL 409  Old Russian Literature
Spring. 4 credits. Not offered 1997–98.

RUSSL 410  Eighteenth-Century Russian Literature
Spring. 4 credits. Not offered 1997–98.

RUSSL 411  Early Nineteenth-Century Literature
Not offered 1997–98.

RUSSL 412  Russian Romanticism
Spring. 4 credits.

RUSSL 413  Russian Realism
Fall. 4 credits. Also open to advanced undergraduates with permission of instructor. Not offered 1997–98.

RUSSL 414  The Tradition of Russian Poetry
Spring. 4 credits. Not offered 1997–98.

RUSSL 415  Gogol

RUSSL 416  Russian Drama and Literature (also Theatre Arts 622)
Fall. 4 credits. Not offered 1997–98.

RUSSL 417  Russian for Russian Specialists
633, fall; 634, spring. 4 credits each term.

RUSSL 418  Modern Russian Literary Criticism
Spring. 4 credits. Not offered 1997–98.

RUSSL 419  Bakhtin
Spring. 4 credits.

RUSSL 420  Russian Intellectual History
S HUM 404 Trauma and Captivity from Cervantes to Garcia Márquez (also Spanish Literature 404)
Fall. 4 credits. Limited to 15 students. Limited to graduate students and qualified undergraduates. M.A. García. The psychoanalytical notion of trauma comes to the fore in the narratives of Cervantes through the repetitive reenactment of his ordeal as a captive of Maghrebi corsairs in Algiers. Our seminar will survey the effects of captivity in Cervantes, from his famous "Captive's Tale," in Don Quijote I, to the stories of human bondage and delusions explored by his novelas. No other age resembles more the early modern Mediterranean world, described by Cervantes, than the twentieth-century with its random imprisonments and assassinations for dissenting political views. Paying particular attention to the erotic-political connections surfacing in these fictions, we will compare Cervantes' approach with contemporary texts and films that deal with torture and kidnapping in Latin America. Selections include works by Cervantes, Dorfman, García Márquez, Sábato, and Luisa Valenzuela. Theoretical readings on trauma and torture may be drawn from texts by Barthes, Foucault, Craciano, Feiman, and Scarry. Among others. The course will be conducted in English. Special arrangements will be made for students wishing to read the texts in Spanish.

S HUM 405 Freud and Since: Trauma and the Object (also English 424/624)
Fall. 4 credits. Limited to 15 students. M. Jacobus. Freud's and Klein's writings redefine trauma as the loss of the object. We will explore the implications of this redefinition for the evolution of psychoanalytic theory in England and France, asking questions such as: how does psychoanalysis make sense of traumatic events? We will also compare Cervantes' approach with contemporary texts and films that deal with torture and kidnapping in Latin America. Selections include works by Cervantes, Dorfman, García Márquez, Sábato, and Luisa Valenzuela. Theoretical readings on trauma and torture may be drawn from texts by Barthes, Foucault, Craciano, Feiman, and Scarry. Among others. The course will be conducted in English. Special arrangements will be made for students wishing to read the texts in Spanish.

S HUM 406 Trauma and Memory
Fall. 3 credits. Limited to 15 students. P. Ramadano. In this seminar we will try to bring together important philosophical concepts of memory (Plato, Aristotle, St. Augustine, Nietzsche) and Freud's analysis of trauma in order to provide a better understanding of traumatic memory that includes both perspectives. With Derrida we will also explore the psychoanalytic coexistence of trauma and memory. With the help of the course we will be able to understand memory.
S NUM 409 The Pathological Public Sphere (also English 457/657)
Fall. 4 credits. Limited to 15 students.
Limited to graduate students and seniors with permission of instructor. Seniors must submit a 2-3 page statement on related or preparatory courses taken and reasons for choosing seminar. Deliver to room 212 A.D. White House by 8/28/97. M. Seltzer.

An interdisciplinary examination of the shifting understandings of the social and collective conditions of the subject, from the later nineteenth century to the present. More exactly, an account of the ways in which spectacles of public violence and pathology have come to provide one of the most powerful ways of keeping visible the possibility of the shared social spaces of the public sphere itself, albeit a way of conserving that possibility in markedly negative or aversive form. What this amounts to is the formation of what might be called the pathological public sphere. Readings will include literary, sociological, and psychological accounts of "the crowd," "mass culture," and the "pulses in modern psychoanalytic theory will include Freud, Group Psychology and the Analysis of the Ego, Laplanche, Life and Death in Psychoanalysis, Zizek, For They Know Not What They Do: Enjoyment as a Political Factor, and Borch-Jacobsen, The Freudian Subject, in anthropological/sociological work, Canetti, Crowds and Power, Theweleite, Male Fantasies, Habermas, The Structural Transformation of the Public Sphere, and in literary/visual arts, novels (among others, T. Swift, Krabbe, Harris), and films including Pandora's Box, The Vanishing, True Romance.

S NUM 410 Politics and Trauma: From Revolution to Transgression
Fall. 3 credits. Limited to 15 students. S. Stewart.

How does the nineteenth-century opposition of reform and revolution get rewritten into the twentieth century as the opposition of patriarchy and transgression? This seminar will trace the psychoanalytic theory of the (male) democratic subject through this transformation. It will begin with Freud, especially his cultural writings on his founding myth of democratic subjectivity as the killing of the primal father. Freud's work, as well as his feminist critics, will comprise the largest part of the course. Subsequent readings will include the theorists of German Social Democracy, Benjamin, Schmitt, Lacan, Bersani, and Felman.

S NUM 412 Theory, Pathology, Treatment (also German Studies 411)
Fall. 4 credits. Limited to 15 students. B. Martin and C. Miller.

In keeping with the Society of the Humanities theme, "Why Trauma, Why Psychoanalysis," this course is designed to examine not only psychoanalytic histories but alternative approaches to the conceptualization of "trauma," "childhood," and intervention. The course will be team-taught. Biddy Martin, professor of German studies, will explore the constructions of "trauma," "childhood," and "play" in the history of psychoanalytic work on children. Carol Maxwell Miller, a clinical psychologist, will discuss the effects and treatment of trauma from several current theoretical perspectives and provide an overview of ongoing research. It is our

S NUM 418 The Sexual Child (also English 401/601)
Spring. 4 credits. Limited to 15 students. B. E. Hanson.

With respect to children, Americans today have what we might call a pedophilic imagination. The sexual child, as an emblem of trauma, has become the focus of moral panics from every point on the political spectrum—panics about cultural phenomena as various as child pornography, single-parent motherhood, the Roman Catholic priesthood, access to the Internet, and gay studies curricula. But what is it a child? What does it mean to love or desire a child? How might we construe child sexuality beyond the dominant, largely Freudian paradigm of Trauma? Who promotes the idea of child sexuality and why? How has it been constructed through narrative and visual imagery? This course offers a political, historical, and rhetorical analysis of the language of trauma that has developed around the sexual child in the past century. Readings for the course will include theoretical texts on child sexuality, trauma, and the debate over "false memory" (Sigmund Freud, James Kincaid, Judith Lewis Herman, Frederick Crews); we will also do close readings of literary and visual texts, from Lewis Carroll's Alice books to Stanley Kubrick's film The Shining, and Sally Mann's erotic photographs of children.

S NUM 419 The Trauma of the Conquest
Spring. 3 credits. Limited to 15 students. Some knowledge of psychoanalysis is required. M. Hernandez.

All sorts of consequences, factual and ideological, seem to derive from the traumatic Westernization of the Andean world. The application of psychoanalysis to the understanding of the trauma of the conquest of the Incas may allow for new narratives of the event and a deeper comprehension of its consequences. The seminar also offers a chance to review the psychoanalytic concept of trauma and the value of its application.

S NUM 420 Objects, Lost and Found (also German 420/620)
Spring. 4 credits. Limited to 15 students. M. Jacobus.

Psychoanalysis has grown to literature from its inception. Approaching literary and aesthetic questions by way of the legacy of Freud and Klein, we will ask how criticism can engage productively with central concepts in British and Continental object relations theory. We will focus on the reading of specific literary "objects."

S NUM 421 Electronic Art, Cultural Memory, Baroque Theory (also English 434/634)
Spring. 4 credits. Limited to 15 students. Students should have a confident grasp of electronic art and/or early modern culture. T. Murray.

The course will analyze the "interface" between recent projects in video and the electronic arts (from installation to the World Wide Web) and the trajectory of early modern culture. How should we read the attraction and resistance of electronic art to early modern precedents of utopia, colonialism, passion, light, and space? Is it coincidental that so many video and electronic artists have turned their attention to consider the traumatic consequences of the new early modern technologies of printing, science, art, and colonialism? Does the turn to the
Baroque shed light on our own society's ambivalent response to electronic art and its digital machineries developed in an uncertain age of rapid societal transformation, erosion of identity and rational boundaries, suspicion of the-parser with a special caused by epidemic and natural catastrophe? We will consider video and electronic artists such as Juan Downey, Thierry Kuntzel, Esther Parada, Gary Hill, Peter Greenaway, Derek Jarman, Keith Piper, Bill Viola, Yves Van Duvall, Francesc Torres, Tony Oursler, Lynne Hershenow, and Steve Fagin. The seminar will also consider essays on visualization and the Baroque by such writers as Gilles Deleuze, Julia Kristeva, Raymond Bellour, Louis Marin, Rosalind Krauss, Mieke Bal, Christine Buci-Glucksmann, D. N. Rodowick.

S HUM 422 The Age of Anxiety
Spring. 3 credits. Limited to 15 students. General knowledge of psychoanalytic and/or critical theory recommended. J. Stonebridge.

South Asia Program
The South Asia Program coordinates research, teaching, and special campus events relating to Bangladesh, India, Pakistan, Nepal, and Sri Lanka. The program faculty includes members from a variety of disciplines, including agricultural economics, agricultural engineering, anthropology, architecture, art, city and regional planning, communication, comparative religion, ecology and systematics, economics, English, environment, history, history of art, human ecology, industrial and labor relations, international agriculture, linguistics, literature, rural sociology, and science, technology, and society. Undergraduates with a special interest in the region may major in Asian studies with a South Asia concentration, or complete a South Asia concentration with any other major. Graduate students may pursue the M.A. degree in Asian studies with a concentration in South Asia.

Southeast Asia Program

Southeast Asian studies at Cornell is included within the framework of the Department of Asian Studies. Nineteen full-time core faculty members in the colleges of Arts and Sciences, Business and Public Administration, 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. An additional 18 lecturers and other faculty provide language and area instruction on Southeast Asia. Courses are offered in such fields as agricultural economics, anthropology, Asian studies, economics, finance, government, history, history of art, linguistics, music, and rural sociology. Instruction is also offered in a wide variety of Southeast Asian languages: Burmese, Cambodian, Cebuano (Bisayan), Indonesian, Javanese, Tagalog, Thai, and Vietnamese, for which Foreign Language Area Studies Fellowships are available to U.S. citizens. Intensive instruction in Indonesian is offered in the Full-Year Asian Language Concentration (FALCON) which covers the beginning and intermediate levels. An intensive advanced Indonesian language program is held from June through August in Indonesia each summer. The formal program of study at Cornell is enriched by a diverse range of extracurricular activities, including an informal weekly brown bag seminar and concerts of the Gamelan Ensemble. The George McT. Kahin Center for Advanced Research on Southeast Asia is also the site for public lectures and other activities related to this area. The John M. Echols Collection on Southeast Asia, in Kroch Library, is the most comprehensive collection on this subject 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 by completing 18 credits of coursework. Students interested in exploring these opportunities should consult the director, Southeast Asia Program, 180 Uris Hall.

PhD Program in Asian Studies
Fellows, visiting scholars, and graduate students from the United States and the region are accepted to pursue advanced research at Cornell. Asian studies graduate students may pursue the M.A. degree in Asian studies with a concentration in Southeast Asia, South Asia, or East Asia, or the Ph.D. degree in an interdepartmental program. The degree requirements are flexible, allowing students to design their study according to their research interests. Advanced seminar courses are held throughout the academic year, and the department organizes an annual seminar and colloquium program. The program also serves as a regional office for the Association for Asian Studies, and it organizes an annual conference for graduate students and faculty in Asian studies. The department also offers a summer institute for graduate students in East Asia, which includes seminars, workshops, and field trips. The program has a strong focus on gender, sexuality, politics, and society, and it encourages interdisciplinary approaches to the study of Asia.

PhD Program in South Asian Studies
The South Asia Program at Cornell is a multidisciplinary program that offers graduate students the opportunity to pursue advanced research in the history, culture, and societies of South Asia, which includes the countries of Bangladesh, India, Pakistan, Nepal, and Sri Lanka. The program is committed to fostering a diverse and inclusive intellectual community that values difference, promotes critical thinking, and encourages the development of new perspectives on the region.

The program offers a comprehensive curriculum that includes coursework in a variety of disciplines, such as history, anthropology, economics, linguistics, literature, and social sciences. Students have the opportunity to work closely with faculty members from across the campus, including members of the colleges of Arts and Sciences, Business and Public Administration, and Agriculture and Life Sciences.

Students interested in exploring these opportunities should consult the director, Southeast Asia Program, 180 Uris Hall.

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.

Women's Studies Program

Introduction to the Program
Women's Studies is an interdisciplinary program that seeks to deepen understanding of women's lives, cultures, and history, in all their complex multiplicities. Transformative as well as additive, women's studies challenges us to re-examine much of what we think we already know by providing an intellectual—and critical—framework through which to view the many interconnections among gender, knowledge, and power. Thus, central to the curriculum in women's studies are such overarching notions as these:

(a) that definitions of gender—including those that privilege exclusive heterosexuality—are not natural or universal but are instead social constructions that vary across time and place, serve political ends, and have ideological underpinnings;

(b) that systems of gender inequality interact with other social inequalities, including those of class, race, ethnicity, sexual preference, and Western vs. non-Western cultures; and

(c) 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 instead emerges out of particular historical and political contexts.

Although all Women's Studies courses except writing seminars count toward the major, they do not all satisfy distribution requirements or count toward the total hours required in Arts and Sciences; if a course is cross-listed with another Arts and Sciences department, be sure to check with college offices about whether it will satisfy distribution or our requirements for Arts and Sciences.

Program Offerings
The Women's Studies Program 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 women's studies can apply directly to the program. Undergraduate students in other colleges at Cornell will need to work out special arrangements and should speak to the Director of Undergraduate Studies (DUS) in Women's Studies.

The Undergraduate Major

The questions posed by feminist inquiry cannot be answered from within any single discipline or even from a simple combination of two or more disciplines. For that reason, the women's studies major provides students with a basic groundwork in the interdisciplinary field of women's studies and then requires each student to construct an advanced and individually tailored program of study on a topic, in a discipline, or in a combination of disciplines of special interest to the student alone.

Rather than specifying a particular sequence of required courses for each and every student, the women's studies major gives students a starting point in women's studies, an active advisory system to help them shape a curriculum, and an ongoing impetus to reflect on their entire program of undergraduate study.

In designing their major, students should keep in mind that there are not many graduate programs offering a degree in women's studies itself. Accordingly, undergraduates wishing to major in women's studies should talk at length with a faculty member about how to design a program of study that will best qualify them for entry into either a job or a postgraduate degree program when they leave Cornell. To give one example of what needs to be considered in designing a major: Undergraduates who might want to do graduate study within a discipline will need to develop a certain level of disciplinary specialization at the undergraduate level. This can be done either by supplementing the women's studies major with a carefully selected cluster of courses in that discipline or by pursuing a double major.

Requirements for a Women's Studies Major

1. Prerequisite courses: Before applying to the major, the student must complete any two Women's Studies courses with a grade of B- or better. Some suggested entry-level courses for 1997–98 include: 206, 210, 234, 263, 269, 273, 277, and 285. These courses would count both as prerequisites and as part of the women's studies major. Freshman writing seminars, in contrast, would count as prerequisites but not as part of the major.

2. Required course work:
   a. A minimum of 36 credits in women's studies is required for the major. No course in which the student has earned less than a C- can count toward these 36 credits. Although there is no single women's studies course that is required of all majors, every major must complete a program of study that is both graduated in difficulty and interdisciplinary in scope—a program, in other words, that reflects both the breadth and depth of women's studies scholarship. This program of study must be developed in consultation with the student's adviser in women's studies and must include advanced seminars at the 300 level or above.
   b. Students may count up to three courses outside women's studies toward the major if those courses are approved by the student's women's studies adviser as constituting a meaningful component of the student's women's studies curriculum. To facilitate the coordination of a women's studies major with other majors in the college, students may also count toward the major up to three courses that are simultaneously being counted toward a second major.

3. The Honors Program: To graduate with honors, the major in women's studies must complete a senior thesis under the supervision of a women's studies 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 3.5 average in all courses applying to their women's studies major. Students interested in the Honors Program should consult the Director of Undergraduate Studies (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 WOMNS 400 and the "Guidelines For a Senior Honors Thesis" available in the Women's Studies Program office.

The Women's Studies Concentration

Undergraduate students in any college at Cornell can concentrate in Women's Studies in conjunction with a major defined elsewhere in the university. The concentration consists of four courses in Women's Studies completed with a grade of D- or above, no more than two of which can come from a single discipline and none of which should overlap with the major. Freshman writing seminars cannot be included within the four required courses. Students wishing to concentrate in Women's Studies should see the DUS.

The LBG Concentration

Women's Studies serves as home to the Lesbian, Bisexual, and Gay Studies Program, which offers an undergraduate concentration as well as a graduate minor. The LBG undergraduate concentration consists of four courses. The Women's Studies courses that may be used to fulfill the LBG concentration are 210, 262, 277, 321, 355, 376, 377, 413, 433, 450/650, 465, 465/665, and 466. For a complete listing of all courses that will fulfill this concentration please see the LBG Studies Program office.

WOMNS 104 FWS: Whose Families?

Spring. 3 credits. M. B. Norton.

Today the term "family values" appears frequently in the media. Traditional family values are being destroyed, commentators claim, by (take your pick): divorce, abortion, the gay-lesbian rights movement, wage-earning mothers, teenage out-of-wedlock births, violence and sex on television and in the movies, rap music, you name it. The list seems endless. This seminar will first identify and analyze contemporary texts discussing the seeming decline in "family values." It will then read and analyze historical works. Finally, students will explore the experience of their own families by examining documents and/or interviewing relatives, primarily parents and grandparents, to place "common knowledge" into concrete historical and personal contexts, and to familiarize students with the process of rigorous analysis.

WOMNS 105 Feminine and Masculine Ideals in Japanese Culture (also Asian Studies 105)

Fall and spring. 3 credits. Staff.

In its long history, Japanese culture has developed a large number of role models—the aristocrat, poet-priest, warrior, entertainer, "salary man," and "education mama" and idealized them in its literature and art. Using these ideals as its subject matter, the seminar will give students practice in reading texts closely, analyzing ideas, and writing various types of papers. Through studying Japanese concepts of femininity and masculinity, the students will not only explore a new culture but will also gain new perspectives on their own cultures.

WOMNS 106 FWS: Women and Writing (also English 105)

Fall and spring. 3 credits. Staff.

What is a woman? How does she confront her personal experience? Does she play a special role in history? To what extent does society, or in our understanding of language and literature? This course will explore the relationship between women and writing. We will discuss writings by and about women, debate our attitudes toward feminism, and analyze the relevance of these questions to our own written work. Individual sections will emphasize different aspects of the relationship between women and writing. Which section to choose would depend on your own interest in exploring how women appear in private or autobiographical writings, historical contexts, and/or literary works. Further information on specific sections is available in the freshman writing seminar office. Textual overlap is kept to a minimum so that students can take more than one Women and Writing seminar during their time at Cornell.

WOMNS 107 FWS: Women Living on the Edge (also Society for the Humanities 106)

Fall. 3 credits. S. Olov.

This seminar about women confronting state power and terror in Soviet Russia, Nazi Europe, and the American South during slavery and segregation will focus on how they have portrayed themselves, or have been portrayed, in fiction, nonfiction, poetry, and film. We will analyze these portrayals from rhetorical, moral, and historical perspectives, paying special attention to how they are presented and how they are received. Our writing will mostly be analytic. Materials will include a report smuggled out of a Soviet labor camp by women political prisoners in the '70s; Anne Frank's Diary and testimonies by Holocaust survivors; Laura Jane Look's Book of a Slave Girl Written by Herself; Bette Davis's film Watch on the Rhine; and our interview with a Russian dissident.

WOMNS 109 FWS: Gendered Imaginations in African History and Literature (also History 109)

Fall. 3 credits. A. R. Greene.

In this course, we will explore and write about the many worlds of African history,
culture, and society throughout texts composed by African oral historians and contemporary African fiction writers. Texts include the oral tradition, SUNDIALTA, and the historical novel, SHAKA, as well as writings by Chinua Achebe, Buchi Emecheta, Flora Nwapa, who use their novels to engage in an intense debate about the role that women and men play and continue to play in the societies in which they live.

WOMNS 167 FWS: Masculinity in Light of Feminism (also Anthropology 167) Fall. 3 credits. A. Villarejo. What is masculinity? What is male domination, and what is its relationship with masculinity? What are the possibilities for reforming or even radically transforming the gendered power relations of male domination, and what would the impact be upon masculinity? This course examines both what masculinity and male domination are and how they might be transformed through an exploration of anthropological literature on masculinity cross-culturally and feminist critiques of masculinity and male domination.

WOMNS 178 FWS: Desire (also English 178) Fall. 3 credits E. Hanson. In this course we will discuss some of the literary methods of articulating "these pleasures which we slightly call physical," to borrow a phrase from Colette. We will begin with the theory that sexual desire has a history, even a literary history, and we will examine some of its most influential modes: Platonic, Christian, decadent, psychoanalytic, and feminist. Because this is a course in lesbian and gay studies, we will focus on homosexuality almost every week, but we will also discuss hysteria, mysticism, madness, masochism, gender-bending, pornography, and psychoanalytic and feminist perspectives. Course objectives will be achieved through lectures, readings, films, class discussions, and personal experiences.

WOMNS 210 Introduction to Feminist Theory Fall. 4 credits. A. Villarejo. This course introduces students to critical approaches in feminist scholarship to the cultural, social, 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.

WOMNS 214 Biological Basis of Sex Differences (also Biological Sciences 214 and Biology and Society 214) 3 credits. Prerequisite: one year introductory biology. Limited to non-biology majors and freshmen, sophomore, and junior biology majors; majors may register only with permission of the instructor. Offered alternate years. Not offered 1997-98. Next offered Fall 1998-99. J. Fortune.


WOMNS 234 Gender in Early Modern Europe (also History 234) # Spring. 4 credits. Sophomore seminar. Enrollment limited to 20 students. R. Weil. An inquiry into how masculinity and femininity were defined in early modern Europe. Questions to be explored include: What purpose did gender distinctions serve in this particular society? To what extent were men and women able to shape and redefine the meaning of their gender? How was their ability to do so affected by such events as the Reformation and the French Revolution?

WOMNS 238 The Historical Development of Women as Professionals, 1800-Present (also Human Development and Family Studies 258, American Studies 258, and History 238) # Spring. 3 credits. Not offered 1997-98. J. Brumburg.


WOMNS 244 Language Use and Gender Relations (also Linguistics 244) Spring. 4 credits. S. McConnell-Ginet. This course explores connections between language (use) and gender (sex) systems, addressing such issues 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 sex, gender? How does conversation structure the social worlds of women and men? Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and general women's studies and feminist theory.

WOMNS 249 Feminism and Philosophy (also Philosophy 249) Fall. 4 credits. J. Whiting. An historical introduction, using literary as well as philosophical texts, to views about the nature of women and their position in society—from the ancient debate (between Plato and Aristotle) about whether men and women are by nature suited to different activities, to contemporary debates between "sameness" and "difference" feminists. Texts will include Anaxagoras, Aristotle, Rousseau, Wollstonecraft, Engels, and various twentieth-century authors (such as Virginia Woolf, Carol Gilligan, Catherine MacKinnon, and Sarah Houl gland).

WOMNS 251 Twentieth-Century Women Novelists (also English 251) 4 credits. Not offered 1997-98. S. Samuels.

WOMNS 253 Interpreting Melodrama and the Woman's Film (also English 253) Spring. 4 credits. Students must be free to attend regular screenings of films and videos. Lab fee $25.00. Priority given to Women's Studies and English majors. Limited to 20 students.

With some attention to melodrama's roots in nineteenth-century fiction and theatre and in twentieth-century women's fiction and popular Freudianism, we will work to define Hollywood's melodrama as both a genre and a way of viewing the world. Psychoanalytic and feminist analyses of melodrama will help us pose larger 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 questions about desire, pleasure, fantasy, and ideology in relation to the melodramatic heroine. Required weekly, evening screenings of such films as Stella Dallas, Now, Voyager, Mildred Pierce, The Woman, Imitation of Life, and Gaslight and Picnic. Regular critical readings, frequent viewing questions, two longer essays, no exam.

WOMNS 259 Introduction to Feminist Political Thought (also Government 368) Spring. 4 credits. Not offered 1997-98. N. Hirschmann.

This course will provide a general introduction to feminist political thought, surveying various current issues and methodologies. The course will combine analysis of women's historical political thought and the relationship of feminism to the discipline of political science; readings by contemporary feminist theorists, and consideration of what theory can contribute to practical issues such as hazing, pornography, prostitution, racism, sexuality, and sexual harassment.

WOMNS 273 Women in American Society, Past and Present (also History 273) # Spring. 4 credits. M. B. Norton. A survey of women's experiences in America from the seventeenth-century to the present. Among the topics to be discussed are women's familial roles, the changing nature of household work, racial and ethnic differences in women's experiences, the movement for women's rights for women, and contemporary feminism.
ARTS AND SCIENCES - 1997-1998

WOMNS 277 Social Construction of Gender (also Psychology 277)  
Fall. 3 credits. Limited to 240 students.  
S. Bem.  
Psychology/Women's Studies 277 is an interdisciplinary course that addresses two broad questions: 1) how an individual's gender and sexuality are constructed; and 2) how hidden assumptions or "lenses" embedded in our social institutions, cultural discourses, and individual psyches perpetuate mental assumptions 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 in the importance of looking at biology in context, the parental "instinct," androcentrism in law, sexual orientation cross-culturally, androgyne, the intersections of gender and race, sexual harassment, egalitarian relationships, gender-liberated child-rearing, and homophobia.

WOMNS 279 Lesbian Personae (also English 279)  
Fall. 3 credits. Not offered 1997-98.  
E. Hanson.

WOMNS 285 Introduction to Sexual Minorities (also HDFS 284)  
Fall. 3 credits. Prerequisite: One social science course. Sections TBA.  
R. Savin-Williams.  
This course introduces students to theories, empirical scholarship, public policies, and current controversies with lesbian, gay, bisexual, transgender, sexual questioning, and other sexual minority populations. The major focus is on historical, social, development, lifestyles, and communities with additional emphasis on ethnic, racial, gender, and class issues. Requirements include reaction papers to the readings.

WOMNS 305 Emotion, Gender, and Culture (also Anthropology 305)  
4 credits. Not offered 1997-98.  
B. J. Isbell.

WOMNS 307 African-American Women in Slavery and Freedom (also History 303 and Africana Studies 307)  
Historical exploration of African-American women from a sociopolitical perspective. Topics include: slavery, freedom, sexuality, labor, family, gender cross-racially that begins with the African background and ends at 1900.

WOMNS 321 Sex and Gender in Cross-Cultural Perspective (also Anthropology 321)  
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 the relative positioning of the sexes in social, political, economic, ideological, cultural, and biological aspects of culture; we emphasize the diversity in gender and prospects for change around the world. In addition to lectures and films or videos, participants will work in small discussion sections (maximum enrollment of eight) to prepare several practical field exercises, short papers and critical assessments of other course materials.

WOMNS 341 Ethical Theory (also Philosophy 341)  

WOMNS 344 Male and Female in Chinese Society and Culture (also Anthropology 344)  

WOMNS 348 The Female Literary Tradition: Wollstonecraft to Woolf (also English 348)  

WOMNS 349 Readings in Feminist Literary Theory (also English 349)  

WOMNS 353 Feminism: State and Public Policy (also Government 353)  

WOMNS 355 Decadence (also English 355)  
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, unnatural, or morbid, the so-called "decadents" of the late-nineteenth century sought to free the pleasures of beauty and sexual desire from their more conventional ethical moorings. Although we will focus on Oscar Wilde, we will also read works by Charles Baudelaire, Paul Verlaine, J.-K. Huysmans, Renee Vivien, Leopold von Sacher-Masoch, Walter Pater, A.C. Swinburne, and Lionel Johnson. We will also consider historical, theoretical, and early medical texts on sexual inversion. Because this is a course in lesbian and gay studies, we will focus primarily on the various ways that decadence became a powerful trope for the articulation of homosexuality and other proscribed sexual pleasures. Topics for discussion will include androgyny and sexual inversion, sodomy and satanism, lesbianism and vampirism, cultural and linguistic degeneration, hysteria and paranoia, masochism and mysticism, chastity and sublimation, Catholicism and Hellenism, and dandyism and camp.

WOMNS 357 American Families in Historical Perspective (also History 359, American Studies 359 and Human Development and Family Studies 359)  
3 credits. Prerequisite: Human Development and Family Studies 150 or one 200-level social science or history course. Students in endowed units must register for Women's Studies 357 or History 359 or American Studies 359. Not offered 1997-98. Next offered 1998-99. J. Brumberg.

WOMNS 358 20th-Century Experimental Fiction by Women (also English 358)  

WOMNS 362 Global Perspectives on Gender  
Spring. 4 credits. N. Assie-Lumumba.  
The course will examine how forms of gender inequality have been shaped by historical and political forces and structured by differences in national histories. The class will be taught by a rotating set of two faculty members from different departments. Contingent on the particular faculty directing the course, the class will consider 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; the role of the state in constructing an engendered economy and policy.

WOMNS 363 Representations of Women in Ancient Greece and Rome (also Classics 363 and History 367)  
Spring. 4 credits. L. Abel.  
The task of this course is to analyze ancient Greek and Roman representations of women—some famous, some infamous, some nameless—within their historical and cultural contexts and the assumptions that underlie these representations. Using literary, historical, legal, and artistic sources (in translation) and examining the historiographical and methodological problems the use of such evidence poses, the class will assess the changing social conditions that relate to the roles, status, and images of women in antiquity. Among the topics considered are: myth and ideology, women's role in the family and society, views of the female body and female sexuality, the place of women in creative art.

WOMNS 366 Women at Work (also Industrial and Labor Relations: Human Resources 366)  
Spring. 3 or 4 credits. J. Farley.  
Various aspects of female occupational roles in twentieth-century United States. Historical, social, and legal factors that influence women's choice of careers, work socialization and training, and subsequent labor-market experience are considered. Working women's entry-level jobs, opportunities for advancement, and income are compared to men's.

WOMNS 368 Marriage and Sexuality in the Middle Ages (also History 368 and Religious Studies 368)  
Few topics generate heat so readily as gender relations and sexuality. Behind the current controversies lie decisions made in the first Christian centuries, and firm up in the course of the Middle Ages; these still affect all of us, believers and unbelievers alike. This course studies Western attempts to deal with the problem of sexuality up to about 1500. The class will first clarify the church's normative rules of law and theology. Armed with this framework, it will then turn to more specific topics, including homosexuality, prostitution, rape/abduction and sexuality in medieval literature. The goal is to be able to compare the ideal model with the reality, and thus to assess the product the medieval church passed on to Western culture and ourselves. No formal prerequisite, though some prior knowledge of medieval European history is desirable.
WOMNS 370 19th-Century Novel (also English 370) #
E. Hanson.

WOMNS 374 Nineteenth-Century American Women Writers (also English 374 and American Studies 374) #
Spring. 4 credits. I. Brown.
In this cross-cultural examination of nineteen­teenth-century American women writers, we will contrast a variety of nineteenth-century works of fiction, political/feminist manifestos, and slave narratives. We will investigate the ways in which these writers used their texts to construct culturally valuable and authentic selves. We will also consider tensions between "sentimental" idealism and political pragmatism, passionless femininity, and autonomy. Readings will include Louisa May Alcott's Behind a Mask, Anna Julia Cooper's A Voice from the South, Frances Harper's Iola Leroy, Harriet Beecher Stowe's The Ministers' Wooing, and Harriet Wilson's Our Nig.

WOMNS 376 Gay Fiction (also English 377) #
E. Hanson.

WOMNS 380 Gender, Ideology, and Culture (also Sociology 380) #
Spring. 4 credits. P. Becker.
This course will explore representations of women in popular culture, including images, narratives, and religious practices. We will examine the relationship between popular culture and ideology, and look at how women "read" popular culture. The aim of the course is to enable students to critically and analyze the effects of ideological representations of difference on personal identity, construction, status, and power relationships. Readings are drawn mostly from sociology of culture and cultural studies; most texts deal with popular culture and gender in the 19th and 20th centuries United States.

WOMNS 381 19th Century French Women Literature (also French Literature 381) #
Fall. 4 credits. Course conducted in French.
A. Berger.
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 will include Stéphanie de Pellevé, George Sand, M. Desbordes-Valmore, Flora Tristan, and Rachilde.

WOMNS 384 History of Women and Unions (also Industrial & Labor Relations 384) #
Spring. 4 credits. J. DeVault.
This course will examine women’s participation in the U.S. labor movement in the nineteenth and twentieth centuries. The class will cover issues such as women workers’ relations with male-dominated union movements, the role of cross-class alliances of women in organizing women workers, and organizations with radical parties and organizations, problems faced by women union leaders and activists, racial and ethnic differences in organizing, and the impact of societal stereotypes and expectations.

WOMNS 400 Senior Honors Thesis
Fall and spring. 2–4 credits. For Women’s Studies seniors only. Permission of Women’s Studies faculty member required. Student must carry a GPA of 3.0 in all subjects and a 3.3 in Women’s Studies.
Staff.
Both the form of theses, and the nature and extent of contact between student and adviser, will depend on mutual agreement between the two. In one diagram, the student will write an essay of approximately 50 pages in length, drafted and revised in a series of carefully planned stages over the course of two semesters, with an outline expected on approximately Sept. 15th and a draft of the first chapter on approximately November 15th. An “R” grade will be assigned at the end of the fall semester and a letter grade on completion of the project at the end of the spring semester.

WOMNS 404 Women Artists (also History of Art 406) #
Fall. 4 credits. J. Bernstock.
This seminar will be devoted to a study of the work of women artists from antiquity to the present. The works of the most important women artists from each period will be studied in relation to prevailing issues and styles of roles in society. Readings by feminist critics are a major part of the course.

WOMNS 406 The Culture of Lives (also Anthropology 406) #

WOMNS 409/609 Misogyny and Its Readers (also Italian 409/609 and Comparative Literature 449/649) #

WOMNS 426 Undergraduate Seminar in Early American History (also History 426) #

WOMNS 427 Shakespeare: Gender, Sexuality, Cultural Politics (also English 427) #
B. Correll.

WOMNS 431 Scenes of Female Enlightenment (also English 431) #
M. Jacobus.

WOMNS 433 The Female Dramatic Tradition (also Theatre Arts 436) #

WOMNS 438 Female Adolescence in Historical Perspective, 1815–1960 (also Human Development and Family Studies 417 and History 458) #
Spring. 3 credits. J. Brunberg.
This seminar analyzes the changing nature of female adolescence in the United States is explored using nineteen­teenth-century primary sources available in the Department of Manuscripts and University Archives. Olin Library multidisciplinary readings and discussion sessions are designed to uncover the nature of women’s childhood, patterns of authority within the family, cultural attitudes toward sexuality, female friendships, courtship patterns, and rites of passage into adulthood.

WOMNS 444 Historical Issues of Gender and Science (also Science and Technology Studies 444) #
Fall. 4 credits. M. Rossiter.
This course is a one-semester survey of women’s role in science and engineering from antiquity to the 1990’s with special emphasis on the United States in the 20th century. Readings will include biographies and autobiographies of prominent women scientists, educational writings, and other primary sources as well as recent historical and sociological studies. By the end of the semester we should have attained a broad view of the problems that have faced women entering science and engineering in the past and those that still remain. There are no formal prerequisites for the course, although some knowledge of women’s history and the history of science would be helpful.

WOMNS 445 Nineteenth-Century Women Novelists (also English 445) #

WOMNS 447 Reading Freud: Gender, Race, and Psychoanalysis (also German Studies 447 and Comparative Literature 447) #

WOMNS 448/648 Boccaccio: Gender, Power, and the Sexual Text (also Italian Literature 445/645 and Comparative Literature 456) #
Fall. 4 credits. M. Migiel.
A study of the discourses about reading and sexual difference in Boccaccio’s Decameron. We will devote special attention to two questions: 1) What does it mean to carry out a feminist reading of a male-authored text? 2) How do the narrators of the Decameron rework earlier discourses about reading and sexual difference found in literary, historical, and philosophical material drawn from Italian, Old French, and Latin sources? All readings will be done in English translation; students who command the pertinent foreign languages may read texts in the original. An extra hour-long discussion section will be organized for students who read and speak Italian.

WOMNS 450/650 The Lenses of Gender (also Psychology 450/650) #
Spring. 4 credits. Permission of instructor required. Limited to 15 seniors and graduate students. No preregistration; interested students should attend the first class. Graduate students sign up for Women's Studies/Psychology 650. S. Benn.
This seminar analyzes the ideological, institutional, and psychological mechanisms that are responsible for the social reproduction of male power in Western—and especially American—culture. It is interdisciplinary, covering material from biology, history, anthropology, law, sociology, psychology, psychiatry, philosophy, and feminist theory. As much as the central focus of the seminar is on gender, it does not analyze gender in isolation, but looks also at
WOMNS 451 Women in Italian Renaissance Art (also Art History 450) §
Spring. 4 credits. Prerequisite: permission of instructor. C. Lazzaro.
This seminar examines representations of the Madonna and Child from the fourteenth and fifteenth centuries, the narrative scenes painted on tapestries and other domestic furniture, biblical and historical heroines such as Judith and Lucretia, portraits of patrician women and courtesans, and violence to women in a political context. It will investigate the contemporary ideas about motherhood, beauty, sexuality, social presentation, and gender roles in society that inform these representations. We will construct a critical framework for interpreting them in feminist art history and theory, particularly in the Italianate Renaissance. We will be concerned especially 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.

WOMNS 458 Women, Men and the Law in Muslim Courts (also Near Eastern Studies 459) @ #
Fall. 4 credits. Prerequisite: Previous course within Islamic Studies helpful but not essential. J. Pierce.
This course examines relations between women and men by focusing on the manner in which an 18th-century community in the Muslim Middle East functioned through its court. By analyzing actual court cases, we will explore issues such as marriage and divorce, property rights, sexuality and its regulation, access to communal and domestic space, and the control of knowledge. We will be particularly interested in the question of whether normative codes of law (religious, state) were consistent with the individual's sense of moral worth and self-interest; hence we will also be concerned with relations between the individual and the community, and between the community and the state. Previous course work in Islamic studies is helpful but not essential.

WOMNS 459 Education in Africa and the Diaspora (also Africanas 458) @
Fall. 4 credits. N. Assie-Lumumba.
This course deals with theories and concepts of planned change for social development and their application to educational innovations geared to promoting equal opportunity based on gender, race, and class in Africa and the African Diaspora. The first part of the course will be concerned with the stages of innovations from their inception to their implementation, resistance, diffusion and impact of different social categories. The second part of the course will deal with concrete cases of educational innovations such as the creation of educational institutions and change in curriculum development and medium of instruction. Historical and contemporary cases of educational innovations will be presented and analyzed. The case studies include the development of Africana Studies as a discipline, the creation and expansion of historically black institutions such as Lincoln University in Pennsylvania, Tuskegee Institute in Alabama, Spelman College in Georgia, and the Westside Preparatory School in Chicago.

WOMNS 461 Feminist Epistemology (also Philosophy 461)
Fall. 4 credits. Prerequisite: K. Jones.
Many feminists recognize that the concepts of reason and objectivity have served the ideological function of maintaining oppressive social structures. It will then use these theories as a framework for examining how history and theory (particularly in the academic disciplines) have been self-undermining, casting into doubt the status of the critique itself. The course begins with this problem. We also examine feminist work on the social construction of gender and the role that "experience" has played in discussions of whether women are a social group.

WOMNS 464 Gender and Politics in the Roman World (also Classics 463 and History 463)

WOMNS 465 Feminist Theory/Lesbian Theory

WOMNS 466 Feminism and Gender Discrimination (also Government 466 and La Linguistica 466)
Fall. 4 credits. K. Abrams.
This course will introduce students to the major schools of feminist legal theory, including equality theory, difference theory, dominance theory, and anti-essentialism. It will then use these theories as a framework for examining several areas in which the law has attempted to address gender-specific injuries. These will include the workplace (sexual harassment, regulation of fertility, work/family conflict), and violence against women (rape, spousal abuse, pornography). The course will emphasize analysis and critique of present political and legal responses and formulation of alternative responses. Some previous exposure to legal materials (case law, statutes) is useful but not required.

WOMNS 467 Sexual Minorities and Human Development (also HDFS 464)
Fall. 3 credits. Limited to 15 students. Permission of instructor required. R. Savin-Williams.
The first half of the course covers topics of a fairly general nature regarding theoretical, research, and applied issues on sexual minorities in context. In the second half of the course, students determine the content through their selection of particular topics that interest them. The success of the course depends on students feeling personally engaged and committed to the course content. Because of the multidisciplinary nature of the course, it is hoped that students from a variety of backgrounds in disciplines, gender, sexual orientation, ethnicity, race, class, and religious affiliation will feel comfortable in the course.

WOMNS 468 Radical Democratic Feminisms (also Government 467)
Fall. 4 credits. A. M. Smith.
Radical democratic feminisms is an advanced feminist theory seminar. We will focus on contemporary political discourses that are influenced by socialist feminism, radical democratic pluralism, critical race theory and radical anti-racist and anti-heterosexist multiculturalism. The reading list will include works by Sheila Rowbotham, Joan Scott, Michele Barrett, Lynne Segal, Zillah Eisenstein, Frances Pox Piven, Barbara Ehrenreich, Jacqui Alexander, Chandra Talpade Mohanty, Judith Butler, Julia Epsteiin, Anne McClintock, Angela Davis, Alice Echols, Dangerous Bedfellows, Lisa Duggan, Nan Hunter, Anya Gluckman and Betsy Reed, Elizabeth Grosz, Elspeth Probyn, Katha Pollitt, Renata Salecl, Patricia J. Williams, Eileen Wels, Gayatri Spivak, Jeffrey Escoffier, Barbara Epstein and bell hooks. Students should have completed at least one course in feminist theory and at least one course in social theory or political theory before taking this course.

WOMNS 471 American Indian Women's Literature (also English 471)
Fall. 4 credits. K. Roberts.
Though a variety of genres—fiction, poetry, the nonfiction essay, and autobiography—as well as media other than writing, we will examine what it means and has meant to be an indigenous woman in North America. Although our focus will be on American Indian women in the United States, we will also consider the experiences of Canadian Native women. Beginning with early tribal histories as expressed in "as-told-to autobiographies," we will look at the ways in which women fit in their respective cultures, their roles in circumstances of their lives. The most famous Indian women—women such as Pocahontas and Sacajawea—have earned their places in American mainstream culture based on heroism enacted primarily to benefit non-Indians. How historically accurate are such portrayals and how representative are such women of other Native women? These and many other questions will guide us throughout the term.

WOMNS 475 Studies in the Twentieth Century (also English 475)

WOMNS 478 Family and Society in Africa (also Africana 478) @
Fall. 4 credits. N. Assie-Lumumba.
The family as a social institution is structured according to socioeconomic, historical, political, and cultural specificities. In this course, the topics to be discussed will include the concepts of nuclear and extended family, the planning and role of different age-groups and generations in the family, marriage and related issues, such as dowry, divorce, parenthood, childrearing, sex roles, and class differences. The course will also discuss the impact of industrialization and of westernization on the family in Third World countries. Examples will be drawn from urban and rural communities in industrial/urban and agrarian/non-western societies.
This course will examine the political, social, and cultural contexts of contemporary feminist theory. Students will study works by writers like Luisa Valenzuela (Argentina), Rigoberta Menchú (Guatemala), Helena Maria Viramontes and Gloria Anzaldúa (U.S.), and Simone de Beauvoir, Monique Wittig, Julia Kristeva, Jacques Lacan, Luce Irigaray, Jacques Derrida, and Helene Cixous. Taught in English. Not offered 1997–98. Next offered spring 1998–99.

D. Castillo.

This course will provide a sampler of novels and short stories by and about Latin American women. We will look at the question of self-construction and issues such as the social and political concerns involved in a specifically Latin American feminine identity. All works will be read in translation (Romance Studies students should read originals of the works from the Spanish). Authors may include writers like Luisa Valenzuela (Argentina) and Rigoberta Menchú (Guatemala), Helena Maria Viramontes and Gloria Anzaldúa (U.S.), and Simone Schwartz-Bart (Guadalupe).

WOMNS 499 Directed Study

Fall or spring. Variable credit. Prerequisites: one course in women's studies and permission of a faculty member of the Women's Studies Program Board. Staff.

WOMNS 500 Special Topics in Feminist Theory: An Interdisciplinary Graduate Course in Women's Studies

Fall. 4 credits. Offered every three years. Not offered 1997–98. K. March.

The purpose of this course is to expose graduate students to interdisciplinary approaches in Women's Studies and feminist theory to a variety of topics or questions. While many of our graduate courses train students in highly specialized areas of feminist theory, this course aims to teach students how to find common intellectual ground around a single topic from interdisciplinary perspectives without sacrificing the complexity of any disciplinary approach. The course is designed for graduate minors in Women's Studies and students with a specialized interest in feminist theory. Although it is not required, the course is strongly recommended for students obtaining a graduate minor in Women's Studies.

WOMNS 608 African-American Women (also History 608)

Spring. 4 credits. M. Norton.

This graduate seminar will examine contemporary feminist theory from the perspective of political theory. We will study the work of feminist theorists who work specifically within the discipline of political science, as well as the specifically political dimensions of work not generally considered political theory. Though particular readings and topics will change from year to year in response to the most recent literature, in general the course will focus on questions of epistemology and methodology as a way to explore a variety of issues of relevance to feminism as an academic, intellectual, and political enterprise.

WOMNS 671 Feminist Methods (also Rural Sociology 671)


WOMNS 685 Reconstructing the Era: Nineteenth-Century African American Women's Literature and Society (also English 685)

Fall. 4 credits. L. Brown.

In this course we will explore the expressions of postbellum ideology, women's culture, and family politics that influenced nineteenth-century African American women's literature. Our discussions of the texts and their social and intellectual impact will be grounded in intensive historical research. While reading such books as Emma Dunham Kelly's Four Girls at Cottage City, Susie King Taylor's Civil War Memoir, A. E. Johnson's The Hazel Family, and Frances Harper's recently discovered novelas (Mmi's Sacrifice and Trial and Triumph), students will refine their nineteenth-century research skills. In addition to working with federal census data, pension rolls, town histories, and lesser-known African American newspapers and periodicals, students will conduct extensive genealogical searches in order to reconstruct the worlds of the nineteenth-century novels we are reading. Contemporary analyses of the nineteenth-century literary tradition, biographies, and examples of methodological approaches by critics such as Claudia Tate, Frances Smith Foster, Hazel Carby, Elizabeth Ammons, Melba Boyd, and Ann duCille will complement the primary materials.

WOMNS 692 Hispanic Feminisms (also Romance Studies 692)

Fall. 4 credits. Taught in Spanish.

D. Castillo.

This seminar is designed to explore the interrelationship of feminist literary theory and the narrative production of the Hispanic world. In this inquiry, we will be developing feminist critical methodologies (based on readings of essays by thinkers such as Castellanos and Glanz) and developing strategies for possibilities of feminist criticism. Finally, we will study the ways in which feminist analyses of literature alter our readings of texts by men (Isacs, Cotázar, Onetti, García Lorca) as well as by women (Pardo Bazán, Tusquets, Valenzuela, Garro), and how they change our conception of criticism and the task of the critic.

WOMNS 699 Topics in Women's Studies

Fall or spring. Variable credits. Staff. Independent reading course for graduate students on topics approved in regularly scheduled courses. Students develop a course of readings in consultation with a faculty member in the field of Women's Studies who has agreed to supervise the course work.
ARTS AND SCIENCES - 1997-1998

FACULTY ROSTER

Aburfa, Hector D., Ph.D., U. of North Carolina at Chapel Hill. Emile M. Chamot Professor of Chemistry, Chemistry
Adams, Adam G., Ph.D., U. of Michigan. Assoc. Prof., Africana Studies and Research Center
Adams, Barry B., Ph.D., U. of North Carolina. Prof., English
Adelson, Leslie A., Ph.D., Washington U. Prof., German Studies
Ahl, Frederick M., Ph.D., U. of Texas at Austin. Prof., Classics
Albrecht, Andreas C., Ph.D., U. of Washington. Asst. Prof., Romance Studies
Altschuler, Glenn C., Ph.D., Cornell U. Prof., German Studies
Ammons, Archie R., B.S., Wake Forest Coll. Asst. Prof., Psychology
Altmann, Richard W., Ph.D., Stanford U. Prof., Physics
Ammons, Archie R., B.S., Wake Forest Coll. Asst. Prof., Physics
American Studies
Angeles, Prof., Anthropology
Angell, Adam, Ph.D., U. of California at Los Angeles. Prof., Comparative Literature
Apter, Emily S., Ph.D., U. of Chicago. Prof., International Studies, Government
Archer, Richard J., M.A., U. of Missouri. Prof., Computer Science
Argyres, Philip C., Ph.D., Princeton U. Prof., Physics/LASSP*
Arroyo, Carmen M., Ph.D., U. of Munich (Germany). Emerson Hinchliff Professor of Spanish Literature, Romance Studies/Comparative Literature
Aruwiti, Robert S., Ph.D., U. of California at Los Angeles. Prof., Anthropology
Ashcroft, Neil W., Ph.D., Cambridge U. (England). Horace White Professor of Physics, Physics/LASSP*
Austin, William W., Ph.D., Harvard U. Prof., Senior Scientist, Geological Sciences/INSTOC*
Barbosa, Dan, Ph.D., U. of Illinois. Prof., Mathematics
Barzman, Karen-edis, Ph.D., Johns Hopkins U. Asst. Prof., History of Art
Bassett, William A., Ph.D., Columbia U. Prof., Geological Sciences
Basu, Kausik, Ph.D., London School of Economics (England). Prof., Economics
Battick, David, Ph.D., U. of Chicago. Prof., German Studies/Modern Language and Culture
Baumer, Simon H., Ph.D., U. of Chicago. Prof., Emeritus, Chemistry
Beaug, Daniel A., Ph.D., Cambridge U. (England). Prof., History
Becker, Penny E., Ph.D., U. of Chicago. Asst. Prof., Sociology
Beegle, Tadgh P., Ph.D., California Inst. of Technology. Asst. Prof., Chemistry
Berek, Ayele, Ph.D., Temple U. Asst. Prof., Africana Studies and Research Center
Berm, Daryl J., Ph.D., U. of Michigan. Prof., Psychology
Bem, Sandra L., Ph.D., U. of Michigan. Prof., Psychology/Women's Studies
Benera, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning/Women's Studies
Bensel, Richard, Ph.D., Cornell U. Prof., Government
Bereaud, Jacques, Doctorat d'Univers., U. of Lille (France). Prof., Romance Studies
Bergen, Anne, Ph.D., Paris VII (France). Assoc. Prof., Romance Studies
Berkelman, Karl, Ph.D., Cornell U. Goldwin Smith Professor of Physics, Physics/LNS
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