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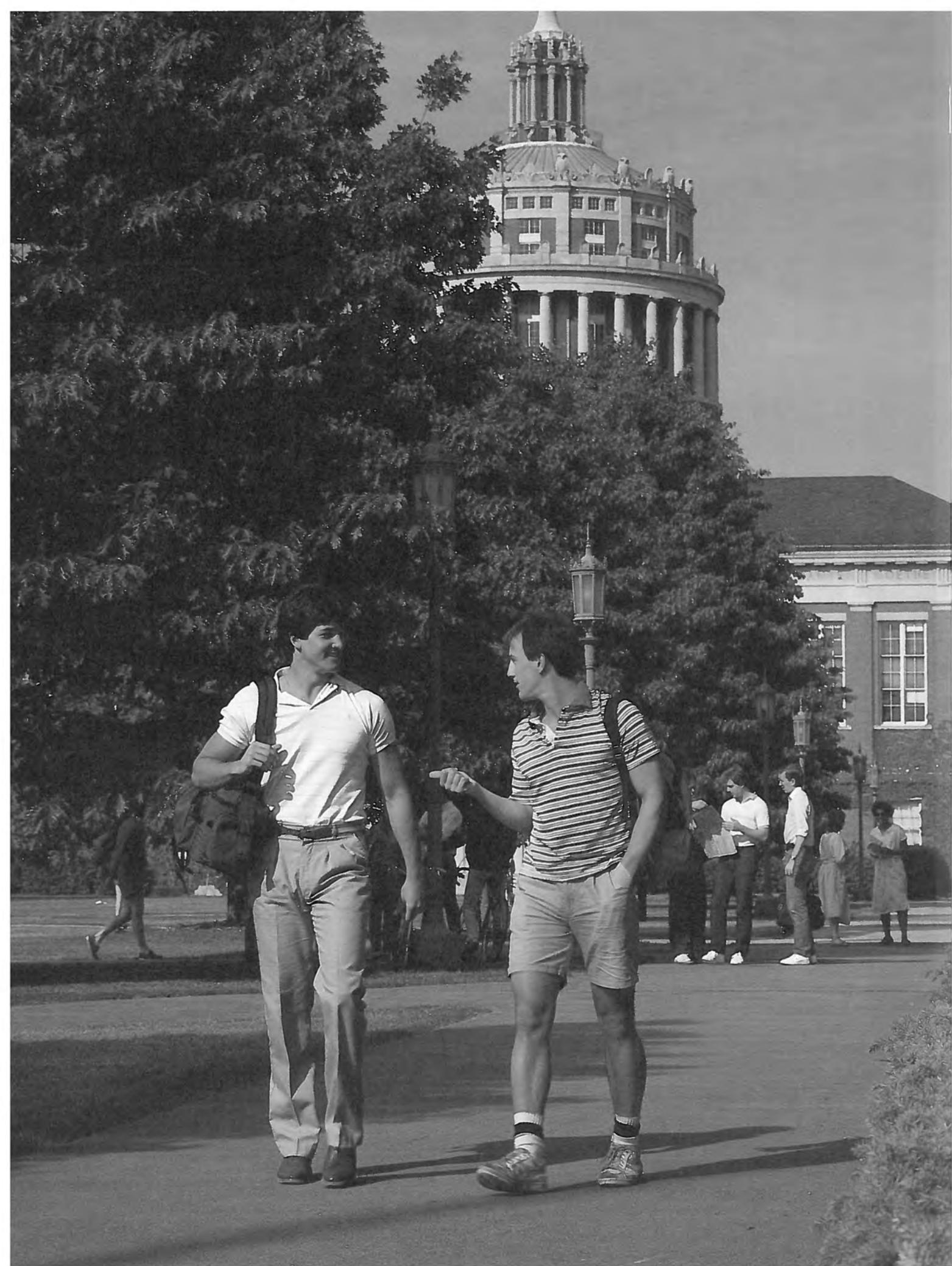
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UNIVERSITY OF
ROCHESTER

COLLEGE OF ARTS AND SCIENCE
COLLEGE OF ENGINEERING AND APPLIED SCIENCE
EASTMAN SCHOOL OF MUSIC
GRADUATE SCHOOL OF EDUCATION AND HUMAN DEVELOPMENT
SCHOOL OF MEDICINE AND DENTISTRY
SCHOOL OF NURSING
WILLIAM E. SIMON GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

OFFICIAL BULLETIN
UNDERGRADUATE STUDIES
1991-92

(Separate bulletins also are published for
graduate studies and by the Eastman School of Music,
Graduate School of Education and Human Development,
School of Medicine and Dentistry, and William E. Simon
Graduate School of Business Administration.)



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Some notes about **The University**

The University of Rochester, founded in 1850, is one of the leading private universities in the country.

Undergraduates from throughout the country take advantage of the distinction and variety of its academic programs. At the same time, they discover that it's a university on a personal scale, with an attention to the individual not found at larger research institutions.

Among the 3,000 colleges and universities in this country, only 58 are members of the prestigious Association of American Universities—and Rochester is one of them. The University's faculty are held in particularly high regard by colleagues at sister institutions, and many of its departments are widely recognized to be among the best in the country.

The University includes the following colleges and schools:

- College of Arts and Science
- College of Engineering and Applied Science
- Eastman School of Music
- Graduate School of Education and Human Development
- School of Medicine and Dentistry
- School of Nursing
- William E. Simon Graduate School of Business Administration

This constellation of colleges is key to undergraduates' choices for study. Undergraduates have the opportuni-

The considerable size of this book springs from the wonderful diversity of the University itself. Intriguing possibilities, beckoning in all directions, are outlined herein and I assure that all of them are first-rate. "Meliora," Rochester's motto, signifies "always better." As of this writing, the University community is hard at work to develop substantial enhancements to the undergraduate program. Many of these innovations will likely be instituted in the 1992-93 year or shortly thereafter. Even now, your choices at Rochester are considerable. We will be pleased to help you make the most of them.

—Provost Brian Thompson

ty to take graduate courses; premed students can enroll in classes at the medical school or at the Eastman School of Music; future engineers can diversify their studies with an advanced course in Chaucer. Most students take electives outside their fields, and some take double concentrations or earn certificates in complementary subjects. Still other students individually design their own interdepartmental programs. These and other options suit both the students who come to Rochester knowing their intended majors and those who plan to decide later on.

The results of these opportunities are self-evident: Rochester alumni have an outstanding track record in finding placement in excellent graduate schools and in establishing themselves in careers of their choice. Says one student, "Rochester opens doors."

Following are just a few examples of the more recent additions to the University undergraduate program:

- The unique "Take Five" Program allows selected undergraduates to take a fifth year of courses tuition-free if their majors limit their chances to pursue other interests.
- Rochester's management certificate program can give you an added credential for employment, no matter what your major.

University of Rochester





- University Day afternoons (on each Wednesday of the semester), are reserved for special academic and intellectual events; at most parts of the University, few regular classes are scheduled.
- “Reach for Rochester” employment programs offer—regardless of students’ financial needs—a national summer jobs program and paid internship experiences.

There are approximately 4,800 full-time undergraduates and 2,200 full-time graduate students at the University. The great majority of classes are small in size, enabling all students to work closely with their teachers. Undergraduates often study with distinguished senior faculty—taking an English course with a

prize-winning poet, working on a research project with an engineer or biomedical scientist in the forefront of the discipline, or perhaps studying laser fusion in the Laboratory for Laser Energetics. Undergraduates are encouraged to work with individual faculty members where possible in the pursuit of original scholarship, and the faculty-to-student ratio is 1 to 12.

Academic advising and career counseling begin before the start of the freshman year and extend beyond graduation. Entering students are invited to come to the University for several days during the summer before they start their freshman year—to tour campus; meet with faculty members, deans, and fellow undergraduates; discuss course selections; take in a class or two; and sample on-campus social life. Their parents are invited to the campus at the

same time for their own orientation program. Throughout the undergraduate years, faculty and staff counsel students about their studies and career plans.

Students can’t expect to gain a “Rochester education” simply by studying and attending class. Out-of-class activities—whether they be intramural sports, political clubs, volunteering off-campus, or movies and concerts—are an integral part of the four years of undergraduate life. Moreover, the Rochester region—from the city’s parks, theaters, and shops, to the countryside of the nearby Finger Lakes—offers ample attractions. The *Rand McNally Places Rated Almanac* has ranked Rochester ninth among the nation’s “best all-around” metropolitan areas.

*"Dandelion Yellow"
has been the University
color since 1893, joined
in later years by the dark
"Rochester Blue."*

THE COLLEGES AND SCHOOLS OF THE UNIVERSITY

The **College of Arts and Science** (pages 31 to 161) is the oldest of the University's eight academic units. The College provides undergraduate and graduate degree programs in the humanities, natural sciences, and social sciences and remains the home college for most undergraduates during their studies at Rochester.

The **College of Engineering and Applied Science** (pages 163 to 188) enrolls upperclass undergraduates and graduate students and offers introductory courses for freshmen and sophomores who plan formal enrollment later in one of its degree programs. From the start of freshman studies, the College's faculty and staff play an active role in academic advising and support of underclassmen planning concentrations in engineering. The College is accredited for its chemical, electrical, and mechanical engineering bachelor of science degree programs by the Accreditation Board for Engineering and Technology, the national accrediting agency of the engineering profession. The Institute of Optics is an internationally known center for teaching and research.

The **Eastman School of Music**, known throughout the world as a major center for the training of professional musicians as well as for the study and creation of music, offers diverse curricula leading to undergraduate and graduate degrees. Students pursuing a bachelor of arts degree through the College of Arts and Science with a concentration in music take some

of their course work at the Eastman School. Other University undergraduates, having met the requirements and with permission, may also take applied music lessons or other music courses at Eastman.

The **Graduate School of Education and Human Development** (pages 197 to 200) provides a broad range of courses and programs for undergraduates interested in studying various aspects of education, as well as an extensive teacher preparation program. Undergraduates can take courses in subjects ranging from psychology of learning and adolescent development, to education in the American social order. Secondary school certification is offered in English, mathematics, modern foreign languages, the various sciences, and social studies. A masters in elementary teacher education also was recently established. Students enrolled in undergraduate programs normally receive their degrees from the College of Arts and Science. The Graduate School of Education and Human Development also offers a 3-2 Program in Human Development, designed for students planning to undertake advanced graduate study. Students work closely with faculty on research projects and complete a thesis in their fifth year, after which they receive a master's degree.

In addition to the programs leading to the M.D., M.S., and Ph.D. degrees, the **School of Medicine and Dentistry** offers unusual opportunities for undergraduates. In the newly instituted Rochester Early Medical Scholars

Program (REMS), exceptionally talented students enter the University with an assurance of admission to its medical school. The Rochester Plan offers sophomores early admission to the School of Medicine and Dentistry with an integrated program of study.

The **School of Nursing** (pages 189 to 195) offers study leading to the bachelor of science degree with a major in nursing. Undergraduate students are admitted to the College of Arts and Science. They may declare nursing as a major and then will be enrolled in a pre-nursing sequence of courses. As juniors, they enter the School of Nursing for professional course work and clinical experience. Students within the University of Rochester and from other colleges and universities may also transfer into the School of Nursing upon successful completion of specified liberal arts and science courses. Registered nurses interested in completing a baccalaureate degree in nursing are encouraged to enter the B.S. track designed especially for them. The School also offers a combined B.S./M.S. program for registered nurses, the master of science degree in one of many clinical specialties with a broad range of subspecialties or the doctor of philosophy in nursing and a postdoctoral clinical scholars program.

The **William E. Simon Graduate School of Business Administration** (pages 201 to 204) offers graduate study in business administration for

management careers in the profit and nonprofit sectors. For undergraduates interested in such careers, it also offers a unique opportunity to earn an undergraduate degree and a master of business administration degree (M.B.A.) in five years instead of the usual six. This 3-2 program consists of three years of undergraduate study in another college followed by two years in the Simon School. The School also offers undergraduate courses in management in the areas of accounting, behavioral science in industry, computers and information systems, finance, general business administration, law, marketing, and operations management. The School cooperates in an undergraduate program leading to a Certificate in Management Studies, offered by the College of Arts and Science (see page 115).

The University College of Liberal and Applied Studies monitors the studies of part-time students who matriculated prior to July 1, 1983. Afternoon, evening, and summer courses, both credit and noncredit, and degree programs are offered through the appropriate colleges and schools for part-time students enrolled after July 1, 1983. University College also coordinates the financial aid available to part-time students under New York's Aid for Part-Time Study program.

THE RIVER CAMPUS

The 60-year-old River Campus is the University's main campus and "home ground" for most of its undergraduates; it is the location of the College of Arts and Science and the College of Engineering and Applied Science, as well as the Graduate School of Education and Human Development and the William E. Simon Graduate School of Business Administration. On the southern edge of the city, the 90-acre campus is tucked in a bend of the Genesee River. Next door are the University Medical Center and one of Rochester's many parks.

The original complex of buildings on the campus in the Greek Revival and Georgian Colonial styles has been expanded with newer structures designed to harmonize with their older neighbors. Newer buildings include the Wilson Commons, a six-level glass-and-brick student union designed by the renowned architect I. M. Pei; the multipurpose Zornow Sports Center, housing the University's programs in sports and recreation and used by over 90 percent of Rochester's undergraduates; the Computer Studies Building, home of several academic departments as well as a science library and student computer facilities; and Schlegel Hall of the Simon School.

The scale and the greenery of the River Campus are mirrored by the livable size and quality of the City of Rochester. A center of mature and emerging high technology firms, Rochester is an hour from New York City and 20 minutes from Toronto by plane, and an hour's car ride north of New York's Finger Lakes region.

An Indian fort once occupied the knoll upon which the Susan B. Anthony residence balls now stand.

LIFE ON CAMPUS

"The shortest distance between two points is where Wilson Commons is." This campus graffito, chalked up during construction of the student union, accurately identifies the hub of out-of-class life.

Wilson Commons is the kind of place where you meet friends, eat lunch, watch television, see a film, view an art exhibit, give a concert, have a party, play ping-pong, consume a piece of the famous mouth-watering Wilson Commons fudge, or just watch the passing throng—all recognized and respected student activities.

A great deal goes on inside Wilson Commons—and elsewhere on the campus. "Your social life is what you make it," says one Rochester student. "There's a lot of discovering to be done. You can always find your own niche."

Niches found by one freshman by the end of her first semester, for example, were a volunteer job at nearby Monroe Community Hospital, yoga classes at the University Interfaith Chapel, a lively dance group at the Commons, and ice-skating sessions.

Other undergraduates work on the student-run campus newspaper or the AM-FM radio station, join one or more of the many performing arts groups, participate in the activities of political action and community service organizations, or collaborate with like-minded students in a variety of special-interest groups, from the Sailing Club to the Science Fiction Society.

The University's Mees Observatory, located in the Bristol Hills 40 miles south of Rochester, is the highest observatory in the eastern half of the country.

In all, students pursue a variety of individual interests through more than 90 campus groups, and student-sponsored events take place nearly every night of the week: film series, both classic and contemporary; concerts, recitals, and plays; a lively outside-speakers program; and parties and informal get-togethers. (For a more detailed description of these activities, see the *Student Affairs* section beginning on page 217.)

Special campus-wide events enliven the school year at regular intervals: Yellowjacket Day to start things off in the fall, Dandelion Day to celebrate the arrival of spring, and, for a mid-winter frolic, the annual Winter Carnival encompassing such events as a snowman-building contest, marathon indoor softball game, and a Wilson Commons All-Nighter highlighted by karate and gymnastics demonstrations, a paper airplane contest, dancing, games, films—and, for the hardy, a Survivors' Breakfast.

SPORTS AND RECREATION

Rochester joins eight other leading private universities around the nation (Brandeis, Carnegie Mellon, Case Western Reserve, University of Chicago, Emory University, Johns Hopkins, New York University, and Washington University) in the University Athletic Association; the members of this league engage in round-robin and championship competition in most of their varsity sports.

The 22 varsity teams are complemented by an extensive schedule of intramural sports—from racquetball,

basketball, and volleyball to inner-tube water polo and tennis, and club sports such as crew and ice hockey. Most students participate in the intramural program, which includes men's, women's, and coed competition. On occasion, faculty and staff members also join in. (See *Sports and Recreation*, page 225.)

The Rochester Crew is host to an array of college rowing teams for the annual Bausch & Lomb Regatta, a fall event on the Genesee River enjoyed by the campus and Greater Rochester communities.

There is ample opportunity for individual sports. The University maintains a jogging path along the Genesee River, a 400-meter outdoor track, a banked eighth-mile indoor track, and comprehensive exercise and weight-training facilities. Swimming facilities accommodate both serious lap-swimmers and those who just want to swim to relax. An enclosed ice rink adjacent to the campus has special hours for University skaters.

The multipurpose Zornow Sports Center offers recreational facilities for racquet sports, volleyball, basketball, and swimming.

STUDENT RESIDENCES

"The people on my hall are like my family," says an undergraduate who looks forward to going home to her residence hall after classes and intensive study sessions at the library. Like most undergraduates, she chooses to live in University housing, within minutes of classrooms, labs, libraries, recreational, and athletic facilities.

The living accommodations are comfortable and diverse enough to meet individual preferences. As part of its continuing renovation program, the University has already renovated 12 of the larger residence halls on the River Campus with four more scheduled for renovation 1991–1995.

All campus residence halls have individual room telephones, most of which are equipped for computer data service, automatic message recording, and other up-to-date telecommunications features. Students may also subscribe to the University discount long-distance services.

The Medieval House, Drama Center, Music Floor, Interclass Living Center, and Computer Interest Floor are among a score of special-interest residence arrangements appealing to many students. Here student residents and faculty members with mutual interests learn from each other in informal settings. These intellectually centered resident communities sponsor films, concerts, outside speakers, readings, plays, and off-campus ventures open to their entire residential unit, and often to the entire University as well. Special-interest housing is also provided in the residence halls for the "residential" fraternities and sororities; six other fraternities maintain houses on the Fraternity Quadrangle. (See page 220 for more on student residences and the program for students who choose to live off campus.)

THE OTHER UNIVERSITY OF ROCHESTER CAMPUSES

The Medical Center, adjacent to the River Campus and the site of the School of Medicine and Dentistry and the School of Nursing, has extensive facilities providing an excellent spectrum of patient care and research to support the educational programs. Strong Memorial Hospital, with a capacity of 707 beds, is an integral part of the University's Medical Center and serves as the principal teaching hospital of the School of Medicine and Dentistry and the School of Nursing.

The School of Nursing administrative offices, classrooms, conference rooms, and some faculty offices are located in Helen Wood Hall. A Teaching/Learning Resource Center designed to promote independent, self-paced learning for nursing and medical students is located in the Medical Center. The amphitheaters, classrooms, conference rooms, and laboratories of the Medical Center and the River Campus are also used for instruction of nursing students.

The Edward G. Miner Library is a full-service library with more than 215,000 volumes, including more than 3,000 current journals and serials, an extensive collection of reference resources in medicine, nursing, and psychiatry, and more than 15,000 volumes in the rare and historical collections.

The Eastman School of Music is linked to the other campuses by University-run free shuttle buses. Its Sibley Music Library, with resources numbering more than a half-million items, is recognized as one of the foremost music research libraries in

the world. Housed since 1989 in commodious and newly constructed facilities, its collection includes autograph scores of masters of the past as well as those of many contemporary composers. Kilbourn Hall (seating capacity, 459), Howard Hanson Recital Hall (65), Kilian and Caroline Schmitt Organ Recital Hall (96), and Eastman Theatre (3,094), one of the great theaters of the Western world, comprise the unparalleled performance facilities of the School. In 1991, Eastman undergraduates took residence in the School's new student living center, which includes not only inviting living and dining spaces but also lounges and game rooms of a student union, study areas, and an informal performance facility.

The University's South Campus, a quarter-mile south of the Medical Center, was opened in 1966 with the completion of the Nuclear Structure Research Laboratory, which is used by the Departments of Physics and Astronomy, Chemistry, and Geological Sciences. A newer building houses the Laboratory for Laser Energetics of the College of Engineering and Applied Science and the National Laser User's Facility. Since then the River Road Laboratory and Residence have been added to the South Campus. South Campus is linked to other campuses by a free University shuttle bus service.

The Prince Street Campus contains the University's Memorial Art Gallery, which serves as a public art museum serving west-central New York, with representative collections of

More than 200 River Campus students take lessons each semester at the Eastman School of Music, and many more perform in River Campus ensembles (including a symphony orchestra, jazz ensemble, and gospel choir).

world art of nearly all major schools and periods and regularly changing exhibitions.

C.E.K. Mees Observatory is located on Gannett Hill in the Bristol Hills south of Rochester.

THE ROCHESTER AREA

"The Rochester area has a lot to offer, and Rochester students are very mobile," says a senior who adds variety to his out-of-class time by exploring the attractions of the city and the surrounding countryside. "If you want to go off campus, it's easy." Many students have cars; others get rides from friends. A free shuttle bus connects the University campuses, making regular stops at the Eastman School of Music in downtown Rochester. A "UR Special" bus makes weekend runs to a variety of "hot spots," movie theaters, restaurants, and snack places.

Rochester is a culturally sophisticated city south of Lake Ontario and north of the hills of the Finger Lakes region. With a flavor and appeal of its own, it has been rated among the East's most livable cities: small enough and clean enough to be comfortable, but large and cosmopolitan enough (it's the third-largest metropolitan area in New York State) to afford a variety of diversions, whether your tastes run to symphony orchestras and jazz concerts, planetariums and museums, or harness racing and professional ice hockey.



For off-campus eating, the city offers a tempting array of restaurants, from elegant, expensive, and continental, to tasty, economical, and ethnic. Many of the favorite restaurants are located in the Park Avenue area, a section filled with comfortable turn-of-the-century residences, trendy boutiques, handcraft shops, art galleries, import stores, and emporia (for instance, a celebrated neighborhood emporium selling everything from Famous Amos chocolate chip cookies to life-size posters of movie stars).

Adjacent to Park Avenue is stately, tree-lined East Avenue, once dubbed the most beautiful residential street in America. Two of the Rochester area's many museums are located here — the world-famous International Museum of Photography at George Eastman House and the Rochester Museum and Science Center, which includes the Strasenburgh Planetarium, one of the most sophisticated planetariums in the world. Nearby is the University's Memorial Art Gallery, possessing a distinguished collection of world art and with regularly changing loan exhibitions. The newer Margaret Woodbury Strong Museum focuses on the growth of American taste from the Victorian era through 1930 and includes among its holdings of fine and decorative arts the world's largest and most definitive doll collection. The area's other major museum, the

Genesee Country Museum, a reconstructed nineteenth-century village, is located in farm country several miles southwest of the city.

Rochester has been called "a city of music." The presence of the University's Eastman School of Music, one of the world's great comprehensive music schools, and the Rochester Philharmonic Orchestra, one of the country's fine regional orchestras, has nurtured a proliferation of other performing organizations, among them the Rochester Bach Festival, the GeVa professional theater company, and the world-touring Bucket Dance Theatre. The accomplished artists who study and teach at the Eastman School are featured in concerts, most of them free, almost every night of the week. In addition, the School's beautiful Eastman Theatre regularly plays host to distinguished guest performers. Recent visiting artists have included James Galway, Itzhak Perlman, Jean-Pierre Rampal, Mstislav Rostropovich, Isaac Stern, the New York City Ballet, and the American Ballet Theater. Jazz and popular-music concerts are a frequent feature of the local concert schedule.

Professional baseball and ice hockey are popular spectator sports in Rochester, with major-league football and hockey just an hour's drive away in Buffalo. Horses race at nearby Finger Lakes Race Track and Batavia Downs.

In the city and beyond is a network of public parks for recreation of all kinds, including canoeing, hiking, horseback riding, skiing, fishing, and swimming. Genesee Valley Park, next door to the campus, offers athletic fields and courts, boating, ice skating, and picnicking, and has two public golf courses. About an hour's drive away are Letchworth Park, the "Grand Canyon of the East," and the Finger Lakes, home of the New York State wine industry and the site of a variety of recreational opportunities, including 17 ski areas. Niagara Falls and Toronto, one of the continent's most exciting cities, are not far away by car.

A major center for medical and social services, the community offers many opportunities for volunteer service. For example, several University of Rochester varsity basketball players started an informal Saturday morning coaching clinic for youngsters who go to the elementary school in a neighborhood across the river from the campus. Students deciding to volunteer also may work in hospitals, including the University's Strong Memorial Hospital, courts, prisons, social service organizations, and educational and tutorial agencies.

Skiers, ice skaters, snowmobilers, ice boaters, snowshoers, sledders, tobogganers, ice fishermen, builders of snowmen, and makers of snow angels love Rochester's winters. Spring and fall in Rochester are beautiful, and the University's location affords a good opportunity to enjoy them. While it is a major metropolitan center, the City of Rochester is minutes from open countryside.



RUSH RHEES LIBRARY

HERE IS THE HISTORY
OF MANS HUNGER FO
TRUJH GOODNESS AN
BEAUTY LEADING HI
SLOWLY ON THROUC

Degrees Offered

D

egrees are awarded by the University of Rochester in the following subjects, grouped by college or school of the University:

COLLEGE OF ARTS AND SCIENCE

Anthropology (B.A., M.A., Ph.D.)

Applied Mathematics (B.S., M.S.)

Art and Art History:

Art History (B.A.)

Studio Arts (B.A.)

Astronomy (Ph.D.)

Biological Sciences (B.S.), with specialties in:

Biochemistry

Cell and Developmental Biology

Ecology and Evolutionary Biology

Microbiology

Molecular Genetics

Neuroscience

Biology (B.A., M.S., Ph.D.)

Biology-Geology (B.S., M.S.)

Chemistry (B.A., B.S., M.S., Ph.D.)

Cognitive Science (B.A.)

Comparative Arts (M.A.*, Ph.D.)

Computer Science (M.S., Ph.D.)

Computer Sciences: Applied Mathematics (B.S.)

Computer Sciences: Mathematics (B.A.)

Economics (B.A., M.A., Ph.D.)

English (B.A., M.A., Ph.D.)

Environmental Studies (B.A.)*

Environmental Science (B.S.)*

Film Studies (B.A.)

Foreign Languages, Literatures, and Linguistics:

Comparative Literature (M.A., Ph.D.)

Foreign Literature (B.A., M.A.)

French (B.A., M.A.)

German (B.A., M.A.)

Japanese (B.A.)

Linguistics (B.A., M.A., Ph.D.)

Russian (B.A.)

Spanish (B.A., M.A.)

Geology (B.A., B.S., M.S., Ph.D.)

Geomechanics (B.S.)

Health and Society (B.A.)

History (B.A., M.A., Ph.D.)

Integrated Sciences (B.A.)

Interdepartmental Studies (B.A., M.A., M.S.)

Mathematics (B.A., M.A., M.S., Ph.D.)

Mathematics-Statistics (B.A., M.A.)

Medical Statistics (M.S.)

Music (B.A.)

Philosophy (B.A., M.A., Ph.D.)

Physics (B.A., B.S., M.A., M.S., Ph.D.)

Physics and Astronomy (B.A., B.S., Ph.D.)

Political Science (B.A., M.A., Ph.D.)

Psychology (B.A., M.A., Ph.D.)

Public Policy Analysis (M.S.)

Religion and Classics

Classics (B.A., M.A.)

Religion (B.A.)

Statistics (B.A., M.A., Ph.D.)

Women's Studies (B.A.)

Certificate Programs in the College of Arts and Science (taken in conjunction with a bachelor's degree)

Actuarial Studies

Asian Studies

Biotechnology

International Relations

Management Studies

Russian Studies

Minors in the College of Arts and Science (taken in conjunction with a bachelor's degree)

Anthropology

Applied Economics

Archaeology

Art History

Astronomy

Biology

Chemistry

Classical Civilization

Classics: Greek

Classics: Latin

Comparative Literature and Theory

Economic Theory

English Literature

Environmental Geology

Ethics

Film Studies

French

Geology

German

Health and Society

Health Psychology

History

History of Philosophy

Italian

Japanese

Latin American Studies



Linguistics
 Literary Theory
 Marine Geology and Ecology
 Medical Anthropology
 Music
 Organizational Psychology
 Philosophy
 Philosophy of Science
 Physics
 Political Science
 Probabilistic Mathematics
 Psychology
 Psychology as a Natural Science
 Psychology as a Social Science
 Religion
 Russian
 Spanish
 Statistics
 Studio Arts
 Theater
 Women's Studies
 Writing

**GRADUATE SCHOOL OF
EDUCATION AND HUMAN
DEVELOPMENT**

Education (M.S., Ed.D., Ph.D.):
 Administration, Curriculum and
 Teaching, Counseling and Human
 Development, Higher Education

Elementary Teacher Education (M.S.)
 Special Education (M.S.):
 Deaf Education
 Teacher Preparation (M.S., M.A.T.)
Certificate Programs (taken in con-
 junction with a bachelor's degree)
 leading to a New York State teach-
 ing certificate
 Secondary Education for one of
 the following areas:
 English
 Mathematics
 Modern Foreign Languages
 Science (Biology, Chemistry,
 Physics)
 Social Studies

**COLLEGE OF ENGINEERING
AND APPLIED SCIENCE**

Chemical Engineering (B.S., M.S.,
 Ph.D.)
 Electrical Engineering (B.S., M.S.,
 Ph.D.)
 Engineering and Applied Science,
 an Interdepartmental Program
 (B.S.)
 Engineering Science (B.A.)

Geomechanics (B.S.)
 Materials Science (M.S., Ph.D.)
 Mechanical and Aerospace Sciences
 (M.S., Ph.D.)
 Mechanical Engineering (B.S.)
 Optics (B.S., M.S., Ph.D.)

Certificate Programs in the College
 of Engineering and Applied Science
 (taken in conjunction with a bache-
 lor of science degree)

 Biomedical Engineering

Minors in the College of Engineering
 and Applied Science (taken in con-
 junction with a bachelor of science
 degree)

 Chemical Engineering

EASTMAN SCHOOL OF MUSIC

Applied Music (B.M.)
 Conducting (M.M., D.M.A.)
 Jazz Studies and Contemporary
 Media (M.M.)
 Music Composition (B.M., M.A.,
 M.M., D.M.A., Ph.D.)
 Music Education (B.M., M.A.,
 M.M., D.M.A., Ph.D.)
 Music History (B.M.)
 Music Theory (B.M., M.A., Ph.D.)
 Musicology (M.A., Ph.D.)

In 1900, suffragist Susan B. Anthony pledged her \$2,000 life-insurance policy to assure that women were admitted to the University, then a college for men only.

Opera (M.M.)
Performance and Literature (M.M., D.M.A.)
*Piano Accompanying and Chamber Music (M.M., D.M.A.)

SCHOOL OF MEDICINE AND DENTISTRY

Anatomy (M.S., Ph.D.)
Biochemistry (M.S., Ph.D.)
Biophysics (M.S., Ph.D.)
Dental Science (M.S.)
Environmental Studies in Toxicology (M.S.)
Genetics (Ph.D.)
Industrial Hygiene (M.S.)
Medicine (M.D.)
Microbiology (M.S., Ph.D.)
Neuroscience (M.S., Ph.D.)
Pathology (M.S., Ph.D.)
Pharmacology (M.S., Ph.D.)
Physiology (M.S., Ph.D.)
Public Health (M.P.H.)
Toxicology (M.S., Ph.D.)

SCHOOL OF NURSING

Nursing (B.S., M.S., Combined B.S./M.S. for R.N.s, Ph.D., Combined M.S./M.B.A., Post-Masters study to prepare practitioners)
Clinical specialty areas of study for M.S. include:
Care of Children and Families
Community Health Nursing
Gerontological Nursing
Medical-Surgical Nursing
• Cardiopulmonary
• Critical Care
• Oncology
Nursing Administration
Primary Care of Adults

Psychiatric-Mental Health Nursing
Women's Health Care
Master of Science in Nursing/Master of Business Administration

WILLIAM E. SIMON GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

Business Administration (M.S., M.B.A., Ph.D., Combined M.B.A./M.S. in nursing, M.B.A./M.S. in microbiology, M.B.A./M.P.H., M.B.A./Master's in engineering [Keio University, Japan])

UNIVERSITY COLLEGE OF LIBERAL AND APPLIED STUDIES

General Studies (B.S.)** with concentrations in:
Humanities
Natural Sciences
Social Sciences

UNIVERSITY-WIDE STUDIES

Combined Bachelor's Programs
B.A. and B.S. in the College of Arts and Science
B.A. or B.S. in the College of Arts and Science and B.S. in engineering
B.A. or B.S. in the College of Arts and Science and B.M. in music
B.A. or B.S. in the College of Arts and Science and B.S. in nursing

3-2 Programs

B.A. and B.S. in an engineering concentration (for transfer students), see page 165
B.A. or B.S. plus an M.B.A., see page 201

B.A. or B.S. plus a master's in public health, see page 146
B.A. or B.S. plus an M.S. in computer science, see page 68
B.A. or B.S. plus an M.S. in human development, see page 197
B.A. or B.S. plus an M.S. in public policy, see page 149
B.A. in statistics plus an M.S. in medical statistics, see page 157
B.S. and M.S. in applied mathematics
B.S. and M.S. in electrical engineering, see page 171
B.S. and M.S. in nursing, see page 194
B.S. and M.S. in optics, see page 182

Combined Bachelor's and M.D. Degree Program

B.A. or B.S. plus an M.D.

Combined Master's Programs

Master's in public health and M.S. in public policy, see page 149
M.B.A. and M.P.H.
M.B.A. and M.S. in microbiology
M.B.A. and M.S. in nursing

Combined Master's and Doctoral Programs

Ed.D. and M.B.A.
Ph.D. in education and M.B.A.
Ph.D. in education and M.S. in public policy, see page 149

Inter-College Degree Programs

*Genetics (Ph.D.)
Neuroscience (M.S., Ph.D.)

*NYS approval pending.

**These degree programs are not open to matriculants after July 1, 1983.



University
of Rochester
Facilities

LIBRARIES

The University library system is an extensive one, housing more than two and a half million volumes and 16,000 current periodicals. Its libraries include Rush Rhees Library and two science libraries on the River Campus, Edward G. Miner Library in the Medical Center, Sibley Music Library at the Eastman School of Music, and the Charlotte Whitney Allen Library at the Memorial Art Gallery.

Rush Rhees Library is the principal library on the River Campus. It holds nearly two million volumes, primarily in the humanities and social sciences. There are approximately 40,000 volumes in Rush Rhees' central reference collection and more than 650,000 volumes in its government documents collection, a federal document depository center. The microform collection of more than two and a half million items contains materials which are scarce, unique, or virtually unavailable in the original.

Included within Rush Rhees are special libraries for art, Asia, the map collection, management, and the Department of Rare Books and Special Collections. In 1988 a new facility opened on the fourth floor of Rush Rhees. It houses the Robbins Library, a collection on medieval literature and life donated by Middle English literature specialist Rossell

Hope Robbins, and the Koller-Collins Graduate English Center, a core collection in British and American literature, with special strengths in Tennyson, Matthew Arnold, Graham Greene, and the Elizabethan dramatists.

The Computing and Reserve Library (CARL) in Rush Rhees Library is jointly operated by Rush Rhees Library and the University Computing Center. Software circulates for use on a large number of microcomputers and computing consulting services are available. The CARL collection contains not only software and its documentation, but also reserve material for courses, computing literature, and sound recordings.

In Rush Rhees Library the special collections of books and manuscripts include the following materials:

Nineteenth- and twentieth-century public affairs: Papers of William Henry Seward, Thurlow Weed, David Jayne Hill, Susan B. Anthony, Frederick Douglass, Rev. William C. Gannett, Thomas E. Dewey, Marion B. Folsom, Kenneth B. Keating, Frank Horton, and the Anti-Masonic movement.

Sciences: Papers of Lewis Henry Morgan, Herman LeRoy Fairchild, Henry A. Ward, and Carl E. Akeley; extensive book collections on optics, instrumentation, Charles Darwin, and nineteenth-

century botany and horticulture (Ellwanger and Barry Collection).

English literature and history:

History of law and political theory, Restoration drama, Robert Southey, John Masefield, Colin MacInnes, John Ruskin, Benjamin Disraeli, Sean O'Casey, and nineteenth- and twentieth-century theater manuscripts.

American literature: Washington Irving, Henry James, Mark Twain, William Dean Howells, Adelaide Crapsey, Christopher Morley, John Gardner, Joyce Carol Oates, Thomas McGuane, Frederick Exley, John A. Williams, Jerre Mangione, and historical children's books.

Regional history: Settlement and land development, Indians, early upstate printing, and manuscript records of businesses, industries, and families.

Art: Anthony J. and Frances A. Guzzetta Collection of Leonardo da Vinci, Claude Bragdon Papers, and landscape architecture.

University archives: Printed and manuscript material relating to the history of the University.

Libraries which serve science and engineering students include: Map Center (Rush Rhees), Physics-Optics-Astronomy (Bausch & Lomb), Carlson Library (for biology, chemistry, computer science, engineering, geology, and mathematical sciences in the Computer Studies Building),

When Rush Rhees Library was opened in 1930, the 19 stack levels in the building's tower formed the highest bookstack in the world.

and the library serving the Laboratory for Laser Energetics. The Carlson Library, opened in September 1987, offers varied seating, microcomputers and photocopiers, increased space for books and journals, and reference service.

LIBRARY SERVICES

Library staff throughout the system offer a wide range of services to support course work, research, and teaching. Reference department staff in each library are ready to help students and faculty individually or through class presentations, to define the kind and amount of information needed, and to learn how to search for it most efficiently. Great care is taken to add to the collections the best current books and journals needed for courses and research. Extensive microcomputer-based services make locating the right sources easier. More than 50 databases indexing materials in the sciences, arts, humanities, engineering, and social sciences are available in compact disk (CD-ROM) format for free do-it-yourself searching. Hundreds of other databases (many providing the full text of sources) can be searched by librarians for a small fee; and for those who wish to do their own searching of remote information databases, a training service is offered. Photocopy machines are conveniently placed throughout the library system, and there are provisions for borrowing books or journal articles from libraries outside the University. Microcomputer stations

are located in Rush Rhees and Carlson Libraries, with software disks and disk drives provided from the "reserve" desks.

In addition, all the libraries provide quiet places for study and for reading materials set aside on "reserve" for particular courses. Rush Rhees provides table and carrel seating for 2,179 patrons with an additional 464 seats in the science libraries, and 48 faculty research studies.

In 1985, the University of Rochester library installed its first terminal to give access to Chester—the on-line catalog. In January of 1987 the libraries began a process of transition from dependence on card catalogs to reliance on Chester. On-line catalog terminals are available for patron use in all University libraries. In addition, everyone in the University community may gain access to Chester by using the University switch and a terminal/microcomputer at home or in a room in the residence halls or office.

Most of the University of Rochester libraries now use an automated circulation system, and the remaining ones will be using it soon. Faculty, staff, and students using this system now can easily and quickly check out materials from library collections by simply providing staff with a validated University ID. Information about materials that are checked out is immediately made available in the on-line catalog, so patrons may reduce trips to the stacks in search of material that may not be there.

LIBRARY AFFILIATIONS

Rochester is a member of the *Association of Research Libraries*, an organization established in 1932 and now including over one hundred research libraries in the United States. ARL's purpose is to initiate and develop plans for strengthening research library resources and services in support of higher education and research.

In June 1984, the University library became a member of the *Research Libraries Group* (RLG), a corporation owned by the nation's major universities and other research institutions and dedicated to improving the management of the information resources necessary for the advancement of scholarship. Affiliated institutions share their on-line catalog records, which together total more than 14 million, and offer members preferential borrowing privileges.

Since 1973 Rochester has been a member of OCLC, a network of over 11 thousand libraries in 38 countries and territories. Member libraries participate in a shared on-line computer system, which provides each library with access to over 22 million catalog records.

Rochester is also a member of the *Center for Research Libraries*, a non-profit organization operated and maintained by major academic institutions for the purpose of shared access to rare and unusual items (foreign and domestic journals, newspapers and government documents, extensive materials on Asia, Latin

America, and Europe, etc.). Member libraries and their scholars are accorded special borrowing privileges.

An important regional affiliation is that held by the University libraries on the *Rochester Regional Library Council*, a cooperative library system operating as a nonprofit regional activity of the New York State Reference and Research Resources Program of the New York State Library. Its purpose is to supply needed research materials to faculty and students, business and industrial management personnel, professional persons, and independent scholars in a five-county area adjacent to the city of Rochester.

The University libraries—through cooperative activities with other libraries at the University, in the Rochester community, and throughout the nation and the world—are links in a vast information network. They offer tremendous resources in support of study and research, thereby providing a significant component to the educational experience at the University of Rochester.

THE ARTS

In addition to the superb theaters of the Eastman School, the University has several excellent facilities for the performing arts on the River Campus. *Strong Auditorium*, the largest hall on campus, is the scene of many music performances, lectures, films, and other activities. More intimate spaces for concerts are available in the Wilson Commons Student Center, in the *Welles-Brown Room*, located in Rush Rhees Library, in the *Interfaith Chapel*, and in *Hubbell Audi-*

torium, located in Hutchison Hall. Music practice facilities are located in the Frederick Douglass and Spurrier buildings. Seventeen rooms are equipped with pianos and are available to all students for 15 hours each day. Most residence halls also have practice facilities available.

For drama, *Todd Theater* and the *Drama Center* are favorite spots. Todd Theater, which seats approximately 160 persons, is home to student performers as well as to professional guests, who in recent years have included Edward Albee and members of the Royal Shakespeare Company. Drama Center offers a residential base for about 20 students—and a chamber theater for their productions as well. Student groups that use the various drama facilities include the Committee on the Performing Arts and the Association for Black Drama and the Arts. For dance, the Spurrier Dance Studio offers a fine resource for classes and performances and for presentations by distinguished dance companies.

The visual arts are served by several centers. On the River Campus, *Sage Art Center* provides a spacious area where student and faculty artists can pursue their work, while the *Hartnett Gallery*, in Wilson Commons, offers a site for frequently changing exhibits of student and professional art. Off-campus, the University's *Memorial Art Gallery* offers students the opportunity to see examples of works from periods they may be studying and by such masters as Rembrandt, Cezanne, Monet, and Henry Moore. For students interested in photogra-

phy, outstanding exhibits are available in the *International Museum of Photography*, located at the George Eastman House. For those who want to study film, the museum offers rich resources. Significant film holdings, which can be viewed by individual students as well as by groups, are also available in the Film Studies Center on the River Campus.

COMPUTERS AT ROCHESTER

The University's approach to computers mirrors the approach taken in the professional world.

In some areas of business and industry, computers are tools for record keeping, data processing, and systems analysis. In other areas, computers are themselves the objects of research and development.

So it is at Rochester, where students and professors employ computers selectively to study everything from writing to optics, and where, at one of the country's top computer science departments, innovative researchers take on projects like the development of a new generation of supercomputers.

The University has several mainframe computers for academic use, running the UNIX, VMS, VM/CMS, and MVS operating systems. Dozens of public terminals and all residence hall rooms are connected to these mainframes and to the public telephone network through the data communication ports of the University's digital telephone system.

Nearly 300 workstations and microcomputers in open computing labo-

laboratories are available to undergraduates. Many of these are connected to the campus-wide Local Area Network, giving high-speed access to the University's mainframes and to the national research networks. Several departmental computing laboratories and networks supplement these facilities with discipline-specific computers and software.

In addition, the University has access to a high-speed parallel computer, a BBN Butterfly Multiprocessor with 96 self-contained microcomputers working in tandem. The Butterfly Multiprocessor is located on campus and undergraduate students have the opportunity to assist faculty in advanced research in parallel computation.

All of these facilities are readily accessible to students, whether they are running complex statistical analyses, designing integrated circuits, or just beginning to learn about computer languages.

The College of Arts and Science established a Humanities Writing Center that is open to all students. It supports the College's emphasis on undergraduate writing instruction by providing word-processing facilities, various computer-aided writing programs, and access to staff skilled both in the teaching of English composition and in the use of computers.

Through a computer account at the University Computing Center, all faculty, staff, and students can participate in NYSERNet, a link between universities and industries throughout New York and super-

computing centers at Cornell, and four other universities nationwide. Access to this network, which connects directly to transcontinental links, is shared by industries, medical centers, and research facilities. Researchers using the network have access to incredibly large amounts of data. Network members also are able to exchange information with each other and to take full advantage of electronic mail, supercomputer calculations, teleconferencing, library research, and remote education.

Faculty in the computer science department are in the forefront of research in many aspects of the field, including artificial intelligence. A number of University departments use computers in presenting course materials, and programs in mathematics, engineering, management, and education all offer opportunities for computer concentration (see relevant department listings). Each semester over half of Rochester's full-time undergraduates are enrolled in these courses.

Like most of the nation's leading universities, Rochester does not require its students to buy computers. Instead, students are given a broad range of experience with various mainframes, workstations, and microcomputers and are provided the opportunity to purchase computers with professional assistance in selection of systems. The University has negotiated special agreements with several leading computer manufacturers to enable students to purchase computers from an on-campus computer store at significantly discounted prices.

*The University's
Memorial Art Gallery
fills the unusual dual
role of university
museum and public art
center for the entire
Rochester community.*

COMPUTING FACILITIES

The University Computing Center, which maintains a library of computer programs to perform many general calculations and analyses, has a staff of analysts and programmers to assist with computing problems. The Center also presents over 40 short courses and tutorials on services. Equipment includes two IBM 4381s, an Alliant FX/80, two Sun 3/280s, Solburne and other Suns, a VAX 8650, three VAX 11/750s, and over 250 microcomputers. Several on-line timesharing systems are available. These systems can be used through more than 1,000 terminals located throughout the campus. The Graphics Lab houses several Sun computers (i.e., 4/260, 3/260, three 3/60s, and a 3/160) and a Shinko color printer and an AT&T Pixel machine.

The University maintains microcomputers for open access by students in several locations; there are large microcomputer laboratories in Rush Rhees Library and in Taylor Hall and microcomputer facilities in five residence halls open 24 hours a day to their residents. Rush Rhees Library also has a software collection which is available for evaluation. In addition, individual colleges, e.g., the College of Engineering and Applied Science, provide microcomputer laboratories. The Graduate School of Education and Human Development and the School of Nursing maintain their own microcomputer laboratories for use by students enrolled in programs or courses offered through the schools. A powerful scientific computer facility exists at the Laboratory

for Laser Energetics, where a Control Data 990 is dedicated to energy research. The William E. Simon Graduate School of Business Administration Computing Center provides interactive computer access based on a Hewlett-Packard HP3000 Series 68 computer. (See page 203 for a more complete description of the Center's services.)

There are many microcomputers, workstations, file servers, and computer services available for student use via University computing networks. For example, the departments of the College of Engineering and Applied Science are interconnected by a broadband network. This network is connected to the University Telecommunications system and enables access by PC, Macintosh, and high performance workstations to a number of college file systems and very high performance computing facilities. In addition, these network interconnections provide links to other University-administered systems such as the VAX cluster, UNIX series, and an IBM 4381.

SPECIAL RESEARCH FACILITIES

The University has a broad range of specialized facilities for research:

- An 18 MV tandem Van de Graaff accelerator is the principal research instrument at the Nuclear Structure Research Laboratory.
- Fifteen electron microscopes are available.
- C.E.K. Mees Observatory on Gannett Hill in the Bristol Hills, about 40 miles from Rochester, is the

highest observatory in the eastern half of the United States. It has a 24-inch Cassegrain telescope, one of the largest in the state.

- Specialized laboratories and controlled-environment rooms are located in the building housing the psychology department.
- Rochester is one of nine universities responsible for the management of the National Radio Astronomy Observatory and the Brookhaven National Laboratory under federal contracts. It is a leading user and participant in the University Research Association, which manages the world's most powerful device for studying subatomic interactions.
- The Laboratory for Laser Energetics, a multidisciplinary teaching and research unit of the College of Engineering and Applied Science, is the first of its kind at any American college or university. Students are involved in all of the research programs, including a project to explore the potential of high-power lasers to produce controlled thermonuclear fusion as an alternative energy source. The Laboratory's principal research tool is a 12-trillion-watt laser system. The research activities include major programs in: photon-matter interactions, optical materials development, laser physics and technology, and the physics of ultra-high density phenomena. The Laboratory also investigates the production and utilization of phenomena occurring on time scales less than a billionth of a second. LLE contains many specialized facilities including a

CYBER 990 supercomputer, an image processing laboratory, a materials characterization laboratory, an optical coating facility, and other support equipment.

- Specialized laboratories fully equipped for the full range of geological, biological, and chemical testing and analysis are located in the River Campus's Hutchison Hall.

OTHER COLLEGES IN THE ROCHESTER AREA

Colgate Rochester (Colgate Rochester Divinity School-Bexley Hall-Crozer Theological Seminary) is an interdenominational seminary affiliated with the University of Rochester. It offers graduate programs leading to professional degrees related to the ministry. The arrangement between the two autonomous institutions permits students from either to take courses at the other, with approval of faculty advisors. Faculty and students of both institutions have full library privileges on each campus.

There are several other institutions of higher learning in or near the city of Rochester. These include Rochester Institute of Technology, Nazareth College, St. John Fisher College, Monroe Community College, State University Colleges at Brockport and Geneseo, and Roberts Wesleyan College. It is possible for students enrolled at the University of Rochester to complement their programs with courses taken at one of the area colleges. (See Special Academic Opportunities under Academic Services and Information, page 207.)



Special Academic Opportunities for **Undergraduates**

S

tudents taking their entire four years as undergraduates in the College of Arts and Science receive extraordinarily strong grounding in their chosen fields. But the outstanding graduate and professional schools of the University also offer undergraduates many opportunities to study in advanced and specialized areas (some are briefly mentioned in the listing of the colleges and schools earlier in this book). With only a few exceptions, students may count credits for courses in any unit of the University toward the bachelor's degree in the College of Arts and Science. Graduate study in one's specialty may be taken for credit toward the bachelor's degree by students whose work in a given area is sufficiently advanced.

3-2 PROGRAMS

Five-year combined programs of undergraduate and graduate study (the first three undergraduate, the last two graduate) are available in a number of fields, and permit students to earn a bachelor's degree (awarded after four years) and a professional master's degree. This 3-2 option is available in fields including:

- Business administration (page 201)
- Computer science (page 68)
- Engineering (page 165)
- Human development (page 197)
- Optics (page 182)
- Public health (page 146)
- Public policy (page 149)

Among other combined programs students can begin during the undergraduate years is the combined master of science in public policy/master's in public health (page 149).

Here are other options available to Rochester undergraduates:

ROCHESTER MANAGEMENT SUMMER

Students may pursue the Certificate in Management Studies during the summers between their freshman and senior years. This special program is offered to all Rochester undergraduates as well as to students from other colleges and universities. (See page 115 for further information on the management studies program.)

"TAKE FIVE"

The "Take Five" Program permits selected undergraduates to take a fifth year of study, tuition free, toward the bachelor's degree; students apply after they have been accepted into a major, usually in the sophomore or junior year. The program is designed for students who find that course requirements in their majors prevent them from exploring as broadly as they would like during their undergraduate years. For example, an electrical engineering student decided to use the "Take Five" Program to take courses in history, noting that "scientists who build today's technologies

must be aware of the effect their handiwork will have on their culture."

UNDERGRADUATE RESEARCH

As a major research institution, the University actively encourages primary research by undergraduates, not only in the natural sciences and engineering but in the social sciences and humanities as well. Opportunities for doing hands-on, professionally supervised research in fields as diverse as organic chemistry and medieval history are open to qualified students, both within regular courses and in special independent projects during the regular school year and in summer. As an example of the latter emphasis, Rochester ranks with Harvard and Columbia in the number of its undergraduates who have won coveted National Endowment for the Humanities "Younger Scholar" summer research and writing fellowships. For information on such opportunities, contact the Director of Undergraduate Research, Office of the Dean, College of Arts and Science.

UNIVERSITY DAY

Wednesday is University Day, and most afternoon classes are suspended in favor of lectures, concerts, and other special events. Activities across campus on a single University Day might include, for example, an exhibit on echocardiography; an open

Rochester's English department is the sixth oldest in the country.

rehearsal by Eastman School students; a film on the history of blacks in America; and lectures on the history of photography, on infrared spectroscopy, and on free trade with China. University Day events are organized and sponsored by both faculty and students.

CERTIFICATE PROGRAMS

Some students combine their departmental majors with an interdisciplinary specialization by following one of the five Certificate Programs—in actuarial studies, Asian studies, international relations, management studies, and Russian studies—offered through the College Center for Interdisciplinary Studies (page 113). In addition, a Certificate in Biotechnology is offered through the Program in Biology and Medicine and a Certificate in Bioengineering is offered through the Program in Biomedical Engineering. These certificates, which give formal recognition to the specialized study, are awarded in addition to the bachelor's degree. A student wishing to supplement a major in English with a program in business studies, for example, can earn both a bachelor of arts degree with a concentration in English and a Certificate in Management Studies.

PREPARATION FOR THE PROFESSIONS

Business

Companies want more from their employees than skills limited to accounting, marketing, and sales. They look for well-rounded graduates who can think clearly and ana-

lytically about business problems, who have a broad perspective on a variety of issues, and who can direct the work of other people effectively. The balance between liberal arts and professional programs at Rochester creates a collegiate environment with a rich mix of intellectual depth and breadth.

The Certificate in Management Studies, as described above, includes formal direction and recognition for the development of business skills, even as students pursue a concentration in the humanities, sciences, or engineering.

The 3-2 program leading to bachelor's and M.B.A. degrees is described elsewhere in this section.

Education

Through the Graduate School of Education and Human Development, undergraduates may prepare for careers in secondary school teaching or a variety of human service professions as they complete their bachelor's degree programs. The preservice programs in education and human development also prepare students for graduate study in these fields.

Students who wish to prepare to teach a secondary school subject begin professional study in their junior year. Those interested in human development may enter the School's 3-2 program as seniors, and complete both bachelor's and master's degrees in a total of five years.

In addition to degree and certification programs, undergraduates may take many courses as electives. Included among them are offerings re-

lated to child, adolescent, and adult development; aging; exceptional children; and the social, philosophical, and psychological foundations of education.

For more information about degree and certification programs in the Graduate School of Education and Human Development and about courses open to undergraduates, see page 197.

Engineering

Engineering study at Rochester need not be preparation for an engineering profession (some engineering students, for example, prepare themselves for careers in business, education, law, or medicine). But for the majority of engineering students, their undergraduate degrees lead directly to work in a field of engineering.

For more information about the College of Engineering and Applied Science, please see page 163.

Government

The University offers a number of interdisciplinary programs designed to help prepare students for a career in government.

Students interested in international affairs may earn a certificate in international relations (see page 114). The Department of Political Science offers undergraduate and graduate courses in public policy and admits a select number of undergraduates into the Public Policy Analysis Program at the end of their junior year (see page 138).

The Frederick Douglass Building was named to honor the legendary black abolitionist who lived and worked in Rochester from 1847 to 1872.

Internship opportunities at the local, state, and national level, and in Europe, are available to undergraduate students.

The Health Professions

For careers in medicine, nursing, dentistry, health care administration, health policy and planning, or the health sciences, students will find a broad curriculum, a comprehensive advising program (page 214), and many ways to gain practical experience at the University.

Outstanding entering students may apply to the new *Rochester Early Medical Scholars Program* (REMS), an eight-year BA/BS-MD program. Students enrolled in this program enter the University as freshmen with an assurance of admission to its medical school. The program's most distinctive aspect is its flexibility. REMS students are encouraged to pursue their own special interests; clinical and laboratory opportunities are available, but there are additional options for REMS students that may not relate directly to medicine.

Another opportunity for Rochester undergraduates is the *Rochester Early Selection Plan*, which allows students to integrate premedical and medical education. Although the normal eight-year time sequence needed to earn bachelor's and medical degrees is not shortened, the program affords students considerable flexibility and freedom to design personalized and innovative courses of study. Students apply in the sophomore year, and those selected may also pursue double majors or degrees, graduate degrees, and inde-

pendent research, and may study abroad for longer periods than would otherwise be possible. Finally, those Rochester Plan applicants who successfully complete the first stage of the application process are strongly encouraged to apply simultaneously for the "Take Five" Program (page 23). If accepted, they then have the opportunity to spend a tuition-free ninth undergraduate semester or fifth undergraduate year taking courses unrelated to medicine and their major fields of study. Further information is available from the health professions advisor (Career Services and Placement Center, Lattimore Hall).

Although most medical schools have core-course admissions requirements, it is by no means necessary for applicants to have completed a concentration in biology or another natural science. A student does not need to follow a "premed" or "predent" (or any other preprofessional) concentration program. Students are encouraged instead to become familiar with a broad spectrum of disciplines and to major in what they like and do best.

For premed students who choose biological science, the University offers the undergraduate *Program in Biology and Medicine* (page 50). Developed by the College of Arts and Science and the School of Medicine and Dentistry, the program offers seven undergraduate specializations in biological science, a certificate in biotechnology, and numerous opportunities for independent research.

The *School of Nursing* offers a distinctive "unified" model of enriched professional education combining nursing research, clinical practice, and teaching. Nursing educators, researchers, advanced clinical practitioners, and administrators are faculty who work collaboratively at the Medical Center and in a variety of community agencies.

Students interested in nursing follow a curriculum of professional study that is based on a strong foundation in the liberal arts and sciences. Upperclassmen build on the broad conceptual foundations established through their previous studies in specified courses in the liberal arts and sciences. Knowledge gained in the humanities, as well as the physical, biological, and social sciences, complements the specific theoretical and clinical instruction in nursing. Special opportunities for students to earn double degrees in nursing and in a College of Arts and Science discipline, such as psychology, are also available. Alternatively, students may complete a minor in a related discipline. Registered nurses are encouraged to pursue a baccalaureate degree in the curriculum plan designed to meet their individual needs in combination with the professional program of study.

A *combined baccalaureate and master's curriculum* is available to registered nurses who originally received a diploma or associate degree. This accelerated program is designed for highly motivated and career-oriented nurses, currently in clinical practice and interested in earning a baccalau-



Inscribed with Einstein's equation of mass and energy, the meridian marker in the center of the Eastman Quadrangle records its exact latitude (43° 7' 40'') and longitude (77° 37' 49'').

reate degree as well as a master's degree in a clinical specialty.

The unusual *health and society concentration* is the product of extensive cooperation between the College of Arts and Science and the School of Medicine's Department of Community and Preventive Medicine. This individualized, interdisciplinary degree is suitable for students preparing for medical school, for those seeking a career in health care administration, and for many others who want a broad-based, up-to-date liberal arts education. Students in this program design their own concentration, in consultation with faculty advisors.

Extensive resources for students interested in health-related careers are also available through the *College of Engineering and Applied Science*. Many students find that an undergraduate degree in engineering provides excellent preparation for medical school. Others use the resources of the College to pursue biomedical engineering (page 184).

Law

Whatever major a prelaw student chooses, law schools will be interested primarily in the breadth and depth of the intellectual challenges represented by the student's overall undergraduate career. The Association of American Law Schools also stresses the importance of gaining some familiarity with the legal professions before deciding to apply to law school. Such exposure may be

valuable to the admission committee of a law school; even more important, it will assist students in making a wise career choice.

At Rochester, students can have direct personal contact with lawyers through a variety of extracurricular programs; and, in addition, the University offers academic opportunities, including internships locally and abroad, for students to gain first-hand experience with lawyers and their activities.

Reserve Officer Training Corps

Rochester has an exceptionally strong Naval Reserve Officers Training Corps (NROTC) program, for men and women students seeking commissions in the U.S. Navy or U.S. Marine Corps (see page 126). In addition, students at the University may take training for either the Army or Air Force Reserve Officer Training Corps through the Rochester Institute of Technology.

INDEPENDENT STUDY, INTERNSHIPS, AND STUDY ABROAD

Independent study courses permit qualified students to pursue areas of reading and research not included or not treated in sufficient depth in regularly offered courses. These special tutorial courses are most often on a one-to-one basis, with the content and objectives of the course determined by faculty-student collaboration.

Practica are credit courses supervised by University faculty members which usually combine field experience with lectures, seminars, and oral and written reports. Each practicum provides direct personal interaction with working professionals in their everyday environment. Examples include the interdisciplinary Health Service Practicum, the Practicum in Gerontology, and several courses in the Department of Psychology.

Internships enable students to work in a variety of off-campus settings. Recent internship placements have included the Rochester District Attorney's office, Xerox Corporation, the local television stations, State-wide Youth Advocacy, the Memorial Art Gallery, various financial and investment offices, and other local banks and businesses. With special approval, students may engage in full-time internships away from the Rochester area; recent examples include the New York State Senate and Assembly, and the Minority Public Policy Internship Program. Opportunities for internships in Washington and abroad are described in the sections that follow. Students in the College of Arts and Science, working under the supervision of a faculty member, can receive credit for their work.

The *Washington Semester Program*, administered by the Department of Political Science, allows selected students to participate on a full-time basis directly in the work of legislators at the national level. Students work as staff assistants in the offices of United States Senators or Repre-

The ethereal "music from the sky" heard on campus comes from the 50-bell Hopeman Carillon, played by a carillonist pounding madly on hand keys and foot pedals connected to the bell clappers.

representatives for a semester and receive full academic credit. Their activities usually include writing speeches, attending hearings, researching law, taking notes at committee meetings, answering mail, and performing other assignments associated with the political process.

Study Abroad Programs provide students with the opportunity to participate in a year or a semester of foreign study sponsored by the University of Rochester or by other American colleges or universities. Rochester-sponsored programs include the one-year program at Worcester College, Oxford University, the programs at Hebrew University in Jerusalem and American University in Cairo, and many one-semester programs in London, Bonn, Brussels, Madrid, and Paris listed below, each of which combines course work with an internship. As 1992 approaches, students at Rochester and elsewhere are eager to gain first-hand knowledge of the political, social, and economic systems of a rapidly changing Europe. Rochester's *Internships in Europe* Program provides particularly effective opportunities for learning.

The *London Internship Programs* place students as research and administrative assistants in five different areas: politics, museums, health science/medical research, business, and theater.

Politics interns can work for British Members of Parliament and as interns in law firms, interest groups, constituency offices, and in offices of Members of the European Parlia-

ment. Participants have the opportunity to experience the workings of the British political system at close hand.

Museum interns can work in a broad range of London museums or art galleries including the Victoria and Albert, the Museum of the City of London, the Imperial War Museum, the Tower of London, and the British Film Institute, to name a few. Interns become involved in every phase of museum work, helping select items to be shown, mounting exhibitions, and researching and organizing collections within the museum.

Health Sciences Medical Research interns work in the administrative area of a health care facility or in a research laboratory of one of London's leading teaching hospitals, such as Charing Cross, the Royal Free, or King's College Medical School. The program includes a seminar offering academic exposure to the British health care system through visits to facilities and lecture-discussion sessions with guest speakers.

Business interns are placed according to their specific interests in banks, stockbroking firms, advertising agencies, and various multinational corporations.

Theater interns are placed in London's "fringe" theaters, which, like New York's "Off-Broadway," are smaller establishments which allow students to get hands-on experience in many different aspects of theatrical productions.

On the Continent, internships are available in Bonn, Brussels, Madrid, and Paris. Each of these four capitals offers unique opportunities to student interns. In *Bonn*, politics interns are placed with members of the Bundestag; other placements are made in business, museums, and social service agencies. *Brussels* offers internships with members of the European Parliament; depending on the student's foreign language skills, they may work for MEPs from any of the 12 European Community member nations. Politics interns in *Madrid* can work for Members of the Cortés or for political party headquarters; there are also museum, advertising, and business internships. In *Paris*, students can choose from an extraordinary range of internships in politics, museums, businesses, and theaters.

Through the University's affiliation with the *Institute of European and Asian Studies*, Rochester students may study in Australia, Austria, China, England, France, Germany, Italy, Japan, Singapore, the Soviet Union, Spain, and Taipei. Rochester's affiliation with the *Council on International Education Exchange* permits students to study in programs in China, the Soviet Union, and France.

Rochester is also a member of the Advanced Studies in England Consortium, a program which offers courses in medieval and Renaissance history and literature in Bath, Oxford, and Stratford.

The University of Rochester also sponsors several *short courses overseas*: the study of French in Rennes,



France, and of German in Marburg, Germany; an Italian course in Palermo; and intensive play-going in London are examples of current programs. In the summer of 1989, Rochester began sponsorship of a new CIEE Russian program in Tver'.

SUMMER STUDY

Some students choose to enroll in regular summer session courses or to

arrange credit-bearing independent study projects. Summer sessions of varying lengths, offered from May through August, provide students with the option of combining one or two months of course work with their vacation time.

SPECIAL DEGREE PROGRAMS

The interdepartmental degree programs (pages 112 and 186) provide

students with an unusual opportunity to construct individual programs suited to their special talents and interests. Students are currently pursuing interdepartmental concentration programs in Euro-American trade relations, American studies, biomedical engineering, environmental engineering, and medieval English culture, among others. Faculty members in the College Center for Interdisciplinary Studies (page 113) assist undergraduates in developing their interdepartmental studies concentrations in the College of Arts and Science. Students planning an interdepartmental program leading to a bachelor of science in engineering and applied science work closely with faculty members on the Program Committee in the College of Engineering and Applied Science (page 186).

Two formalized special degree programs are health and society and the cognitive science concentrations (pages 101 and 67). Students pursuing these concentrations design their own courses of study in consultation with faculty advisors affiliated with the program. Both concentrations offer students extensive opportunities to do independent work and to explore areas of special interest.

ACADEMIC ADVISING

With so many curricular possibilities and combinations available to undergraduates, Rochester takes seriously its obligation to help students find the programs best suited to them. See the *Academic Support* section (page 205).

Academic Calendar

UNDERGRADUATE— RIVER CAMPUS COLLEGES AND SCHOOL OF NURSING

1991 FALL SEMESTER

September 4 (Wednesday)
Classes begin at River Campus colleges and School of Nursing.

October 1 (Tuesday)
Last date for students in the College of Arts and Science to have courses deleted from current program.
Last date for students in the College of Arts and Science and the Graduate School of Education and Human Development to add courses, including independent study courses.
Last date for students in the College of Arts and Science and the College of Engineering and Applied Science to declare the S/F option.
Last date for students in the School of Nursing to declare the S/F option for the first elective period.

October 11 (Friday)
Fall term break begins at end of day.

October 16 (Wednesday)
Classes resume.

October 24 (Thursday)
Last date to drop courses for students in the Graduate School of Education and Human Development and to

make program changes for students in the College of Engineering and Applied Science.

October 29–31
Registration materials distributed to undergraduates.

November 4–8
Undergraduate program advising.

November 8 (Friday)
Last date for students in the School of Nursing to declare the S/F option for the second elective period.

November 11–15
Undergraduate Program Approval Forms filed with Registrar.

November 15 (Friday)
Date after which enrollment deposit is forfeited by undergraduates who do not notify the appropriate dean's office of their plans for withdrawal from the University effective at the end of the fall semester.

November 27 (Wednesday)
Thanksgiving recess begins at noon.

December 2 (Monday)
Classes resume.

December 9 (Monday)
Last date for transfer students in their first semester in the College of Arts and Science and the School of Nursing to declare the S/F option.

December 11 (Wednesday)
Classes end. Last date for students in the College of Arts and Science, the

College of Engineering and Applied Science, and the School of Nursing to drop courses without penalty.

December 12 (Thursday)
Reading period begins (optional by college offering course).

December 14 (Saturday)
Reading period ends.

December 15–21
Final examinations.

December 21 (Saturday)
Winter recess begins at end of day.

1992 SPRING SEMESTER

January 20 (Monday)
Classes begin at River Campus colleges and School of Nursing.

February 14 (Friday)
Last date for students in the College of Arts and Science to have courses deleted from current program.
Last date for students in the College of Arts and Science and the Graduate School of Education and Human Development to add courses, including independent study courses.
Last date for students in the College of Arts and Science and the College of Engineering and Applied Science to declare the S/F option.
Last date for students in the School of Nursing to declare the S/F option for the first elective period.

March 6 (Friday)

Last day to drop courses for students in the Graduate School of Education and Human Development and to make program changes for students in the College of Engineering and Applied Science.

March 7 (Saturday)

Spring recess begins at end of day.

March 16 (Monday)

Classes resume.

April 1–2

Registration materials distributed to undergraduates.

April 6–10

Undergraduate program advising.

April 10 (Friday)

Last date for students in the School of Nursing to declare the S/F option for the second elective period.

April 13–17

Undergraduate Program Approval Forms filed with Registrar.

April 24 (Friday)

Last date for transfer students in their first semester in the College of Arts and Science to declare the S/F option.

May 4 (Monday)

Classes end. Last date for students in the College of Arts and Science, the College of Engineering and Applied Science, and the School of Nursing to drop courses without penalty.

May 5 (Tuesday)

Reading period begins (optional by college offering course).

May 10 (Sunday)

Reading period ends.

**May 11–18**

Final examinations.

May 23–24

Commencement Weekend.

June 15 (Monday)

Date after which enrollment deposit is forfeited by undergraduates who do not notify the appropriate dean's office of their plans for withdrawal from the University effective the end of the spring semester.

1992 SUMMER**May 26 (Tuesday)**

First day of classes for the full summer session C, six-week session B1, and short session A1.

June 17 (Wednesday)

Last day of classes for short session A1.

June 18–19

Final examinations for short session A1.

June 22 (Monday)

First day of classes for short session A2.

June 30 (Tuesday)

Last day of classes for six-week session B1.

July 1–2

Final examinations for six-week session B1.

July 3

No classes.

July 6 (Monday)

First day of classes for six-week session B2.

July 15 (Wednesday)

Last day of classes for short session A2.

July 16–17

Final examinations for short session A2.

July 20 (Monday)

First day of classes for short session A3.

August 11 (Tuesday)

Last day of classes for full summer session C, short session A3, and last day of classes for six-week session B2.

August 12–13

Final examinations for full summer session C, short session A3, and six-week session B2.

College of *Arts & Science*

ADMINISTRATIVE OFFICERS

Richard N. Aslin, Ph.D. (Minnesota)
Dean

Richard G. Niemi, Ph.D. (Michigan)
Senior Associate Dean

Brenda Meehan-Waters, Ph.D.
(Rochester) *Senior Associate Dean
for Undergraduate Studies, College of
Arts and Science*

Jesse T. Moore, Ph.D. (Pennsylvania
State) *Associate Dean*

Ruth A. Hopkins, M.B.A. (Rochester)
Assistant Dean for Administration

Suzanne J. O'Brien, B.A. (Rochester)
Assistant Dean

Dana Rittenhouse, A.A.S. (Rochester
Institute of Technology) *Secretary
to the College*

Kenneth E. Clark, Ph.D. (Ohio State)
Dean Emeritus

The College of Arts and Science offers degree programs leading to the bachelor of arts and to the bachelor of science. In addition, it provides the first two years of instruction for students planning degrees in the School of Nursing and the College of Engineering and Applied Science, as well as the first three years for students admitted to 3-2 programs in community health and management, and the full course of study for 3-2 programs in computer science, public policy analysis, and applied mathematics.

PLANNING AN UNDERGRADUATE PROGRAM

Human inquiry is much more than an amassing of facts. It is a creative process and an attempt to overcome the limitations of common sense or naked-eye perception, the experiences of a single lifetime, or the wisdom of a single culture. The degree requirements and special programs of the College of Arts and Science are intended to help undergraduates acquire the knowledge and the intellectual tools they will need to participate in this adventure.

The freshman year is a time for special attention. In addition to the Traditional Approach (page 33), which allows students to choose from the entire range of courses open to freshmen, the College of Arts and Science has developed a series of Freshman Ventures. These programs, described on page 33, allow freshmen to take approximately half of their first year's work as a single block. As a further special opportunity for freshmen, the College offers Preceptorials, which are seminars designed exclusively for first-year students and limited to about 15 participants (see page 34).

To foster an intelligent choice of concentration and to guide students in their choice of courses outside the concentration, the College has established its foundation requirements. Formal studies, foreign language, and writing requirements set minimum standards in three important areas and reflect the value the college places on clear reasoning and effective expression. In addition, distribution requirements in the humanities, social sciences, and natural sciences en-

sure contact with the traditional divisions of scholarship and help students become aware of the span of knowledge and the place of their chosen fields of specialization within the encompassing human search for order and meaning.

To promote an initial understanding of the different modes of inquiry at a time when such understanding will help students make vital curricular and career choices, the College requires students to take courses in each of the Foundation groups during their freshman and sophomore years. The foundation requirements provide a basis for continued learning, while leaving room for many other courses.

As students proceed through their undergraduate years, concentration requirements help them develop the habits of thought associated with extensive study of a specific field. Through course work, independent study, research opportunities, and internships, students acquire both the specialized knowledge they will need for later work in their chosen field and the general skills that derive from intellectual mastery of complex and interrelated topics.

To supplement concentration programs, a wide range of minors and certificates has been added to the offerings of most of the departments within the College of Arts and Science. Although no student is required to have a minor, the option encourages those who choose it to acquire a broad knowledge of another discipline or to pursue a special subfield in depth. Requirements for minors are described in the listings of the departments that offer them.

REQUIREMENTS FOR THE DEGREES BACHELOR OF ARTS AND BACHELOR OF SCIENCE

To ensure that students acquire a broad base of general knowledge, as well as extensive familiarity with at least one area of specialization, the College has established general degree requirements. These requirements are identical for the B.A. and B.S. degrees.

1. Completion of eight semesters of approved course work, i.e., 32 four-credit courses or 128 credit hours, with an average grade of "C" or better. No more than 20 courses from a single department, no more than three courses from naval science, and no more than eight credit hours of dance technique may be counted toward the degree. For students not majoring in music, no more than eight credit hours of applied music instruction and four credit hours of ensemble may be counted toward the degree.
2. The satisfactory completion of a program of concentration with an average grade of "C" or better. Requirements for these programs are described under the various department headings. Students must make formal application to a department or an area of concentration by the end of the sophomore year and must file in the College Center for Academic Support a program of concentration approved by the appropriate faculty advisor in the department of concentration. As some departments do not accept course work taken outside the College of Arts and Science toward the concentration, students should consult departmental advisors concerning the possibility of receiving credit for outside work.
3. Fulfillment of the foundation requirements:

- a. By the end of the sophomore year, each student must successfully complete the primary writing requirement, a course in English in which emphasis is placed on the writing of effective prose (ENG 103-109) or an approved Venture composition course in other departments (such as CLA 105 or LIT 106). Entering students are advised by the Department of English in the selection of courses.

- b. As early as possible, but at the latest by the end of the junior year, every student must demonstrate knowledge of one foreign language, ancient or modern. (Certain departments require specific languages for their B.S. candidates.) Students will fulfill this requirement by achieving a satisfactory score on a test authorized by the College of Arts and Science or by successfully completing a 103-level course in a foreign language or a 106-level course in American Sign Language. Students with no previous language background may expect to achieve the required level of proficiency within two to three semesters of college study.

- c. Before graduation, each student must successfully complete at least the following courses:

- two courses in the humanities (Group I)
- two courses in the social sciences (Group II)
- two courses in the natural sciences (Group III)
- one course in formal reasoning (Group IV)
- two authorized courses, in addition to the course used to fulfill the primary writing requirement, in which sustained attention is given to writing (Group V).

Of these courses, at least one from each of Groups I, II, and III must be completed during the freshman year, and the requirement from Group IV must be satisfied by the end of the sophomore year.

GROUP I.

Humanities: art and art history (including studio arts); cognitive science 271; English (except 100, 103-105, 111-117, and 171-179); film studies; foreign languages (except courses numbered 101-103); comparative literature; literature in translation; music; philosophy (except 210-219); religion and classics (except language courses numbered 101-103).

GROUP II.

Social Sciences: anthropology; economics; history; linguistics; political science; psychology (101, 160-189, 209, 260-289, 360-389); sociology.

GROUP III.

Natural Sciences: astronomy; biology; chemistry; cognitive science 101 and 201; geological sciences (except geology 270); physics; psychology (120-159, 220-259, 320-359); courses in the Program in Biology and Medicine.

GROUP IV.

Formal Studies: cognitive science 272; computer science; geology 270; philosophy 210-219; mathematics (except 140 and 300); statistics.

GROUP V.

Writing: Selected courses throughout the College of Arts and Science, as certified by the College Curriculum Committee through its subcommittee on writing. A list of these courses is made available prior to registration.

No course may be used to fulfill more than one part of the foundation requirement. No more than two courses from the department of the student's concentration may be applied towards the Group I-V requirements. (Students with double concentrations should specify one department as the "major" department for the purposes of this requirement.)

Course work offered in naval science may not be counted toward these requirements, nor may course work taken in the William E. Simon Graduate School of Business Administration, Graduate School of Education and Human Development, College of Engineering and Applied Science, School of Medicine and Dentistry, and School of Nursing, except as authorized by the Administrative Committee. Although freshman preceptuals may be used to meet foundation requirements, some are not readily

classified; similarly, courses that carry a CAS number do not always meet foundation requirements. In cases of doubt, the student should obtain clarification from the College Center for Academic Support.

Departments of the College discourage students from registering for the next course in a continuing science sequence if an appropriate grade level ("C-" or above) has not been achieved in the preceding course. It has been shown that a student's success in such a sequence is directly related to performance in the preceding course. Students so advised are asked to seek assistance in their future program planning from the College Center for Academic Support and from their faculty advisors.

FRESHMAN OFFERINGS THE TRADITIONAL APPROACH

Students who desire maximum flexibility in course choice, the ability to start working toward a desired concentration from the first semester on, or the opportunity to build a general foundation according to their own special interests will want to consider the Traditional Approach. Assisted by an advisor, students following this approach choose an appropriate group of courses (usually four each semester) from the entire range of offerings open to freshmen. Some of these courses lay a basis for a choice of concentration. Others fulfill basic requirements for graduation and provide the first college-level steps toward a liberal education. Students in the Traditional Approach are encouraged to include a Freshman Preceptorial in their course of study (see description, following).

FRESHMAN VENTURES

The Freshman Ventures Program is supervised by a faculty committee and is administered through the College Center for Interdisciplinary Studies, which is located in 206 Lattimore Hall.

VENTURES ADVISORY COMMITTEE

- Richard Aslin, Ph.D. (Minnesota)
Dean of the College of Arts and Science; Professor of Psychology and in the Center for Visual Science
- Anthony T. Carter, Ph.D. (Cambridge)
Professor of Anthropology
- Richard W. Kaeuper, Ph.D. (Princeton)
Professor of History
- Lawrence Lundgren, Jr., Ph.D. (Yale)
Professor of Geology
- *Brenda Meehan-Waters, Ph.D. (Rochester)
Senior Associate Dean for Undergraduate Studies, College of Arts and Science; Professor of History
- Jarold W. Ramsey, Ph.D. (Washington)
Professor of English and Chair of the Committee
- Gerald A. Bond, Ph.D. (Yale)
Associate Professor of French and German Literature
- Joyce Middleton, Ph.D. (Maryland)
Assistant Professor of English
- David Schildkret, D.M. (Indiana)
Assistant Professor of Music, College of Arts and Science; Assistant Professor of Conducting and Ensembles, Eastman School of Music; Coordinator of Choral Activities

While courses chosen under the Traditional Approach are independent of one another, students who are accepted into a Freshman Venture take approximately half of their course work as an integrated sequence. Participants enjoy year-long opportunities for contact with faculty members and students who share their interests.

All of the Ventures offer multidisciplinary introductions to college study. Rather than being organized around a single theme throughout the year, they consist of separate courses, each of which has its own subject and goals, but is nevertheless linked to the other courses by a common approach. In addition, all of the Ventures stress fundamental skills of analysis and exposition.

Each Venture satisfies several basic graduation requirements, including English

composition. Enrollment is limited, and admission is by application during the summer prior to matriculation.

Ventures offered include the following:

VENTURE 1.

Foundations of Western Culture.

A multidisciplinary examination of the origin, development, and nature of European civilization from pre-Homeric Greece to the beginning of the modern period. Participating departments include history, English, fine arts, foreign languages, literatures, and linguistics, philosophy, political science, and religion and classics.

Completion of Venture 1 satisfies the primary writing requirement, one or two social science requirements, one humanities requirement, and in some cases one upper-level writing requirement.

VENTURE 2.

Ourselves and Others: Cultural Diversity in the Contemporary World.

An exploration of the nature and consequences of cultural diversity in the formation of the contemporary world, including the opportunity to study intensively selected aspects of our own and other cultures. Particular focus is on Japan. Participating departments include anthropology, English, and foreign languages, literatures, and linguistics.

VENTURE 3.

Music: Structure, Sound, and Sense.

An in-depth introduction to music, with emphasis on providing the student with the necessary background to place music in its proper cultural, historical, and aesthetic context. In the first semester, students take an introductory course in music theory which acquaints them with the mechanics of music and provides analytical tools. In addition, they study writing with a special emphasis on creative writing and writing about music. In the second semester, students examine music from a historical perspective,

*Ex officio member of the committee.

studying the development of the principal styles and genres of music. Additionally, they may elect to study either European history for a greater understanding of the events taking place at the same time as the composition of the music, or they may study aesthetics, a more abstract exploration of problems in the nature of the artistic experience. Participating departments include music, English, history, and philosophy. Venture 3 is not recommended for students planning to major in music.

Completion of Venture 3 satisfies the primary writing requirement, two humanities requirements, and in some cases one social science requirement.

VENTURE 4.

Social and Biological Determinants of Behavior.

An exploration of psychological and literary insights concerning personality, character, and the extent to which human behavior is determined by social or biological factors. Participating departments include psychology, English, and biology.

Completion of Venture 4 satisfies the primary writing requirement, one or two natural science requirements, one social science requirement, and, in some cases, one upper-level writing requirement.

VENTURE 5.

Resources, Environment, and Political Choice.

An investigation of the use of geology, political science, and literature in the evaluation of the risks and benefits associated with our natural resources. Participating departments include geology, political science, and foreign languages, literatures, and linguistics.

Completion of Venture 5 satisfies the primary writing requirement, one social science requirement, and one or two natural science requirements.

VENTURE 6.

Personality and Human Development.

An examination of the contributions of psychology, biology, and literature to our understanding of the development of human personality and how it interacts with the flow of human events. Participating departments include biology, English, and psychology.

Completion of Venture 6 satisfies the primary writing requirement, two social science requirements, and one natural science requirement.

VENTURE 7.

Perception, Image, and Form.

An exploration of how human perception and interpretation often vary widely from culture to culture, epoch to epoch, and social group to social group. Participating departments include art and art history; psychology; and foreign languages, literatures, and linguistics.

Completion of Venture 7 satisfies the primary writing requirement, one natural science requirement, and either one humanities requirement or one upper-level writing requirement.

FRESHMAN PRECEPTORIALS

Preceptorials are seminars offered exclusively for freshmen. In contrast to the Ventures, Preceptorials consist of single courses, the subject matter of which tends to be more specialized than that of the courses that make up the Ventures. Each Preceptorial is limited to about 15 students, who are selected from among those who express an interest in it. Preceptorials include directed reading, seminar discussions, and critical reports. Preceptorials carry full course credit and may be applied toward distribution requirements. If their schedules allow, students in a Venture sequence may also enroll in a Freshman Preceptorial.

A list of Preceptorials, together with information on application procedures, is mailed to freshmen prior to orientation and registration. A sampling of offerings is listed below.

ANTHROPOLOGY

197. Sports, Social Integration, and Conflict. This course utilizes informal lectures, ethnographic films, and class discussions. Assigned reading on the nature and organization of sports and other competing and performing groups found in selected cultures throughout the world, including the United States. Various types of interpersonal and intergroup competition, some involving win or lose situations, and others involving degrees of excellence as judged by specific criteria, are compared and contrasted. Effects of sports upon group pride and solidarity, and their importance to the management of intergroup conflict, including feuding, raiding, and warfare, are systematically examined.

ART AND ART HISTORY

190. The Art of East and West. A comparative study of masterworks of painting and sculpture. Selected examples are analyzed in detail and interpreted with reference to the aesthetic and social ideals of the civilization(s) which produced them. The course is an introduction to the great traditions of world art.

197. Art and Society in Early Renaissance Italy. During the late thirteenth and early fourteenth centuries several towns in Italy, notably Florence and Siena, began to distinguish themselves with a new taste and enthusiasm for art. New images, new interest in the everyday world, and new uses for art emerged in the first awakening of the Renaissance. The subject matter for this preceptorial is deliberately limited to allow for greater interdisciplinary discussion of the general relationship between art and society, and the influence of guilds, political ideology, religious thought and literature, and the rise of a merchant class on the production of works of art.

CENTER FOR VISUAL SCIENCE

196. Psychological Tools for Thought. Examines psychological tools to manipulate ideas and formulate action, such as those for making decisions under uncertainty, evaluating risks, and quantifying subjective qualities. Same as PSY 196.

HISTORY

190. Classical Civilizations. Examines the historical perception which demands a "classical" base for Western civilization.

Readings, papers, and discussion center on the meaning of this term, and ways in which we define and redefine it, beginning with definitions which come from the period (roughly, B.C. 500 to A.D. 400) itself. Same as CLA 190.

191. Russian Revolution. This course deals with the history of the Russian Revolution, including: the impact of European socialist thought; the development of the Russian revolutionary movements; the causes, stages, and consequences of the Russian Revolution; typologies of revolution.

192. Women, Work, and Family. This course examines historical and current debates on the reasons for and the consequences of women's entry into the paid labor force. Topics include housework and wage-work; occupational segregation by sex; the experience of minority women; women's work culture; sexuality and reproduction; "having it all." Readings include novels as well as works of history and sociology.

194. Autobiography and History. The course examines the evolution of American society as revealed in the autobiographies of Benjamin Franklin, P. T. Barnum, Frederick Douglass, Booker T. Washington, Henry Adams, Jane Addams, Jack London, Jerre Mangione, Margaret Meade, Claude Brown, and Russell Baker.

195. Japan and Pearl Harbor. The course emphasizes changing aspirations of the U.S. and Japan, their changing perceptions of one another, and the tensions which led to the Japanese attack on Pearl Harbor.

196. The Modern Family. In this course students investigate how we have been shaped by our families, what we can find out about our ancestors, and whether we can "model" these findings and place them in a real social history dealing with past societies.

POLITICAL SCIENCE

198. Issues in Democracy. Introduction to the problems and possibilities involved in the use of elections to enable citizens to affect government policy in contemporary societies.

RELIGION AND CLASSICS

198. Buddhism: The Compassionate Teachings of the Middle Way. A historical introduction to the concepts and values that have shaped the development of Buddhist thought and practice from its origins in India to formation of the Zen tradition in Japan. Attention will be given to the way Buddhism has adapted in various cultural settings.

OFFERINGS FOR STUDENTS AT ALL LEVELS OF UNDERGRADUATE STUDY

PERSPECTIVES COURSES

In order to encourage students to take a broader view of the curriculum and to put their study within their concentration into a broader context, the College offers two categories of Perspectives courses. Central Text courses emphasize the study of influential fictional and non-fictional texts, as well as works of art, music, and film. Each course provides a different context for the study of these works. Contemporary Issues courses focus on topics that are currently matters of public controversy. None of these courses has extensive prerequisites; all are open to students majoring in other areas.

CENTRAL TEXTS**AFRICAN AND AFRICAN-AMERICAN STUDIES**

205. Black Intellectuals and the Crisis of the Twentieth Century. Considers the writings of major political thinkers in the United States, Africa, and the Caribbean by placing their work in historical context. Same as PSC 263.

ANTHROPOLOGY

202. Social Theory: Enduring Issues and Contemporary Ethnographic Studies. The influence of social theory on the collection and analysis of ethnographic data. Primarily for anthropology majors and majors in the social sciences and humanities. (Fall)

ART AND ART HISTORY**ART HISTORY**

101. Introduction to Ancient and Medieval Art. A historical survey of the monuments of prehistoric, Egyptian, Mesopotamian, Greek, Roman, and medieval art. (Fall)

102. Introduction to Renaissance and Modern Art. A survey of art from the late Middle Ages to the early twentieth century, with reference to parallel developments in oriental art. (Spring)

113. History of Photography. This course surveys the history of photography from its origins to the present day. It includes a discussion of technical and aesthetic issues and looks at both artistic photography and the use of photographs for documentary and other "non-art" purposes. Readings include a general text, writings by photographers, and discussions of specific problems. The course is taught by lecture and discussion. There is a mid-term and final and two museum assignments using materials from the International Museum of Photography at George Eastman House. (Spring)

CLASSICS

216. Plato and Logopoiesis. A study of several Platonic dialogues (Phaedrus, Lysis, Symposium) and their themes, especially the relation of eros and speech to divinity. Same as LIT 228. (Spring)

221. Literature and Society in Ancient Rome. Life at the turn of the millennium. Reading mostly in primary sources (in English). Literature, religion, society at the height of Rome's power. Same as HIS 259. (Fall)

ENGLISH

132. Introduction to the Art of Film. The primary visual, aural, and narrative conventions by which motion pictures create and comment upon significant human experience, seen in a variety of narrative, documentary, and "independent" films. Issues of frame, image, space shot, editing, and temporal and dramatic construction are discussed as these raise problems of cinematic style, meaning, and value. (Fall)

140. Classical and Scriptural Backgrounds. Same as CLT 101 and REL 141. (Fall and Spring)

144. Introduction to Shakespeare. A selection of his major plays. (Fall and Spring)

320. Arthurian Traditions. More than any other legends apart from those of the Bible, the stories of King Arthur have provided Western Europe and North America with a vehicle for cultural propaganda and reassessment. From the twelfth to the twentieth centuries artists in all genres and modes have recast Arthurian narratives and images to explore and redefine moral and social concerns of their day. After a brief introduction to Arthurian backgrounds, the course focuses on Arthurian literature of the High Middle Ages with a concentration on England in the fourteenth century, then examines the decline of that ideology in Malory (fifteenth century), the reinvigoration of it in Spenser (sixteenth century), and then concludes with readings in the nineteenth and twentieth centuries. (Fall)

**FOREIGN LANGUAGES,
LITERATURES, AND LINGUISTICS
COMPARATIVE LITERATURE**

100. Introduction to Comparative Literature. Introduces freshmen and sophomores to the interdisciplinary, international, and intercultural possibilities of comparative literature. (Fall)

102. Topics in Comparative Literature. An introduction to topics of interest in the field of comparative literature. Close critical scrutiny of cultural difference as manifested in a variety of literary texts and cultural phenomena. (Spring)

**LITERATURE**

178. Traditional China. This course is intended as an introduction to the social and political philosophy, religious beliefs, artistic expression, and material culture of premodern China. Students read the basic texts underlying Chinese civilization, while lectures, films, and slide presentations focus on various aspects of China's traditional culture. Grading is by take-home midterm and final exams. Same as HIS 178/REL 178. (Fall)

MUSIC

100. Performances: Chamber Music. Internationally acclaimed composer and award-winning teacher Samuel Adler offers a course for listeners. Live performances by distinguished members of the faculty of the Eastman School of Music are the focus for the lectures and discussions. Mandatory concert attendance with several short written assignments. A music appreciation course that could exist only at the University of Rochester! (Fall)

102. Masterpieces of Western Music. A listening course for individuals with little or no previous musical background. Through readings and listening assignments, students become acquainted

with the techniques classical composers use to organize their music, stylistic characterizations at various periods of music history, and the development of the chief genres of western art music. The hands-on approach to listening helps students to develop the skills necessary to understand and appreciate this rewarding art form. (Spring)

122. History of Jazz. A survey of the history of jazz from pre-1900 origins to the present. (Spring)

126. Music and Ritual. Many of the world's people regard music as a primary form of communication with the Spirit world. Used in a variety of contexts, music can cure the sick, can initiate children into the adult world, or can move one into a state of trance or ecstasy. This course examines the role of music in a variety of rituals from the Australian Wild Onion Dance to the ritual of the half-time show. (Fall)

PHILOSOPHY

201. History of Ancient Philosophy. Lecture survey of the development of Western philosophy from the prephilosophical beginnings through Aristotle. (Fall)

202. History of Modern Philosophy. A study of important philosophers from the seventeenth to the eighteenth century and of their position in the cultural history of the West. (Spring)

POLITICAL SCIENCE

219. The Constitution: Then and Now. A study of the events and ideas involved in the writing of the U.S. Constitution and a consideration of the present form of the Constitution in operation. (Fall)

280. The Greek Political Classics. A detailed comparative study of Thucydides, Plato, and Aristotle. Comparisons with modern political theories. Same as PHL 208. (Fall)

281. The Modern Political Classics: The Philosophy of Freedom. Systematic political theories from Hobbes to Nietzsche. Same as PHL 209. (Spring)

RELIGION

101. Old Testament. The historical formation of the Old Testament; a study of its representative books; discussion of their significance then and now. (Spring)

102. Introduction to New Testament.

A survey of all the New Testament writings in their historical and cultural context, with emphasis on the theological themes expressed by that literature. (Fall)

106. Confucius to Zen. The teachings, practices, and social impact of the major religious traditions of China and Japan. Same as HIS 106. (Spring)

107. History of Islam. This course traces the development of the religion of Islam from its origins in the Qur'an and Muhammad's teachings, through the codification of the classical tradition in its various forms and, finally, to the living Islam of the contemporary world. (Fall)

141. Classical and Scriptural Backgrounds to Western Culture. The great tradition from Homer, Greek drama, Plato and Virgil, to the Bible and Dante. Same as CLT 101 and ENG 140. (Fall)

SOCIOLOGY

221. Love, Friendship, and Community. Sociological study of personal ties and face-to-face social groups; kinship networks, friendship groups, political and religious ideological groups, intellectual circles. (Fall)

CONTEMPORARY ISSUES**AFRICAN AND AFRICAN-AMERICAN STUDIES****210. State and Society in Africa.**

Examines the critical contemporary issues in Africa, political and economic trends, with a particular emphasis on the relationship between states and societies. Same as PSC 266. (Spring)

242. Technology and Development in the Third World. Course explores the role of technology in the Third World and factors affecting technological development. Same as PSC 242/PPA 442. (Spring)

252. Economies and Societies of Latin America and the Caribbean Since 1492.

Provides a historical explanation for the general problem of material poverty and the socio-political crises that characterize contemporary Latin America and the Caribbean. Same as HIS 242. (Fall)

280. Just and Unjust Wars. The course considers the just war tradition in political thought and the relevance of this tradition to modern way, both conventional and nuclear. Projects of state formation and nation building are examined in relation to the basic cleavages of contemporary African societies. Same as PSC 277/477. (Spring)

ANTHROPOLOGY**101. Introduction to Anthropology: Understanding "Others" and "Us."**

The course is designed to give students an understanding of our own and other cultures. (Fall)

131. Inequality and Resistance: Comparative Studies of Class, Race, and Gender. Exploration of cultural diversity in the United States using cross-cultural, comparative studies of resistance to inequality. Concepts of culture, social structure, and power. (Fall)

133. From Slavery to Revolution. The impact of capitalism on the peoples of Africa, Asia, and Latin America. (Spring)

135. American Culture: Unity and Diversity. What does it mean to be an American? Using the University as a microcosm, the course examines the rich ethnic and cultural diversity so characteristic of "America." (Spring)

208. Cultural Factors in Aging. Beliefs about aging and the aged examined in the context of the social roles and behavior actually assumed by the elderly in differing cultures. (Spring)

235. Women in Society: A Cross-Cultural Contemporary Survey. Explorations of women's domestic, productive, and political roles in both traditional and industrial societies, including the United States. (Spring)

BIOLOGY**101. Introduction to Modern Biology.**

Brief introductions to the fields of cell biology, genetics, ecology, and evolution provide the necessary framework for discussions of the steadily increasing effect that advances in modern biology are having on our lives. Selected topics of special interest include recombinant DNA technology (economic benefits and new methods for the diagnosis and treatment of disease); cancer (what is it and methods of treatment); AIDS (cause of the disease and the current epidemic); and the evolution of man. Not for students majoring (or minoring) in biology; does not carry major or minor credit. (Fall)

CHEMISTRY

101. Chemistry in Society. A single-semester course intended for prospective social science and humanities majors. Thermodynamics, kinetics, equilibria, and introduction to organic chemistry. No laboratory; lecture discussions pertaining to acid rain, the ozone layer, and designer drugs. (Fall)

ECONOMICS

234. Regulation of Economic Activity. Analysis of the impact of government regulation in transportation, safety, and health on economic welfare and efficiency. (Spring)

236. Health Policy. Analysis of factors that affect supply and demand in the market for medical care; risk, insurance, externalities, ethics, regulation. (Spring)

237. Economics of Education. Costs and returns to investment in education; public policy decisions about education; educational finance. (Spring)

238. Economics of Energy. Theories of exhaustible resources, regulatory policy, and industrial organization as related to energy markets, particularly oil and natural gas. (Fall)

ENGLISH

146. Women, Writing, and Representation. The crucial questions of this course center on the ways in which (masculine) mainstream culture has shaped and limited the representation of one half of the human race in earlier western literature. The course takes account of the lives and experiences of women as far as these are recoverable; but a more direct concern is "femininities," the expectations, possibilities, and limits that are set for women's lives in texts. The evidence is mainly literary, though some time is spent considering visual portrayals of women, and how these define a model—in terms of spectatorship, the gaze, consumption, idealization—for reading women. (Spring)

325. Ethnicity in American Culture. Americans all came here from somewhere else and from the moment when the first inhabitants came down to the beach to greet Christopher Columbus our literature records a continuing series of encounters and exchanges between people of different cultures and expectations. Working on the assumption that as Americans we are the result of what we have learned and failed to learn from each other, this course examines a number of autobiographies and novels that focus on the experience of some of the ethnic groups which make up the American diversity. (Spring)

334. The Ecological Imagination: Ideas of Nature in Literature. Examination, beginning with writings on our present environmental predicament, of ways of engaging nature in literature. Readings in the Biblical, American Indian, Romantic, and post-Romantic traditions. (Spring)

337. Marxism and Feminism. This course analyzes various models which describe the relationship between marxism and feminism. Consideration is given to how each model identifies very different structures of oppression and very

different sites and forms of collective resistance to a dominant culture. And questions are asked about how each of these models might influence our interpretations of literature and other cultural phenomena. (Spring)

GEOLOGY

120. Energy and Mineral Resources. Energy sources presently in use, their availability, and their environmental and economic consequences. Alternative energy sources, their potentials, and problems. The distribution and formation of mineral resources. Reserves, rates of production, and consumption of important minerals. (Spring)

HISTORY

202. The Third World. Exploration of the origins of colonialism and "underdevelopment" in the rise of European capitalism and the struggles of the colonial and post-colonial peoples for political independence, cultural autonomy, and economic development. (Spring)

229. History of the U.S.S.R. The Bolshevik Revolution, with emphasis on the origins and development of economic, political, and cultural institutions from 1917 to the present. (Spring)

MUSIC

124. Gender and Music. Have you ever watched a classical music concert? a nightclub jazz performance? an MTV video? Do you play a musical instrument or sing in a choir? Have you ever wondered if, or how, your gender affected your ideas about and experiences with music? This course explores the role of gender in various world musical systems through recordings, videos, and personal experiences. (Fall)

PHILOSOPHY

103. Contemporary Moral Problems. The application of ethical theory to concrete moral problems such as punishment, abortion, and racism. (Fall)

105. Reason and Argument. A study of reason and argument on both scientific and nonscientific topics. How to evaluate reasoning as it is found in editorials, speeches, and essays. How to understand and evaluate the reasoning found in reports on scientific research. (Fall)

PHYSICS

255. Physics in Modern Technology. Microelectronics and applications to computers, modern communications systems, energy demand and generation. (Fall)

258. Energy and Environment. A broad survey of the energy-environment field, for science and engineering concentrators. (Fall)

POLITICAL SCIENCE

209. Interest Groups in America. An introduction to the issues that concern political scientists (especially) and economists about interest groups in American politics. (Spring)

237. Domestic Social Policy. The content, rationale, assumptions, and development of selected domestic policies. The use of social science theories and findings in policy formation and evaluation. (Fall)

245. Aging and Public Policy. Covers policies in such areas as social security, public assistance, health care, and social services for the elderly. Same as PPA 445. (Spring)

270. International Politics. An examination of foreign policy and world politics especially for the period since World War II. (Fall)

PSYCHOLOGY

369. Psychology of Women. Consideration of recent experimental and theoretical contributions concerning the psychology of women. (Spring)

RELIGION**225. Ethical Decisions in Medicine.**

Examination of a select number of moral issues arising in medicine. Topics include abortion, termination of life, experimentation on human subjects, informed consent, refusal of treatment, and suspension of treatment. Same as PHL 225/425. (Spring)

246. Cry Freedom: Liberation Theologies of Africa and the Americas. This course examines the rise of various theologies of liberation in Africa, Latin America, and North America. Black Americans, the women's movement, the church in Africa and Latin America have all developed their own theologies of liberation, and have each brought a distinctive voice to the cry for freedom in their own setting. Throughout the course, and in the various authors and movements studied, the unique connection between religion and liberation is explored. Same as AAS 246. (Spring)

278. Islam and the Third World. This course studies some of the important and often dramatic changes occurring in modern Islam by examining the effects on it of Third World political, social, and economic factors. Same as AAS 278/HIS 278. (Spring)

SOCIOLOGY

233. Deviant Behavior. The theoretical and empirical analysis of deviance as the product of societal reactions, official labeling activities, and other variables. (Spring)

234. Crime and Delinquency. A review of major sociological findings and theories about crime and delinquency. (Fall)

WOMEN'S STUDIES

202. Women in Society: Health Issues in Cross-Cultural Perspective. This course uses a cross-cultural, anthropological perspective to examine current positions and roles of women and contemporary concepts of gender. Images of women in a variety of cultures are examined and the effects of cultural beliefs on the social construction of gender are explored.

Consideration is given to women's economic and political roles as well as their domestic and reproductive ones. In particular, the issue of women's health is used to focus on some of these larger discussions. The course considers, for example, how politics, economics, and social class work to position women in different health care systems and structures and how international and domestic policies affect women's access to health care services. Also considered are the special needs of women throughout the reproductive cycle and beyond and the way different cultures define and construct ideas of health and illness. One aim of this course is to see how the study of other cultures may suggest new approaches to current social issues facing American women. (Spring)

203. Issues and Methods. Provides an introduction to a general theoretical framework for feminist analysis and offers several methodological examples to explore and test, through a thorough examination of a problem or problems of current urgency in both women's studies and women's daily lives. (Spring)

396. Feminist Theory and Identity Politics: Intersections of Gender, Sexuality, and Race. This course examines recent developments, debates, and conflicts within feminist theory as it engages with questions of identity and coalition politics. Discussions are organized around texts that examine the social and cultural construction of the identities that ground any efforts at coalition building. The goal is to examine the history of U.S. feminism, through the seventies and eighties, as it increasingly needs to confront gender at its intersections with race, ethnicity, and sexuality. Reading a variety of texts that confront so-called "mainstream" feminism and academic feminism with the challenges offered by the theory and politics produced by people of color, and by gays and lesbians, this course focuses on the issue of identity and coalition in cultural politics. (Fall)

EXTRA-DEPARTMENTAL COURSES

The following list of courses reflects current interests of students and faculty. Course listings are published in the *Schedule of Courses* and are posted in Lattimore Hall each semester. Expanded descriptions of current courses are also published each semester.

CAS 100. Introduction to Small Computers. A look at computers, how they work, and what they are used for. Basics of computer hardware and software, with an emphasis on what is commercially available. Computer applications. No degree credit in the College of Arts and Science. (Spring and Fall)

CAS 106. Beginning Personal Computer Applications. A hands-on course on how to use a personal computer for practical applications. Emphasis is on software compatible with industry standards. No degree credit in the College of Arts and Science. (Fall and Spring)

CAS 107. Advanced Personal Computer Applications. A hands-on course, covering more advanced features of WordPerfect and Lotus 1-2-3 for the IBM PC. No degree credit in the College of Arts and Science. (Fall and Spring)

CAS 116. Introduction to Community Medicine. Analysis of current issues in the organization, financing, and evaluation of personal and public health care. (Fall)

CAS 150. GO=Game and Culture. An introduction to the ancient oriental game of GO. Study of the game is used as a window on Japanese culture and as a model of conflict. (Fall)

CAS 301. Senior Seminar in Health and Society. A seminar for seniors completing the interdisciplinary health and society curriculum.

DANCE COURSES

Only eight credit hours of dance technique (171–277, excluding 281) may be applied toward the degree. Students are free to continue in dance technique on a noncredit basis.

171. Introduction to Ballet. Credit—2 hours. Ballet fundamentals including barre work, center work, adagio, and basic combinations. May be repeated for credit. (Fall and Spring)

176. Modern Dance Technique I. Credit—2 hours. Beginning level. Introduction to modern dance, including basic warm-up exercises and combinations. (Fall and Spring)

271. Intermediate Ballet. Credit—2 hours. Continuation of SA 171. This course includes barre work, center work, and adagio and allegro combinations. May be repeated for credit. (Fall and Spring)

DEPARTMENTAL COURSE OFFERINGS AND PROGRAM REQUIREMENTS

The College of Arts and Science departmental courses described between this page and page 161 were offered in 1990–91. Those exceptions are usually noted. Updated course offerings are listed in the *Schedule of Courses*, which is published in March and November of each year.

ACTUARIAL STUDIES

The College offers a certificate in actuarial studies for students contemplating a professional career in the insurance industry. The program is organized by a committee of representatives from the departments of statistics, mathematics, and economics, and from Career Services and Placement Center, with one member designated as program advisor, and administered through the College Center for Interdisciplinary Studies (in 206 Lattimore Hall). Ordinarily, interested students should apply by March 1 of their junior year.

COMMITTEE ON ACTUARIAL STUDIES

Poduri S. R. S. Rao, Ph.D. (Harvard)
Professor of Statistics, of Biostatistics, and in the William E. Simon Graduate School of Business Administration; Chair of the Committee and Program Advisor

Sanford L. Segal, Ph.D. (Colorado)
Professor of Mathematics

Kenneth McLaughlin, Ph.D. (Chicago) *Assistant Professor of Economics*

REQUIREMENTS FOR A CERTIFICATE IN ACTUARIAL STUDIES

The course requirements are

Five core courses:

1. STT 212 or ECO 231 (prerequisites for ECO 231: MTH 161 and STT 165, or various substitutes)
- 2–3. MTH/STT 201 and 203 (prerequisites: MTH 161–162 or equivalent)
4. MTH 164 (prerequisites: MTH 161–162 or equivalent)
5. ECO 208 (prerequisite: ECO 207)

Two additional courses (totaling at least six credits):

One from the following list:

- MTH/STT 207, MTH/STT 209, CSC/MTH/STT 280, STT 216, STT 221, ORM 420 (in the William E. Simon Graduate School of Business Administration)

One additional course, either from the above list, or the following list, or an approved substitute:

- ECO 248, ECO 236, Independent Study (approved by the program advisor)

For certification, students must complete these course requirements with a grade-point average of 2.5 or higher. In addition, some proficiency in a high-level computer language (Pascal, APL, FORTRAN, etc.) is required. CSC 108, CSC 110, CSC 181, and EE 171 are among the courses that may be used to satisfy the computing requirement.

Please note: Course substitutions may be possible with the approval of the program advisor.

Many insurance companies offer summer internships for students contemplating the actuarial profession. Such an internship may provide important additional training, as well as summer income.

The Society of Actuaries is the professional organization of actuaries in the United States and Canada. To become an Associate Member of the Society, one must pass a series of examinations. Some or all of these may be taken while employed, after college graduation; some may be taken while a student. The first examination is in calculus and linear algebra, and the courses MTH 161, 162, and 164 provide at least most of the necessary background. The second examination is in probability and statistics, covered by courses MTH/STT 201 and 203 and STT 212. Certificate students could, and are strongly encouraged to, take the first two examinations before, or upon, graduation. The exams are given three times a year: February, May, and November.

At graduation, students successfully completing the actuarial studies program will receive a certificate in their departmental diploma ceremony.

AFRICAN AND AFRICAN-AMERICAN STUDIES

The Frederick Douglass Institute for African and African-American Studies offers an interdisciplinary program of courses.

ASSOCIATES AND FACULTY

Karen E. Fields, Ph.D. (Brandeis)

*Professor of Religion and Director,
Frederick Douglass Institute for
African and African-American Studies*

Joseph E. Inikori, Ph.D. (University of
Ibadan, Nigeria) *Professor of History
and of African History; Associate
Director of the Institute*

Samuel C. Nolutshungu, Ph.D.
(Manchester) *Professor of Political
Science and of African Politics*

Jesse T. Moore, Ph.D. (Pennsylvania
State) *Associate Professor of History*

Elias Mandala, Ph.D. (Minnesota)
Associate Professor of History

Larry E. Hudson, Jr., Ph.D. (Keele
University, UK) *Assistant Professor
of History*

Ben W. Ebenhack, M.S. (Wyoming)
*Postdoctoral Fellow in African and
African-American Studies and Part-
time Instructor in Chemical Engi-
neering*

The Frederick Douglass Institute for African and African-American Studies sponsors programs of teaching and research at the undergraduate level. As part of the College of Arts and Science, the Institute has a broad mandate in undergraduate and graduate education, advanced research, and exchange within the University community and beyond. It is the focal point for African and African-American Studies at the University.

Institute courses are cross-listed with those of anthropology, economics, history, English, foreign languages, literatures and linguistics, political science, chemical engineering, women's studies, and religion and classics.

In addition to the courses offered, the Institute sponsors an annual Residential Fellowship Program (postdoctoral, predoctoral, and graduate study), Frederick Douglass Forums, conferences, and a



new research initiative, Access to Hydrocarbon Energy for African Development.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

105. Introduction to Third World Politics. An introduction to the comparative politics of the third world. Africa is compared to Europe and Asia for a better overall understanding. Cross-listed PSC 150. (Fall).

120. The Black Family in Historical Perspective. This course provides students with the opportunity to examine the structure and function of the black family in the American context, with an emphasis on the relationship between historical patterns and contemporary adaptations. Cross-listed HIS 120. (Fall)

205. Black Intellectuals and the Crisis of the Twentieth Century. Considers major political thinkers in the United States, Africa, and the Caribbean by placing their work in historical context. Cross-listed with PSC 283. (Fall)

210. State and Society in Africa.

Examines critical contemporary issues in Africa, with a particular emphasis on the relationship between states and societies. Cross-listed with PSC 266. (Spring)

222. Afro-American Literature: Autobiography and Beyond. Introduces students to the major authors within the Afro-American literary tradition. Cross-listed with ENG 226. (Spring)

242. Technology and Development in the Third World. Explores the roles of technology in development in the Third World and factors affecting technological development. Cross-listed with PSC 242. (Spring)

252. Economies and Societies of Latin America and the Caribbean Since 1492. Provides a historical explanation for the general problem of material poverty and the sociopolitical crises that characterize contemporary Latin America and the Caribbean. Cross-listed with HIS 242. (Fall)

268. Critical Issues in North-South Relations. The course analytically examines the relationship between the developed (North) and the underdeveloped (South) world, i.e., geopolitics of inequality between rich and poor nations. Cross-listed with PSC 268. (Spring)

- 277. Energy Resources and Utilization: with Attention to Africa's Undeveloped Energy Prospective Provinces.** Emphasis on technical and developmental aspects of energy resource problems; consideration of quality-of-life impacts of energy. Cross-listed with CHE 277. (Spring)
- 280. Just and Unjust Wars.** This course considers the just war tradition in political thought and the relevance of this tradition to modern war, both conventional and nuclear.
- 288. History of the American South II.** Course concentrates on the political and social relations of the New South and examines the forces which gave the South its distinctive characteristics in this post-Civil War period, and the impact of industrialization, black migration, and internal events upon the making of these new social and political relationships. Cross-listed with HIS 288. (Spring)
- 349. Plantation Societies in the Americas.** This course investigates the rise and fall of plantation societies. It examines the economic, social, and political relations which developed, and considers their influence on post-plantation society. Cross-listed with HIS 349. (Spring)
- 371. Evolution of the World Economic Order Since the Sixteenth Century.** Seminar Course. Course deals with the economic relations between the developed and less developed parts of the world since the sixteenth century. Cross-listed with HIS 371/471 and ECO 371. (Spring)
- 375. The Atlantic Slave Trade and Africa, 1650-1850.** Seminar Course. Examines the level of socio-economic development in Africa by the late fifteenth century, relative to the other major regions of the world at the time. The effects of the "production" of captives for export on social and political structures and the overall economic consequences of the trade in Africa are also examined. Cross-listed with HIS 385/ECO 385. (Fall)

ADDITIONAL COURSES

- 107. History of Islam.** Same as REL 107. (Fall)
- 142. Black American Society Since 1900.** Same as HIS 142. (Spring)
- 150. Topics of Afro-Hispanic Literature.** Same as LIT 150. (Spring)
- 202. The Third World.** Same as HIS 202. (Fall)
- 203. Class, Race, and Gender: Comparative Studies of Inequality and Resistance.** Same as ANT 203. (Spring)
- 215. Race and Gender in Afro-Hispanic Literature.** Same as SP 288/CLT 217. (Spring)
- 230. Economics of African-American Slavery.** Same as ECO 228. (Fall)
- 245. African-American Religion and Black Church History.** Same as REL 247. (Spring)
- 246. Cry Freedom: Liberation Theologies of Africa and the Americas.** Same as REL 246. (Spring)
- 253. Economics and Social Conditions of African-Americans in the Twentieth Century.** Same as ECO 253. (Spring)
- 257. Comparative Political Economy.** Same as ANT 266/466. (Fall)
- 264. Urban Economics: Prospects for Metropolitan America.** Same as ECO 264. (Spring)
- 266. Colonial and Contemporary Africa.** Same as HIS 266. (Fall)
- 275. Francophonie: The North African Novel in French.** Same as FR 275. (Spring)
- 278. Islam and the Third World.** Same as REL 278. (Fall)
- 290. Gender and Global Migration.** Same as WST 290. (Spring)
- 297. South Africa: A History of Apartheid.** Same as HIS 297. (Fall)
- 335. Major Literary Figures: Toni Morrison.** Same as ENG 335. (Spring)
- 339. Religion, Slavery, and Race in the Old South.** Same as REL 339. (Spring)
- 354. State and Revolution in Southern Africa.** Same as HIS 354. (Spring)
- 356. The Black Family in Slavery and Freedom.** Same as HIS 356. (Fall)
- 376. Women and History in Africa.** Same as HIS 376. (Fall)
- 384. The Food Crisis in Africa.** Same as HIS 384. (Fall)

ANTHROPOLOGY

- Anthony T. Carter, Ph.D. (Cambridge)
Professor of Anthropology and Chair of the Department
- Grace Harris, Ph.D. (Cambridge)
Professor of Anthropology and of Religion
- Walter Hinchman Sangree, Ph.D. (Chicago)
Professor of Anthropology
- Edward E. Calnek, Ph.D. (Chicago)
Associate Professor of Anthropology
- Amelia R. Bell, Ph.D. (Chicago)
Assistant Professor of Anthropology
- *Robert Foster, Ph.D. (Chicago)
Assistant Professor of Anthropology
- Ayala Gabriel, Ph.D. (Rochester)
Assistant Professor of Anthropology
- Thomas P. Gibson, Ph.D. (London School of Economics)
Assistant Professor of Anthropology
- Alfred Harris, Ph.D. (Cambridge)
Professor Emeritus of Anthropology
- Robert S. Merrill, Ph.D. (Chicago)
Professor Emeritus of Anthropology
- René Millon, Ph.D. (Columbia)
Professor Emeritus of Anthropology
- A teaching assistant occasionally helps with discussion sections and grading in large courses.*

Anthropology is the comparative study of human societies and cultures. Anthropologists seek to understand how we interact with one another and how different patterns of social interaction shape, and are shaped by, cultural values and systems of meaning. Anthropologists may be concerned with phenomena as diverse as the first stages of urbanization in pre-Hispanic Mexico, the relations between politics and religion in Southeast Asia; the formation of nation-states and national identities in Papua, New Guinea, and other excolonial states; marriage in Nigeria; or the role of women in Israeli politics. Anthropological studies are based on intensive participant observation of single societies and on careful cross-cultural comparison.

The Department of Anthropology offers programs of study leading to the B.A. de-

*These faculty have applied for one or two semesters of leave during 1991-92.

gree, the B.A. degree with honors, and, at the graduate level, the M.A. and Ph.D. degrees.

Students may minor in anthropology by following one of the four plans described below. There is a general minor in anthropology as well as specialized minors in medical anthropology and archaeology and ethnohistory.

CONCENTRATION REQUIREMENTS IN ANTHROPOLOGY

Twelve courses are required for a concentration in anthropology.

1. Nine courses in anthropology of which at least seven must be beyond 200. The seven advanced courses must include:

- At least three courses in anthropology: ANT 201, 202, 203, and 204
 - At least one course in regional ethnography: ANT 240, 241, 242, 243, 245, 246, or 249
 - ANT 301, "The History of Anthropological Thought"
 - A research seminar: ANT 351-370.
2. Three courses beyond the introductory level in an allied field. All allied field courses typically are taken in the same department, but an allied field composed of a mixture of courses from different departments may be substituted with the approval of the departmental advisor.

THE HONORS PROGRAM

Students wishing to graduate with honors in anthropology must fulfill the normal requirements of the undergraduate concentration and must in addition:

- Successfully complete an additional research seminar: ANT 351-370
- Successfully complete ANT 392, "Honors Research in Anthropology"
- Submit an acceptable Honors Thesis by April 1 of the senior year and present the thesis for review by a committee of the department.

REQUIREMENTS FOR MINORS

Anthropology

Six courses in anthropology are required:

- An introductory course: ANT 101-199
- Two of the core courses in anthropology: ANT 201-204
- Two additional 200-level courses
- ANT 301, "The History of Anthropological Thought."

Medical Anthropology

Six courses are required:

- An introductory course: ANT 101-199
- Two of the core courses in anthropology: ANT 201-204
- ANT 216, "Medical Anthropology"
- Two courses from among ANT 208, 218, and 220.

Archaeology

- ANT 102. Anthropological Perspectives on the Past.
- ANT 202. Early Civilizations of the Old World and the New.
- Three of the following 200-level courses: ANT 210, 241, or 245; or AH 220.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

INTRODUCTORY COURSES

- 101. Introduction to Anthropology: Understanding "Others" and "Us."** The course is designed to give students an understanding of our own and other cultures. Freshmen and sophomores only.
- 102. Anthropological Perspectives on the Past.** Recent approaches in archaeology and ethnohistory to the study of human evolution and physical variation, the beginnings of agriculture, and the rise of civilizations in the Old and New Worlds. (Spring)
- 113. MTV: Music and Value in Contemporary Culture.** Credit—2 hours. Anthropological studies of contemporary music

and the mass media. How popular music affects and reflects such contemporary social concerns as love, sex, violence, and gender roles. (Fall)

131. Inequality and Resistance: Comparative Studies of Class, Race, and Gender. Exploration of cultural diversity in the United States using cross-cultural comparative studies of resistance to inequality. Concepts of culture, social structure, and power. (Fall)

133. From Slavery to Revolution. The impact of capitalism on the peoples of Africa, Asia, and Latin America. (Spring)

135. American Culture: Unity and Diversity. What does it mean to be an American? Using the University as a microcosm, the course examines the rich ethnic and cultural diversity so characteristic of "America." (Spring)

CORE COURSES IN ANTHROPOLOGY

- 201. Observing Humankind—Doing Anthropology.** An introduction to the craft of social and cultural anthropology. Exercises in data collection and anthropological writing in the Rochester community and elsewhere. Primarily for anthropology majors and majors in the social sciences and humanities. (Spring)
- 202. Social Theory: Enduring Issues and Contemporary Ethnographic Studies.** The influence of social theory on the collection and analysis of ethnographic data. Primarily for anthropology majors and majors in the social sciences and humanities. (Fall)
- 203. Language and Culture.** The study of language in interaction with society and culture. Primarily for anthropology majors and majors in the social sciences and humanities.
- 204. Ethnographic Classics.** Critical study of a selection of ethnographic texts that have played a major role in shaping anthropology. Primarily for anthropology majors and majors in the social sciences and humanities.

TOPICS IN ANTHROPOLOGY

205. Society, Culture, and Personality. Relationships among socialization procedures, social structure, and ideological and "expressive" aspects of selected cultures. (Fall)

206. Early Civilizations of the Old World and the New. Comparative study of Near Eastern, Chinese, Middle American, and Andean civilizations. (Fall)

208. Cultural Factors in Aging. Beliefs about aging and the aged examined in the context of the social roles and behavior actually assumed by the elderly in differing cultures. (Fall)

216. Medical Anthropology. The study of "disease" and "illness" in relation to society and culture. Comparative analysis of bio- and ethno-medical models. (Spring)

217. The American Family in a Changing Society. Explorations of current issues facing the American family as expressions of contemporary change, cultural diversity, ethnic heritage, and core American values. Prerequisite: one course from among ANT 201-204 or permission of the instructor. (Spring)

218. Birth and Death: The Anthropology of Vital Events and International Health. Analysis of the interaction of population processes socio-cultural systems, and human welfare. Implications for population and health policy and for development are examined. (Spring)

220. Healing and Ritual. How various cultures bring ritual to bear on the diagnosis and treatment of bodily ills and misfortunes. (Fall)

235. Women in Society: A Cross-Cultural, Contemporary Survey. Explorations of women's domestic, productive, and political roles in both traditional and industrial societies, including the United States. (Fall)

240. Southeast Asian Ideologies. Concepts of social and religious order in Southeast Asia, contrasting the tribal highlands with the Buddhist and Muslim civilizations of the lowlands. (Fall)

241. Ancient Mesoamerica. Rise of civilization in Middle America from the earliest time to the Spanish Conquest. (Fall)

242. Native Peoples of North America. An examination of anthropological studies of Native American cultures, organized around the developing theoretical concerns that have informed research. (Spring)

243. Topics in Pacific Ethnography: Knowledge, Power, and Ritual. An introduction to the societies and cultures of Melanesia through ethnographic investigations of such topics as myth; ritual; gift exchange; gender and socialization; political economy; knowledge and power; colonial history; and the politics of producing a national culture in postcolonial states.

245. Religion in Ancient Mesoamerica. Myth, ritual, calendar, religious architecture, and human sacrifice among the Aztecs, Mayas, and other peoples of pre-Hispanic America. (Spring)

246. Peoples of Africa. An examination of the varieties of social structure in selected areas of sub-Saharan Africa. (Spring)

249. Contemporary South Asia. Society, culture, and the world economy in the making of nation-states and their problems. A comparative study of India, Sri Lanka, Pakistan, Nepal, and Bangladesh.

CENTRAL COURSES

261. Political Anthropology. Comparative analysis of political organization in small-scale societies, with emphasis on maintenance of internal order and external independence. (Spring)

262. Kinship, Marriage, and the Family. Critical examination of a variety of systems of kinship and marriage, and of different approaches to their study. (Spring)

263. Religions: Their Values and Symbols. Exploring rituals and doctrines through selected nonscriptural religions in their social-historical contexts. Same as REL 214. (Spring)

265. Disputing: Norms and Processes. An examination of such concepts as authority, the person, responsibility, rights and obligations, guilt and innocence, punishment, freedom, and justice. (Spring)

SEMINARS AND INDEPENDENT RESEARCH

301. The History of Anthropological Thought. An examination of the development of the anthropological tradition from the late nineteenth century to the present. Readings are drawn from the works of key figures in the development of American, British, and French anthropology. Prerequisites: two courses from among ANT 201-204 or permission of the instructor.

352. Critical Social Theories. From Marx and Nietzsche to Foucault: knowledge and power in contemporary social theory. (Fall)

354. Gender Theories: "Man the Hunter/Woman the Gatherer" and Beyond. Cross-cultural examination of theories of gender in the social and human sciences. (Spring)

355. Religion and the State in Southern Asia. Historical and ethnographic approaches to the interdependence of politics and religion in South and Southeast Asia.

357. Making National Cultures. Recent historical and anthropological discussions about the formation of nation-states and national identities, especially in excolonial states.

359. Culture and Agency. Selected topics in theories of practice: cognition and learning; consumption and everyday life; decision making in demography, economics, and politics; discourse and pragmatics; history and social change; and resistance to domination.

391. Practicum in Anthropology.

392. Honors Research in Anthropology.

ART AND ART HISTORY

- Mieke Bal, Ph.D. (Utrecht) *Adjunct Professor of Comparative Arts*
- Carl Chiarenza, Ph.D. (Harvard)
Fanny Knapp Allen Professor of Art History
- Diran K. Dohanian, Ph.D. (Harvard)
Professor of Art History
- *Michael Ann Holly, Ph.D. (Cornell)
Professor of Art History and Chair of the Department
- Archibald Miller, M.F.A. (Cranbrook)
Professor of Art
- *Michael Venezia, M.F.A. (Michigan)
Professor of Art
- Janet Wolff, Ph.D. (Birmingham)
Professor of Art History and of Comparative Arts
- Thomas Bang, M.F.A. (Southern California) *Associate Professor of Art*
- *Roger Mertin, M.F.A. (SUNY, Buffalo)
Associate Professor of Art
- Grace Seiberling, Ph.D. (Yale)
Associate Professor of Art History
- *David A. Walsh, Ph.D. (Minnesota)
Associate Professor of Art History
- Cristelle Baskins, Ph.D. (California, Berkeley) *Assistant Professor of Art History*
- Jean France, M.A. (Oberlin) *Adjunct Associate Professor of Art History*
- Rick Hock, M.F.A. Visual Studies Workshop (SUNY, Buffalo)
Adjunct Instructor in Photography
- Howard S. Merritt, Ph.D. (Princeton)
Professor Emeritus of Fine Arts
- Remy G. Saisselin, Ph.D. (Wisconsin)
Professor Emeritus of Fine Arts and French Literature

The Department of Art and Art History uses teaching assistants only in its introductory courses.

The Department of Art and Art History offers courses in the history of art and in the studio arts. This work may lead to a B.A. degree with a concentration in art history, painting, sculpture, or photography; each program provides a basis for

graduate study and professional training for those students who wish to pursue careers in the arts, and a sound liberal education for those students whose final degree will be the B.A. Students' programs may be enriched by undergraduate/graduate courses in the Department's graduate program in comparative arts, based on the comparative study of literature and the visual arts from several different interpretive perspectives. The Department also offers minors in art history and studio arts. A student may major in art history and minor in studio arts; a student majoring in studio arts may minor in art history.

Registration in some courses is strictly limited and is by consent of the instructor. First-year students and sophomores will be considered first for admission to 100-level courses.

The collections of the Memorial Art Gallery and the International Museum of Photography at George Eastman House are used in support of the programs of the Department. In addition, a series of exhibitions is presented in the Rush Rhees Gallery and in the Hartnett Gallery at Wilson Commons, both on the River Campus. A visiting artist program brings noted artists to the campus throughout the year, and the Department also sponsors several distinguished lectures by outside speakers.

Fully equipped studios for sculpture, painting, and photography are maintained by the Department in the Sage Art Center. Courses in dance are held in a well-designed dance studio in the Spurrier Gymnasium.

ART HISTORY

Art history is a field of study in which the information and methodologies of many fields come together. The discipline of art history involves analysis of the work of art itself—understanding its form, and why and how we appreciate it—and also investigation of its historical context and mode of production. These inquiries can lead in many different directions, involving economic, social, and

gender issues; problems of patronage and taste; and questions of literary exchange, conservation, and restoration. Art historical studies draw upon adjunct areas of study such as cultural and intellectual history, psychology, literary criticism, religion, philosophy, and the history of science. The history of art is an ideal field for a student who wishes to acquire a general cultural background and to sharpen critical sensibilities.

General Course Information

The courses listed as survey courses cover broad historical periods and serve as introductions to the methods and problems of art history. They are useful to both first-year and upper-class students who want a general overview. Sophomores, juniors, and seniors, as well as first-year students who have had a course in art history or some other relevant preparation, may begin at the 200 level as well as the 100 level. The 200-level courses offer similar introductions but in much more restricted areas. These are useful cognate courses for those students studying a specific period or culture in another discipline, and are also the building blocks for an art history major. Seminars are indicated by the 300 level and are open to advanced students from other disciplines as well as to art history majors.

Art History Study Abroad

Study abroad sponsored by the Department of Art and Art History Department is recommended for majors and non-majors alike. During the fall or spring semesters the London Internship Program offers the opportunity to work in institutions such as the Victoria and Albert Museum or the Museum of London. During the summer a small group of students has become involved in archaeological and art-historical fieldwork on the excavation of the medieval site of Bordesley Abbey in the English West Midlands. Students who have had no previous experience in art history are often accepted in these courses.

*These faculty have applied for one or two semesters of leave in 1991-92.

CONCENTRATION IN ART HISTORY

The art history concentration is structured for a diversity of career plans and individual interests. Those who plan to prepare for graduate study in the field are encouraged to consult departmental advisors at an early date. Internships or other special programs at the Memorial Art Gallery, the Strong Museum, the International Museum of Photography at George Eastman House, the Landmark Society of Western New York, and other institutions provide an opportunity for students to have first-hand experience in the field.

AH 101, 102, and 103 are not normally prerequisite for a concentration but may be recommended for some concentrators. The following program is required:

- A minimum of eight courses in the history of art chosen from at least five of the following distribution areas: Asian, ancient/medieval, Renaissance, Baroque/eighteenth century, nineteenth century, twentieth century, and criticism/historiography.
- At least two related courses in other humanistic disciplines such as history, literature, philosophy, and music.
- At least one course in studio arts.

MINOR IN ART HISTORY

The Department offers a minor concentration in art history, providing an introduction to the field and a series of courses leading to an advanced level of study in a defined area. Individual programs are to be decided upon in consultation with the departmental advisor for art history. The minor consists of:

- One course from AH 101 (Introduction to Ancient and Medieval Art), AH 102 (Introduction to Renaissance and Modern Art), AH 103 (Introduction to the Art of India and the Far East).
- Three courses in a historical sequence or on a major topic (e.g., medieval and Renaissance; Asian art; architecture; modern art; critical theory; etc.).
- Two other courses in the Department, of which one may be a studio course.

STUDIO ARTS

The studio arts program allows students to explore their own creative ability and to prepare for further training and professional work. Students may concentrate in either painting, sculpture, or photography. The Department regards courses in the humanities and sciences as an integral part of the formation of an artist in today's world. All studio arts faculty participate at all levels of instruction. Faculty advisors work individually with students to design a coherent program of study.

General Course Information

The introductory courses acquaint the student with a range of concepts and materials encompassing traditional as well as contemporary concerns in art. Upon the completion of an introductory course, students are eligible, with faculty permission, to enter upper-level studio courses. During the final year, students in advanced studio are encouraged to choose several faculty members from diverse areas for regular consultation.

CONCENTRATION IN STUDIO ARTS

Prerequisite to concentration: Two of the four 100-level studio courses must be completed before the junior year, and at least one art history course should be taken; students should consult a studio arts advisor concerning their choice of an art history course.

The concentration consists of 11 courses, in addition to the three prerequisite courses:

- The remaining 100-level studio courses
- Five courses in studio arts in at least two fields beyond the introductory level and including advanced studio
- Four additional courses, of which at least three (one in critical theory) should be in art history, the remainder to be chosen from philosophy or those offerings in psychology that deal with perception and the analysis of behavior.

In studio arts, in lieu of a written examination, each student, in the senior year, will be required to present a group

of recent works for review and be prepared to discuss them with the studio arts faculty.

MINOR IN STUDIO ARTS

The minor in studio arts offers an introduction to two studio disciplines, followed by a coherent group of courses in a limited area. The minor consists of:

- Two courses from SA 111 (Drawing), SA 121 (Painting), SA 131 (Sculpture), SA 141 (Photography).
- Three additional courses in one of the two areas chosen above.
- An art history course on twentieth-century art chosen in consultation with the Department advisor. Students emphasizing photography may select a course in photo history.

Students in the senior year will be required to present a group of recent works for review and be prepared to discuss them with the studio arts faculty.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

ART HISTORY (AH)

SURVEY COURSES

101. Introduction to Ancient and Medieval Art. A historical survey of the monuments of prehistoric, Egyptian, Mesopotamian, Greek, Roman, and medieval art. (Fall)

102. Introduction to Renaissance and Modern Art. A survey of art from the late Middle Ages to the early twentieth century, with reference to parallel developments in Oriental art. (Spring)

103. Introduction to the Art of India and the Far East. A selective survey of the art of India, China, and Japan and an introduction to the methodology of the history of art. (Spring)

110. Picturing Reality. A study of the evolution of a way of seeing in the Western world that led to and developed from the invention of photography.

113. History of Photography. Historical survey of photography from its pre-history to the present day. (Spring)

THEMES IN ART AND CULTURE

201. Interpreting Culture. An interdisciplinary study of literature, the visual arts, and everyday experience. (Fall)

202. Theory and Interpretation in the Visual Arts. A study of contemporary theoretical perspectives (e.g., Marxism, feminism, psychoanalysis, semiotics) in their relationship to the understanding of the visual arts.

203. Critical Theory. Problems of culture and meaning in the Marxist, feminist, and psychoanalytic traditions, and in structuralism and post-structuralism. Same as CLT 210. (Fall)

204. Reading the Image: Critical Practice. An investigation into the generic structure and meaning of portraiture, still life, landscape, history painting, and the nude. Same as CLT 264. (Fall)

206. The Body in the Renaissance. A thematic and topical class investigating the corporeal metaphors running throughout Renaissance imagery.

207. Woman as Image and Text. An examination of the female body as a visual and textual image through history. (Fall)

209. Workshop in Art Criticism. (Fall)

269. Aesthetics. Critical examination of some of the major problems in aesthetics and consideration of the historical roots from which they have evolved. Same as PHL 241. (Fall)

ORIENTAL

190. The Art of East and West. An introduction to the great traditions of world art through comparative study of selected master works of painting and sculpture from Asia and the West. (Fall)

222. Chinese Painting. Masterpieces of Chinese painting studied in their historic contexts and in their relation to developing theories of art and connoisseurship. (Spring)

223. Shrine and Image. Indian religious architecture, its sculptured imagery and ritual use, investigated with respect to the spiritual ideals collectively expressed. Same as REL 222.

224. The Arts of Japan. A survey of the major arts of Japan in their historical sequence, with special emphasis upon the development of a national style. (Fall)

226. The Arts of Buddhist Asia. The development of Buddhist art is traced from its origins in India to its easternmost manifestations in Japan and Indonesia.

227. Ukiyo-E: Popular Art of Pre-Modern Japan. The popular art of the Tokugawa period, chiefly wood-block prints, studied within the context of the social history of pre-modern Japan. (Fall)

228. The Divine Lover: Sexual Themes in Indian Art. The myth of Krishna, the archetypal lover, is analyzed with reference to the continuing traditions of sexual imagery in Indian religious art. Same as REL 238. (Fall)

ANCIENT AND MEDIEVAL

210. Medieval Art and Architecture. A historical survey of painting, sculpture, and architecture from the end of the Roman Empire to the age of Gothic cathedrals, with particular attention given to the relationship between monuments and their historical and ideological contexts. (Spring)

213. Romanesque Art and Architecture. A study of the origins and regional manifestations of Romanesque art in the eleventh and twelfth centuries. Same as REL 205. (Spring)

214. Gothic Art and Architecture. Gothic art is studied from its origins in northern France to its development throughout Europe. Same as REL 206. (Spring)

215. English Art. A survey of the art of the Middle Ages in England from the end of Roman occupation to the Tudor period.

RENAISSANCE AND BAROQUE

232. Italian Renaissance Art. A study of the architecture, sculpture, painting, and art historical concepts of the period from 1400–1550 in Italy. (Spring)

286. Baroque Painting and Sculpture. A survey of northern and southern baroque art during the seventeenth century. (Spring)

MODERN

104. Art Now. An introduction to recent art (1968 to present), the criticisms it makes, and the criticism it arouses.

261. The Age of Revolution: Early Nineteenth-Century Art. The rise of modern art in Europe, especially France, from the late eighteenth century to about 1860.

262. Impressionism and Post-Impressionism. Deals with major movements in European art, especially in France, from 1860 to 1900. Impressionism, Post-Impressionism, and Symbolism are discussed.

263. Twentieth-Century Art. Major directions in twentieth-century art from Cubism to the present in Europe and America. (Fall)

265. Contemporary Art and Its Criticism. A study of contemporary art in its critical context.

270. American Art. A survey of painting, sculpture, and architecture from the nineteenth through the twentieth century. (Spring)

275. American Architecture. A historical survey of architecture in America, from the earliest colonial settlements—Spanish, French, Dutch, and English—through the eighteenth and nineteenth centuries and the beginning of the twentieth, ending ca. 1915. Field trip. (Fall)

276. Twentieth-Century Architecture. A study of twentieth-century architecture, concentrating on America but including international influences and covering traditional, modern, and post-modern developments. Field trip. (Spring)

277. Historic Preservation. Study of methods, techniques, and theory of architectural preservation.

283. Photography and Painting: Representation in Theory and Practice. The evolution of a way of seeing in the Western world that led to and developed from the invention of photography. Concentration on the visual image and its relation to form and content in contemporary pictures in other media. (Spring)

PHOTOGRAPHY AND FILM

111. Introduction to the History of Film. The development of motion pictures from 1895 to the present. Same as ENG 131.

112. Introduction to the Art of Film. The primary visual, aural, and narrative structures and conventions by which motion pictures create and comment upon significant human experience. Same as ENG 132.

273. The Art of Motion Pictures. The motion picture presented and analyzed as a distinctive form of visual and dramatic art. The expressiveness and communication of visual and other information are explored through selected examples of the moving image. Same as ENG 250/450.

284. The Great Divide, Picture or Document: Photography 1880-1930. Exploration of American and European styles and practitioners against social, historical, and art historical backgrounds. AH 283 is strongly recommended as a foundation, but students with a course in modern art will be accepted. (Spring)

285. Modernism and Reactions: The Photograph Since 1930. A study of directions in photography in the last half century.

287. The Photograph: Selected Topics. A study of specific problems in photography with changing focus. (Fall)

386. American Photography in the 1960s. A study of recent developments in American photography. (Spring)

INDEPENDENT PROGRAMS OF STUDY

391. Independent Study in Art History. Independent study under faculty guidance of a limited field of art history or individual study on a single topic at an advanced level under the guidance of a member of the art history faculty.

394. Internships. Internships in London and the United States.

STUDIO ARTS (SA)

Unless otherwise noted, studio courses are open to all qualified students. Studio courses are scheduled for two supervised periods of three hours each week; at least six hours of independent work each week are normally expected of students.

BEGINNING COURSES

In each course the processes, materials, and ideas appropriate to that particular art are explored. The four beginning courses are part of the requirements for concentration in studio arts, and at least two should be taken prior to the junior year. Sections are limited in size; these courses are normally offered every semester and may be taken in any order.

- 111. Drawing I.** (Fall and Spring)
- 121. Painting I.** (Fall and Spring)
- 131. Sculpture I.** (Fall and Spring)
- 141. Photography I.** (Fall and Spring)

UPPER-LEVEL COURSES

It is recommended that two 100-level studio courses and one course in art history be taken prior to or concurrently with a 200-level course.

In courses numbered 200 and higher, some problems may be assigned, but students are expected to develop their own projects. Individual and group discussions of student work, gallery visits, presentations by guest artists, slide talks, and readings are regular features of these courses. Classes are normally limited to 15 students.

212. Drawing II. A continuation of SA 111. Drawing from nature, the figure, still life, and the interior environment. Prerequisite: SA 111. (Fall)

222. Painting II. Offered each semester concurrently with Painting III and Painting IV. Prerequisite: SA 121 or equivalent.

223. Painting III. Prerequisite: SA 222. (Fall and Spring)

224. Painting IV. Prerequisite: SA 223. (Fall and Spring)

232. Sculpture II. Prerequisite: SA 131. Offered each spring concurrently with Sculpture III and Sculpture IV.

233. Sculpture III. Prerequisite: SA 232.

234. Sculpture IV. Prerequisite: SA 233.

242. Photography II. Prerequisite: SA 141. Offered each semester concurrently with Photography III and Photography IV.

243. Photography III. Prerequisites: SA 141, 242, and permission of instructor. (Fall and Spring)

244. Photography IV. Prerequisite: SA 243. (Fall and Spring)

245. Still Photography. Looking at specific works, this course investigates, critically, issues of photography and landscape in the twentieth century. Permission of instructor required.

251. Introduction to Filmmaking. The course provides the student, through discussion, lecture, viewing of films, and practical use and application of the materials and tools of filmmaking, a working knowledge of Super-8 film techniques: film planning and scripting, shooting styles, lighting, editing, sound systems (synchronous and nonsynchronous) and film projection formats. (Fall and Spring)

252. Filmmaking II. A course designed for students who have had at least basic experience with filmmaking and are interested in extending the development of their filmmaking abilities. Major focus of the course is a commitment on the part of the student to work independently on a film project they initiate through guidance and instruction of the teacher. (Fall and Spring)

ASIAN STUDIES

ADVANCED STUDIO

The Advanced Studio course is the final requirement for painting, photography, and sculpture concentrators, and the course is limited to concentrators. Students entering Advanced Studio must have completed a combination of four courses in painting, photography, and sculpture in the 200 series. Students will be expected to bring a number of projects to completion. The courses are offered every semester.

350. Advanced Studio I.

351. Advanced Studio II.

352. Advanced Studio III.

INDEPENDENT STUDY IN STUDIO ARTS

391. Independent Study. Individual studio work at an advanced level and under the guidance of a member of the studio arts faculty.

COMMITTEE ON ASIAN STUDIES

Anthony T. Carter, Ph.D. (Cambridge)

Professor of Anthropology

Diran K. Dohanian, Ph.D. (Harvard)

Professor of Art History

William B. Hauser, Ph.D. (Yale)

Professor of History

David Pollack, Ph.D. (California, Berkeley) *Associate Professor of Japanese and of Chinese*

Douglas R. Brooks, Ph.D. (Harvard)

Assistant Professor of Religion and Chair of the Committee

Thomas P. Gibson, Ph.D. (London

School of Economics) *Assistant Professor of Anthropology*

Yoshihasa Kitagawa, Ph.D. (Massachusetts, Amherst) *Assistant Professor of Japanese*

Melanie Manion, Ph.D. (Michigan)

Assistant Professor of Political Science

Datta S. Kharbas, M.A. (Michigan)

Head, Asia Library

ASSOCIATES

*Henry P. French, Jr., Ed.D. (Rochester)

Professor of History, Monroe Community College

Ushio Sumita, Ph.D. (Rochester)

Associate Professor of Computers and Information Systems in the William E. Simon Graduate School of Business Administration

*Robert Compton, Ph.D. (Stanford)

Associate, Asia Library

The program uses teaching assistants in large lecture courses and language offerings.

ASIAN LANGUAGE AND AREA PROGRAM

The Asian Language and Area Certificate Program at the University of Rochester is designed to permit students concentrating in the social sciences and humanities to develop knowledge of Asian cultures and languages as a complement to their disciplinary concentration. Those interested in the program must satisfy the requirements in their major field and, in addition, submit a program that includes at least the following:

- Six courses from those listed under the heading "Primary Courses in Asian Studies," with an understanding that no more than two will be taken in any one department.
- Four additional courses from any list below.

In addition:

- None of the courses used toward the certificate may be taken satisfactory-fail.
- Students must earn an overall grade-point average of at least 2.0 in courses submitted for the program.

The Asian Studies Certificate Program is administered through the College Center for Interdisciplinary Studies. Students who plan to enroll in the program should pick up an application in the Center office in 206 Lattimore Hall and then consult one of the members of the Asian Studies Committee, who act as faculty advisors for the program. Once the application is filled out and is signed by the faculty advisor, it should be returned to the College Center for Interdisciplinary Studies.

Upon graduation, students successfully completing the Asian Studies Program will receive a Certificate in Asian Studies.

A. PRIMARY COURSES IN ASIAN STUDIES

ANTHROPOLOGY

- ANT 240. Southeast Asian Ideologies.
ANT 249. The Civilizations of South Asia.

ART AND ART HISTORY

- AH 103. Introduction to the Art of India and the Far East.
AH 222. Chinese Painting.
AH 223. Shrine and Image.
AH 224. The Arts of Japan.
AH 228. The Divine Lover: Sexual Themes in Indian Art.

FOREIGN LANGUAGES, LITERATURES, AND LINGUISTICS

- LIT 178. Traditional China.
LIT 240. Traditional Japanese Literature.
LIT 250. Modern Japanese Novel.

HISTORY AND GEOGRAPHY

- HIS 177. Traditional Japanese Culture.
HIS 178. Traditional China.
HIS 276. Japan and Pearl Harbor.
HIS 277. Modern Japan.
HIS 286. Film Images of the Pacific War.
HIS 296. Women in East Asia: Japan, China, Korea.
HIS 377. Studies in Modern Japan.
HIS 378. Tokugawa Japan.

POLITICAL SCIENCE

- PSC 267. Politics in China.

RELIGION AND CLASSICS

- REL 105. The Asian Search for Self.
REL 106. From Confucius to Zen.
REL 178. Traditional China.
REL 234. Buddhism: The Compassionate Teachings of the Middle Way.
REL 242. Dharma: The Hindu Way of Life.
REL 243. Hindu Mysticism.
REL 244. Myth and Ritual in Epic Hinduism.
REL 251. Hindu Goddesses and Women.
REL 254. The Buddha Legend and Buddhist Philosophy.

B. ASIAN LANGUAGE COURSES

FOREIGN LANGUAGES, LITERATURES, AND LINGUISTICS

Any offering from Chinese and Japanese languages.

C. ALLIED ASIAN COURSES

ANTHROPOLOGY

- ANT 266. Comparative Political Economy.

COLLEGE OF ARTS AND SCIENCE

- CAS 150. GO=Game and Culture.

HISTORY

- HIS 202. The Third World.

POLITICAL SCIENCE

- PSC 278. The War in Vietnam.

ASTRONOMY

(see *Physics and Astronomy*, page 131)

PROGRAM IN BIOLOGY AND MEDICINE

COMMITTEE OF

TRACK COORDINATORS

- Stanley M. Hattman, Ph.D. (M.I.T.)
Professor of Biology and Associate Chair, Biology Department; Director of the Program in Biology and Medicine
- George E. Hoch, Ph.D. (Wisconsin)
Professor of Biology and Track Coordinator for the B.A. in Biology
- Carol Kellogg, Ph.D. (Rochester)
Professor of Psychology and Associate Professor of Pharmacology; Neuroscience Track Coordinator
- Robert E. Marquis, Ph.D. (Michigan)
Professor of Microbiology and Microbiology Track Coordinator
- Thomas Eickbush, Ph.D. (Johns Hopkins)
Associate Professor of Biology and Cell and Developmental Biology Track Coordinator
- David C. Hinkle, Ph.D. (California, Berkeley)
Associate Professor of Biology and Molecular Genetics Track Coordinator
- John Jaenike, Ph.D. (Princeton)
Associate Professor of Biology and Ecology and Evolutionary Biology Track Coordinator
- David J. Culp, Ph.D. (California, Berkeley)
Assistant Professor of Dental Research and of Biochemistry and Co-Track Coordinator of Biochemistry
- Eric M. Phizicky, Ph.D. (Cornell)
Assistant Professor of Biochemistry and Co-Track Coordinator of Biochemistry

Undergraduate education in the biological sciences at the University of Rochester involves an unusually close collaboration between the College of Arts and Science and the School of Medicine and Dentistry.

Undergraduates may choose to obtain either a B.A. degree in biology or a B.S. degree in biological sciences with specialization in one of six areas: biochemistry, cell and developmental biology, ecology and evolutionary biology, microbiology, molecular genetics, and neuroscience.

In addition, students may receive a Certificate in Biotechnology in conjunction with a degree upon completion of a prescribed set of courses.

Each of the curricula described below constitutes strong preparation for graduate or professional study. The combined curricula of the Program in Biology and Medicine offer more than 40 lecture and laboratory courses and additional seminars in specialized topics. In addition to formal course work, the large number of faculty involved in the Program provides an exceptional number and diversity of independent research opportunities.

PLANNING A CURRICULUM

One particular advantage of the Program is that the student need not make a premature choice among the degrees offered. The B.A. and B.S. degrees also require a common core of courses: BIO 111, Biology of Organisms; BIO 121, Genetics; and BIO 150, Introduction to Biochemistry. These core courses are normally taken first but do not have to be taken in sequence. The student may then sample several introductory courses in the specific areas of the six B.S. curricula; these courses may be used as part of a B.S. program (as required or as diversification courses) or may become part of a B.A. curriculum. In addition, most of the courses required in the allied fields (chemistry, mathematics, and physics) are the same for all of the degrees offered. Students interested in pursuing a concentration in biological sciences are urged to begin fulfilling the mathematics and chemistry requirements in the freshman year. A typical program for the first two years that would prepare a student for any of the curricula described below is:

Freshman Year

| | |
|---|----------------|
| <i>Fall</i> | <i>Spring</i> |
| MTH 141 or 161 | BIO 111 |
| CHM 103 or 105 | MTH 142 or 162 |
| Elective (English, foreign language) | CHM 104 or 106 |
| Elective | Elective |

Sophomore Year

| | |
|--------------------------|--------------------|
| <i>Fall</i> | <i>Spring</i> |
| BIO 121 | BIO 150 |
| CHM 203 or 205 | CHM 204 or 206 |
| Elective (or MTH 143) | (Biology) elective |
| Elective | Elective |

B.A. in Biology

The B.A. curriculum is intended to provide the student with a well-rounded introduction to the major areas of biology. This program offers the maximum freedom of course selection since among the eight biology courses necessary to earn the degree, only the three core courses are specifically required. (See page 54.)

B.S. in Biological Sciences:

Biochemistry

Basic concepts of metabolism, protein structure and function, and experimental techniques are covered. In the senior year a wide variety of optional courses is offered allowing specialization in enzymology, membrane biochemistry, DNA, and RNA structure formation. (See page 52.)

B.S. in Biological Sciences:

Cell and Developmental Biology

Covers the analysis of the structure and function of cells, the organization and interaction of cells and tissues, and the processes of development responsible for cell and tissue differentiation and production of the adult form. Emphasis is placed on the molecular bases for cellular and developmental processes. (See page 55.)

B.S. in Biological Sciences:

Ecology and Evolutionary Biology

Ecology, animal behavior, population genetics, and molecular evolution. While the descriptive aspects of these subjects receive adequate treatment, the major emphasis in all courses is on the dynamic processes influencing organisms and populations in nature. The subject matter presented concentrates on quantitative analyses, both experimental and theoretical. (See page 56.)

B.S. in Biological Sciences:

Microbiology

The introductory course considers how microorganisms are adapted to their environment. In advanced courses, emphasis is placed on the molecular functioning of microorganisms, covering such topics as microbial physiology, microbial genetics, industrial microbiology, immunology, virology, and pathogenic microbiology. (See page 60.)

B.S. in Biological Sciences:

Molecular Genetics

Covers chromosome structure, the molecular mechanisms of DNA replication, DNA mutations and repair, DNA recombination, and the regulation of gene expression. Emphasis is placed on experimental approaches, including recombinant DNA technology. (See page 56.)

B.S. in Biological Sciences:

Neuroscience

Neuroscience, which is an interdisciplinary pursuit, deals with the mechanics by which nervous systems mediate behavior. A combination of course work and laboratory experience gives students a firm understanding of brain function from the molecular to the behavioral levels. Topics covered include biochemical, anatomical, physiological, and medical aspects of neurobiology. (See page 60.)

CERTIFICATE IN BIOTECHNOLOGY

The program for the Certificate in Biotechnology is designed to give students the specialized background needed for entry into biotechnology jobs or for advanced study in the field. Requirements for the certificate complement the B.A. or B.S. tracks in biological science; students in other degree programs may also be eligible. The certificate is administered through the Office of the Program in Biology and Medicine. Interested students should contact this office for further information.

The Certificate in Biotechnology will be awarded upon graduation to those who have successfully completed the following requirements: the three core courses in biology (BIO 111, 121, and 150); an introductory computer course, e.g., CSC 181; MBI 445, Industrial Microbiology; two laboratory courses chosen from the following: MBI 221, Microbiology Laboratory; BIO 268, Molecular Genetics Laboratory (prerequisite BIO 202); and either BIO 230, Cell and Developmental Biology Laboratory (prerequisite BIO 210 or BIO 226), or BCH 208, Biochemistry Laboratory (prerequisite IND 401), or BCH 218, Topics in Enzymology Laboratory (prerequisite IND 401).

INDEPENDENT RESEARCH, DEGREES WITH DISTINCTION, AND COURSE OFFERINGS

The facts, theories, and principles taught in our formal courses ultimately derive from research in the laboratory or the field. Students are encouraged to experience the challenges, successes, frustrations, and excitement of research by arranging independent research programs in the laboratories of individual members of the faculty in the Program in Biology and Medicine. The diversity of the faculty's research interests gives students the opportunity to select projects from a wide variety of fields. Work in a laboratory provides an inside view of science and scientists that cannot be gained through lectures or reading and is particularly valuable for undergraduates who contemplate careers in research. Occasionally students' contributions to research are incorporated into published journal articles, and the students are listed as coauthors of these papers.

Independent research may be arranged for formal course credit (courses numbered 395). These courses are generally taken in the junior or senior year after the student has gained a solid background of courses in the biological sciences and the allied fields. Lists of available research opportunities for undergraduates with faculty members in the biomedical sciences are kept in the

Program office for reference. Each semester 30 to 40 students take independent research courses with faculty members in the Program. Research projects can also be conducted during the summer through de Kiewiet Summer Research Fellowships, awarded on a competitive basis to students in Program tracks.

Students who have demonstrated ability and initiative in an independent research project may be recommended for a degree with distinction or high distinction in research after successful completion and defense of a written dissertation. The deadline for applying for a degree with distinction in research is February 15 of the senior year. However, it is necessary to plan the research project well beforehand. Specific information is available from the Office of the Program in Biology and Medicine.

Several departments in the biomedical sciences at the University of Rochester participate in the Program in Biology and Medicine by offering courses for undergraduates. These departments include: biochemistry, biology, biophysics, microbiology and immunology, neurobiology and anatomy, pharmacology, physiology, psychology, and the School of Nursing.

BIOCHEMISTRY

Leo G. Abood, Ph.D. (Chicago)

Professor of Pharmacology and of Biochemistry

Robert A. Bambara, Ph.D. (Cornell)

Professor of Oncology in Biochemistry and of Microbiology and Immunology

Thomas R. Broker, Ph.D. (Stanford)

Professor of Biochemistry and Member of Cancer Center

Louise T. Chow, Ph.D. (California Institute of Technology)

Professor of Biochemistry and Member of Cancer Center

Edgar C. Henshaw, M.D. (Harvard)

Professor of Oncology in Medicine and of Biochemistry

Russell Hilf, Ph.D. (Rutgers)

Professor of Biochemistry and of Oncology

George A. Kimmich, Ph.D. (Pennsylvania)

Professor of Biochemistry and

of Biophysics; Senior Associate Dean for Graduate Studies, School of Medicine and Dentistry

*Guido V. Marinetti, Ph.D. (Rochester)

Professor of Biochemistry

Terry Platt, Ph.D. (Harvard)

Professor of Biochemistry and of Biology

Fred Sherman, Ph.D. (California, Berkeley)

Professor of Biochemistry and Chair of the Department; Professor of Biophysics

Alan E. Senior, Ph.D., D.Sc. (University of Newcastle-Upon-Tyne, England)

Professor of Biochemistry

Donald A. Young, M.D. (Yale)

Professor of Medicine, of Biophysics, and of Biochemistry

Seymour Zigman, Ph.D. (Rutgers)

Professor of Ophthalmology and of Biochemistry

Philip J. Fay, Ph.D. (Rochester)

Associate Professor of Medicine and of Biochemistry

James N. Livingston, Ph.D. (Oklahoma)

Associate Professor of Medicine and of Biochemistry

Lawrence A. Tabak, Ph.D. (SUNY, Buffalo)

Associate Professor of Dental Research and of Biochemistry

Sayeeda B. Zain, Ph.D. (Glasgow University)

Associate Professor of Oncology in Biochemistry

*Richard M. Bayer, Ph.D. (Rutgers)

Assistant Professor at Rochester General Hospital and of Biochemistry

H. Neal Bramson, Ph.D. (Chicago)

Assistant Professor of Biochemistry

Wen-Gang Chou, Ph.D. (St. Louis University)

Assistant Professor of Radiation Oncology and of Biochemistry

David J. Culp, Ph.D. (California, Berkeley)

Assistant Professor of Dental Research and of Biochemistry

John W. Ludlow, Ph.D. (Kansas State University)

Assistant Professor of Oncology and of Biochemistry

Richard Panniers, Ph.D. (University of London)

Assistant Professor of Oncology in Biochemistry

Eric M. Phizicky, Ph.D. (Cornell)

Assistant Professor of Biochemistry

- J. Randall Slemmon, Ph.D. (Southern California) *Assistant Professor of Biochemistry and of Neurobiology and Anatomy*
- Harold C. Smith, Ph.D. (SUNY, Buffalo) *Assistant Professor of Pathology, of Oncology, and of Biochemistry*
- Leon L. Miller, M.D. (Rochester) *Professor Emeritus of Biophysics, of Medicine, and of Biochemistry*

The biochemistry track leads to a B.S. degree in biology and is part of the Program in Biology and Medicine.

COMMITTEE FOR B.S. TRACK IN BIOCHEMISTRY

- David J. Culp, Ph.D. (California, Berkeley) *Assistant Professor of Dental Research and of Biochemistry and Co-Track Coordinator of Biochemistry*
- Eric M. Phizicky, Ph.D. (Cornell) *Assistant Professor of Biochemistry and Co-Track Coordinator of Biochemistry*

REQUIREMENTS FOR BIOCHEMISTRY

The core curriculum requires a total of 18 courses from chemistry, mathematics, physics, biology, and biochemistry. In addition, there are two biology diversification electives. Please note:

- Biology Core Requirements—Students must take BIO 111, 121, and 150, The Biology of Organisms, Genetics, and Introduction to Biochemistry, respectively.
- Chemistry—Students should take four semesters of general and organic chemistry. Initial placement in CHM 103 or 105 is not critical since students may change sequence at the end of the first semester. The honors-level chemistry sequence is, however, recommended.
- Mathematics—Courses through MTH 162 or equivalent should be taken (MTH 141, 142, 143 or 161, 162). In addition a course in differential equations (MTH 163), statistics, or computer science must be taken. Students electing to take CHM 251 and 252 are advised to take the MTH 161–163 sequence.

- Physics—PHY 113–114.
- Biochemistry—BCH 401, BCH 214, and a laboratory course (BCH 208 or BCH 218) are required in addition to three advanced electives, selected from BCH 402, IND 425, MBI 473, BCH 216, and PSO 407. Students, with permission of the Track Coordinator, may use BIO 236, IND 443, MBI 456, BCH 395, or RBB 507 for one of these requirements.
- Biology Electives—Students are required to take two biology electives which may be selected from any degree track in the Program in Biology and Medicine other than the biochemistry track.

3-2 PROGRAM IN BIOCHEMISTRY

This is a combined B.S.-master's degree Program in Biochemistry. Qualified students are admitted after completion of the junior year. During the fourth (senior) and fifth year of the program, advanced course work, research, and the successful defense of a master's thesis are required. Consult the Director of the Program in Biology and Medicine for further information.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991–92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

208. Laboratory Methods in Biochemistry. A laboratory course designed to introduce biochemistry students to some of the basic recombinant DNA methodology used in biochemical research. The students use a conjugative plasmid of *E. coli* to carry out a series of experiments which include: plasmid purification and restriction analysis, isolation of a restriction fragment and subcloning, transposon mapping and orientation, and deletion and ligation methods. One lecture and two laboratory periods per week. Prerequisite: BCH 401. (Spring)

214. Proteins and Enzymes. Covers all aspects of protein chemistry (purification, sequencing, molecular weight determination, chemical modification), with emphasis on practical aspects, and considers especially all aspects of conformation and conformational mobility of proteins. The course continues with a review of basic enzyme kinetics before moving to more advanced topics including analysis of multisubstrate reactions, techniques of studying kinetic mechanisms, and a detailed consideration of allosteric models. Students should consider taking BCH 218 in conjunction with this course. Offered every year. Prerequisite: BCH 401. (Spring)

216. Enzyme Regulation. This course provides a broad survey of the biochemical functions of enzymatic proteins, with special emphasis on proteolytic enzymes and enzyme systems of biological and medical significance. The course may be taken in conjunction with BCH 218, which provides supplementary relevant laboratory experience. Prerequisite: BCH 401 or the equivalent. (Spring)

218. Topics in Enzymology Laboratory. This course covers a variety of topics pertinent to enzymology. As a basis it uses the current literature to examine topics such as models for allosteric interactions, enzyme regulation, chemical mechanisms of enzyme catalysis, the role of enzymes in equilibrium systems, and the conformation of proteins. Students take a series of lab projects during the course of the semester. Students are expected to read the literature and discuss both experimental and theoretical aspects of the topics. Prerequisites: BCH 401 or permission of the instructor. This course illustrates a variety of the topics covered in BCH 214 and 216 and is suitable to be taken concomitantly with either of these courses. Prerequisite: BCH 214. (Spring)

395. Independent Research in Biochemistry. Credit—4 hours. Arrangements for independent research in biochemistry can be made with any faculty member in the biochemistry track. Contact can be made directly with the appropriate faculty member or through

the Committee for the B.S. Track in Biochemistry. Students may take this course up to two times with a particular faculty member. BCH 395 courses may be used to fulfill some of the requirements for distinction in research, provided that prior approval of the track coordinator is obtained. (Available every semester)

401. General Biochemistry. Provides a general but intensive review of biochemistry. It encompasses a consideration of the chemistry and biochemistry of each of the groups of biologically important molecules: amino acids, carbohydrates, lipids, nucleotides, proteins, and nucleic acids. Emphasis is given to enzyme kinetics and mechanism, intermediary metabolism, bioenergetics, nucleic acid metabolism and control mechanisms. Offered every year. Prerequisite: organic chemistry. (Fall)

402. Advanced Biochemistry. This course, a sequel to BCH 401, covers modern topics in molecular biology, including: the enzymatic steps involved in DNA replication, repair and recombination, and the biochemical properties of purified enzymes involved in this process; the synthesis of RNA in prokaryotes and eukaryotes, and the processing of this RNA to make the message for protein synthesis; the reactions and regulation of protein synthesis; and metabolic control mediated by cyclic nucleotides and calcium. Reading of original papers is required. Two 1½-hour lectures per week. Prerequisite: BCH 401 or the equivalent. (Spring)

IND 425. Membrane Biochemistry and Biophysics. This course is given in the spring semester of odd-numbered years. It is intended for graduate students in the basic sciences and undergraduates with the appropriate background in biochemistry. The content emphasizes both structural and functional aspects of membrane biology and aims at illustrating concepts and methods by using examples from the scientific literature. Topics include basic properties of membrane lipids and proteins; magnetic resonance, fluorescence, and immunological techniques; mechanical properties and



membrane-membrane interactions; membrane biosynthesis; secretion and endocytosis; receptor signaling mechanisms; transport phenomena, including ion and nonelectrolyte diffusion, channels, carriers, coupled transport systems, and ATPases; cell volume and pH regulation; and epithelial structure and transport. Three 50-minute lectures weekly.

The following is a typical program:

First Year

| <i>Fall</i> | <i>Spring</i> |
|----------------|----------------|
| CHM 103 or 104 | CHM 105 or 106 |
| MTH 161 | MTH 162 |
| Elective | BIO 111 |
| Elective | Elective |

Second Year

| | |
|----------------|----------------|
| BIO 121 | CHM 205 or 206 |
| CHM 203 or 204 | BIO 150 |
| MTH 163 | Elective |
| Elective | Elective |

Third Year

| | |
|----------------------------------|---------------|
| BCH 401 | BCH 214 |
| PHY 113 | BCH 208 (lab) |
| Elective | or 218 |
| A biology diversification course | PHY 114 |
| | Elective |

Fourth Year

| | |
|----------------------------------|--------------|
| A biology diversification course | BCH elective |
| BCH 395 | BCH elective |
| Elective | BCH 395 |
| Elective | Elective |

Further information is available from the Office of the Program in Biology and Medicine, Dr. David J. Culp or Dr. Eric M. Phizicky, Committee on Biochemistry, Box 607, University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, New York 14642.

BIOLOGY

- Robert C. Angerer, Ph.D. (Johns Hopkins) *Professor of Biology and of Pediatrics*
- Thomas T. Bannister, Ph.D. (Illinois) *Professor of Biology and of Biophysics*
- Martin A. Gotovsky, Ph.D. (Chicago) *Professor of Biology, Rush Rhees Professor, and Chair of the Department*
- Barry G. Hall, Ph.D. (Washington) *Professor of Biology*
- Stanley M. Hattman, Ph.D. (M.I.T.) *Professor of Biology*
- George E. Hoch, Ph.D. (Wisconsin) *Professor of Biology*
- Jerome S. Kaye, Ph.D. (Columbia) *Professor of Biology*
- Lasse Lindahl, Ph.D. (Copenhagen) *Professor of Biology*
- Joanna B. Olmsted, Ph.D. (Yale) *Professor of Biology*
- Terry Platt, Ph.D. (Harvard) *Professor of Biochemistry and of Biology*
- Satya Prakash, Ph.D. (Washington University) *Professor of Biology*
- Cheeptip Benyajati, Ph.D. (Princeton) *Associate Professor of Biology*
- Thomas Eickbush, Ph.D. (Johns Hopkins) *Associate Professor of Biology*
- David C. Hinkle, Ph.D. (California, Berkeley) *Associate Professor of Biology*
- John Jaenike, Ph.D. (Princeton) *Associate Professor of Biology*
- Eldridge S. Adams, Ph.D. (California, Berkeley) *Assistant Professor of Biology*
- David S. Goldfarb, Ph.D. (California, Davis) *Assistant Professor of Biology*
- Elizabeth J. Grayhack, Ph.D. (Cornell) *Assistant Professor of Biology*
- Howard Ochman, Ph.D. (Rochester) *Assistant Professor of Biology*

Animesh Ray, Ph.D. (Monash University, Melbourne, Australia) *Assistant Professor of Biology*

John Werren, Ph.D. (Utah) *Assistant Professor of Biology*

Johannes F. C. Holtfreter, Ph.D. (Freiburg) *Tracy H. Harris Professor Emeritus of Zoology*

William B. Muchmore, Ph.D. (Washington University) *Professor Emeritus of Biology*

Uzi Nur, Ph.D. (California, Berkeley) *Professor Emeritus of Biology and Senior Faculty Associate*

Approximately 51 graduate students, in partial fulfillment of requirements for the Ph.D. degree, assist in the instructional program as recitation leaders and laboratory teaching assistants.

The Department of Biology administers curricula leading to four of the seven undergraduate degrees offered through the Program in Biology and Medicine: (1) B.A. in biology, (2) B.S. in biological sciences: cell and developmental biology, (3) B.S. in biological sciences: molecular genetics, and (4) B.S. in biological sciences: ecology and evolutionary biology. A minor in biology is also available. (The general structure of the Program in Biology and Medicine is described on page 50.) A B.S. in biology-geology (see page 98) is administered by the Department of Geological Sciences.

The B.A. curriculum is intended to provide the student with a well-rounded introduction to the major areas of biology.

The B.S. curricula stress theoretical and experimental approaches and the development of expertise in a focused field of biology, including analysis of results in the current scientific literature. Breadth of background in biology is achieved through the three biology core courses and the two additional biology diversification courses selected from outside the area of specialization.

PLANNING A CURRICULUM

See Program in Biology and Medicine, page 50.

B.A. IN BIOLOGY

The requirements for the B.A. in biology are

- Biology Core—BIO 111, 121, and 150.
- Laboratory Requirement: One (1) course from the following list. It is recommended that this lab be taken in the junior year.
 - BIO 200. Laboratory in Biology
 - BIO 225. Laboratory in Population Biology
 - BIO 228. Laboratory in Developmental Biology
 - BIO 230. Laboratory in Cell Biology
 - BIO 268. Laboratory in Molecular Genetics
 - NSC 203. Laboratory in Neuroscience
 - MBI 221. Microbiology Laboratory
 - BCH 208. Laboratory in Biochemistry
- Biology Electives: Four (4) elective courses selected from those offered through the Undergraduate Program in Biology and Medicine and BIO 395. Independent Study. At least three (3) must be chosen from the following list, with at least one from Group A and one from Group B.
 - Group A*
 - BIO 205. Introduction to Population Biology
 - BIO 260. Animal Behavior
 - BIO 263. Ecology
 - Group B*
 - BIO 202. Molecular Genetics
 - BIO 210. Introduction to Cell Biology
 - BIO 226. Introduction to Developmental Biology
 - NSC 201. Basic Neurobiology
 - MBI 220. Introduction to Microbiology
 - MBI 473. Immunology
 - BCH 401. General Biochemistry
 - PSO 407. Introduction to Physiology
- Allied Fields
 1. A calculus sequence (MTH 141, 142, 143, or 161, 162).
 2. Four semesters of chemistry (two general and two organic chemistry courses) with lab.
 3. Two semesters of physics (calculus-based) with lab.

B.S. IN BIOLOGICAL SCIENCES: CELL AND DEVELOPMENTAL BIOLOGY

Cell biology is the study of the structure, composition, and function of cells and their component parts. Cell biologists seek to elucidate the common features of different kinds of cells as well as the unique aspects of structure and physiology that confer special functions on different types of cells in a tissue, organ, or organism. The fields of cell biology and developmental biology are closely related. Developmental biology deals with the processes involved in the production of an adult organism from a fertilized egg. A major facet of developmental biology is the study of the mechanisms by which differentiated cells achieve and maintain their special properties. Modern investigations in both cell and developmental biology are extensively integrated with the theories, results, and techniques of genetics, molecular biology, and biochemistry.

The requirements for the B.S. in cell and developmental biology are

- Biology Core: BIO 111, 121, and 150.
- Biology Diversification—Two courses offered by the Program in Biology and Medicine, excluding those in cell and developmental biology.
- Required Courses—BIO 210, 226, and either BIO 228 or BIO 230 lab. It is recommended that the lab be taken during the junior year.
- Advanced Courses—Any two of the following courses: BIO 220, 236, 243, and 244.
- Seminar—(Optional, with permission of instructor)—BIO 516, Current Topics in Cell and Developmental Biology.
- Allied Fields
 1. A calculus sequence (MTH 141, 142, 143; or 161, 162) and a course in differential equations, statistics, or computer science.
 2. Four semesters of chemistry (two inorganic and two organic chemistry courses) with lab.
 3. Two semesters of physics with lab.

B.S. IN BIOLOGICAL SCIENCES: ECOLOGY AND EVOLUTIONARY BIOLOGY

This track encompasses the studies of behavior, ecology, population genetics, and evolution. Together these disciplines attempt to understand how the activities of individuals, local breeding and foraging groups, and larger populations are affected by the processes of adaptation by natural selection, as well as by other forces that shape the genetic and phenotypic character of populations and species. The sheer number of the mechanisms underlying population phenomena and especially evolutionary change, as well as the numbers of individuals and genes involved and the great variety of different kinds of ecological interactions possible, predispose the subject to formulation in mathematical models that must be tested through observation of natural populations. Students in this program are encouraged to gain experience with the use of analytical, sampling, and experimental techniques of laboratory and field biology.

The requirements for the B.S. in ecology and evolutionary biology are

- Biology Core—BIO 111, 121, and 150.
- Biology Diversification—Two courses offered by the Program in Biology and Medicine, excluding those in ecology and evolution. MBI 220 may be used either as a diversification or an advanced course, but not both.
- Required Courses—BIO 205, 225, and 584, Seminar in Evolution (one credit).
- Advanced Courses—Three of the following courses are also required (at least two must be 200-level courses): BIO 130, 260, 263, 265, and 272; GEO 207; MBI 220.
- Allied Fields
 1. A calculus sequence (MTH 141, 142, 143; or 161, 162) and a course in differential equations, statistics, or computer science.
 2. Four semesters of chemistry (two inorganic and two organic chemistry courses) with lab.
 3. Two semesters of physics (calculus-based) with lab.

B.S. IN BIOLOGICAL SCIENCES: MOLECULAR GENETICS

Molecular genetics is the study of the structure of genes and the mechanisms involved in their maintenance, alteration (mutation), expression, replication, recombination, and transmission. Molecular geneticists seek to describe these events in terms of the properties and interactions of DNA, RNA, proteins, and other molecules.

The requirements for the B.S. in molecular genetics are

- Biology Core—BIO 111, 121, and 150.
- Required Courses—BIO 202 and 268.
- Advanced Courses—At least two of the following advanced courses are required: BIO 243, 244, 451, 452, and MBI 456.
- Diversification/Elective Courses—Three additional courses from the Program in Biology and Medicine are required and must be approved by the Track Coordinator. At least two of the courses must be from outside the field of molecular genetics; at least one must be in the field of cell or developmental biology.
- Allied Fields
 1. A calculus sequence (MTH 141, 142, 143; or 161, 162) and a course in differential equations, statistics, or computer science.
 2. Four semesters of chemistry (two inorganic and two organic chemistry courses) with lab.
 3. Two semesters of physics (calculus-based) with lab.

MINOR IN BIOLOGY

The requirements for a minor in biology are

- Biology Core—BIO 111, 121, and 150.
- Two courses in chemistry—CHM 103 and 104.*
- One 200-level laboratory course (to be chosen from BIO 200, 225, 228, 230, 268, NSC 203, MBI 221, and BCH 208).

*Additional courses in the allied fields of chemistry, physics, and mathematics may be required to meet admissions requirements for medical schools. *Note:* one semester of organic chemistry is a prerequisite for BIO 150.

- One 200-level course (to be chosen from BIO 202, 205, 210, 226, 260, 263, NSC 201, MBI 220, 473, BCH 401, and PSO 407).

No independent study course (391 or 395) may be counted toward the minor in biology. Approval of courses chosen for the minor is granted by the Associate Chair of the Department of Biology, who will serve as the student's advisor.

INDEPENDENT RESEARCH AND DEGREES WITH DISTINCTION

See Program in Biology and Medicine, page 50.

COURSES OF INSTRUCTION

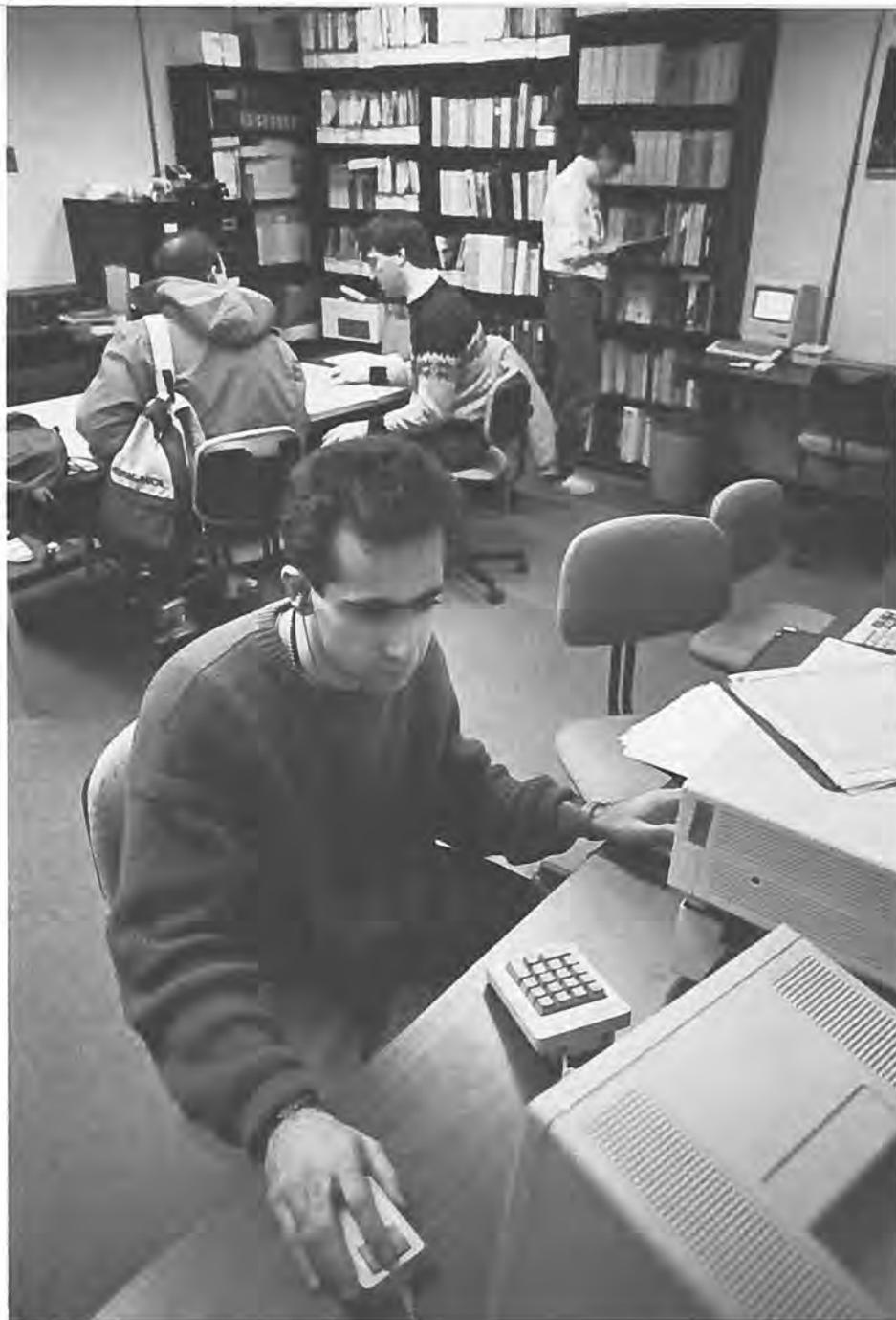
The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991–92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

101. Introduction to Modern Biology.

A lecture course covering the general topics of cell biology, genetics, human physiology, ecology, and evolution. Selected special topics include cancer, recombinant DNA technology, human evolution, and AIDS. Two and one-half hours of lecture and one recitation per week. Not for students majoring (or minoring) in biology; does not carry major or minor credit. (Fall)

111. The Biology of Organisms. A lecture course required for all concentrations in biology. Major topics include: general cellular functions, plants and photosynthesis, functions of higher animals, and ecology, evolution, and environmental biology. Three hours of lecture and one recitation per week. (Spring)

121. Genetics. A required course for all concentrations in biological science. This course provides an introduction to classical and molecular genetics. Major topics include transfer and mapping of genes in eukaryotes and prokaryotes, genetic recombination, the genetic code,



structure of the gene, mRNA transcription and translation, and regulation of gene expression. Three hours of lecture and one recitation per week. Prerequisite: concurrent registration in CHM 203 or 205. BIO 111 is recommended. (Fall, not open to freshmen)

130. General Botany I. Classification, morphology, physiology, and ecology of the major plant groups. Three hours of lecture and one three-hour laboratory per week. Half-day field trips on Saturdays: four in September, one in October, and one in November. No prerequisites. (Fall)

150. Introduction to Biochemistry. A required course for all concentrations in biological science. Topics include: protein structure and function, enzyme

mechanisms, intermediary metabolism and control, membrane structure and function, energy transduction, the structure of nucleic acids, synthesis of DNA, RNA, and proteins. Selected topics in molecular physiology are also included. Three hours of lecture and one recitation per week. Prerequisite: a semester of organic chemistry or comparable familiarity with organic functional groups. BIO 121 or equivalent is recommended. (Spring)

200. Laboratory in Biology. An introductory survey of methods employed in modern biological research, including field methods, population genetics, cytogenetics, and cellular and molecular biology. Exercises and demonstrations

in the laboratory or the field. Two three-hour sessions per week. Prerequisites: BIO 121 and 150. (Fall)

202. Molecular Genetics. This course deals with the molecular mechanisms of gene replication, gene expression, and the control of gene expression in both prokaryotic and eukaryotic cells. Topics include: enzymatic mechanisms of DNA replication, recombination and repair; transposable elements; DNA transcription; RNA splicing; RNA translation; repressors, activators and attenuators; recombinant DNA and genetic engineering. Three hours of lecture and one recitation per week. Prerequisites: BIO 121 and 150. (Fall)

205. Introduction to Population Biology. Introduces aspects of ecology, population genetics, and evolutionary biology. Topics include: population growth and regulation, competition, predation, molecular evolution, natural selection, chance, evolution of altruism, group selection, adaptation, speciation, and rates of evolution. Three hours of lecture and one recitation per week. Prerequisite: BIO 121. (Spring)

208. Physiology and Ecology of the Algae. Physiology of algae and the environmental control of phytoplankton growth in lakes and seas. Three hours of lecture and one three-hour laboratory, demonstration, or discussion per week. Prerequisites: MTH 143 or 162 and CHM 103 or 105. (Spring)

210. Introduction to Cell Biology. A discussion of the structure and biochemical properties of the major cell organelles including mitochondria, the endoplasmic reticulum, ribosomes, the Golgi apparatus, membranes, cytoskeleton, nuclei, and chromosomes. Three hours of lecture per week. Prerequisite: BIO 121 or 150 or permission of instructor. (Spring)

220. Structure and Function of Cell Organelles. A discussion of the organization and function of cytoplasmic organelles. Lectures and readings are from original research literature, and emphasis is on the analysis and interpretation of experimental results. Three hours of lecture per week. Prerequisites: BIO 150 and 210. (Fall)

225. Laboratory in Population Biology. Laboratory exercises designed to familiarize students with the methods and approaches of modern evolutionary genetics and population biology. The first half of the course deals initially with computer modeling, then turns to population biology of large organisms and includes exercises on interspecific crosses in *Drosophila*, statistics and Life Table analyses, polytene chromosome studies, and grazing experiments in snails. The second half deals with *E. coli* and includes experiments in directed evolution, mutant isolation, spontaneous mutation rates, competition for resources, survival, antibiotic resistance in natural populations, and DNA sequence polymorphisms as determined by the isolation and electrophoretic analysis of DNA restriction fragments. Two three-hour laboratories per week. Satisfies the lab requirement for the B.A. in biology. Prerequisite: BIO 205. (Fall)

226. Introduction to Developmental Biology. This course deals with the cellular aspects of animal development with emphasis on both concepts and underlying mechanisms. Topics include: spermatogenesis, oogenesis, fertilization, embryonic cleavage, cytoplasmic localization, regulatory versus mosaic development, determination and differentiation. Three hours of lecture per week. Prerequisites: BIO 121 and 150. (Fall)

228. Laboratory in Developmental Biology. Laboratory emphasizing a hands-on approach to the types of experiments used in modern developmental biology (microscopy, protein and nucleic acid purification, recombinant DNA techniques). Two four-hour labs and one recitation per week. Satisfies the laboratory requirement for the B.A. and B.S. in biology. Prerequisite: BIO 226 (can be taken concurrently). (Fall)

230. Laboratory in Cell Biology. Provides laboratory experience in fundamental techniques of modern cell biology (cell growth, organelle fractionation, purification and analysis of proteins and DNAs, radiolabeling kinetics, in situ localization, and microscopy). Two four-

hour laboratories and one recitation per week. Satisfies the laboratory requirement for the B.A. and B.S. in biology. Prerequisite: BIO 210 or 226. (Spring)

236. Advanced Developmental Biology. Reviews current research on the molecular and cellular mechanisms of development. Topics include cell adhesion and motility, cell communication, hormone action, localized determinants, establishment of embryonic axes, gene expression during development, cell commitment, morphogenesis, and developmental genetics. Three hours of lecture per week. Prerequisite: BIO 226. (Spring)

243. Eukaryotic Genome Organization and Expression I. This course examines the organization of the eukaryotic genomes and the mechanisms and control of gene expression. Topics include content and arrangement of DNA sequences in the genome, structure of specific genes, RNA synthesis and processing, and the structure and composition of chromatin and chromosomes. Three 80-minute lectures per week and an optional recitation. Prerequisites: BIO 121 and either 150 or 226. (Fall)

244. Eukaryotic Genome Organization and Expression II. Topics include: transformation of eukaryotic cells, oncogenes, alterations in chromatin structure associated with gene activation, DNA amplification, diminution/underreplication and sequence rearrangement, alternative pathways of mRNA transcription and processing, levels of control of mRNA abundance, and control points in the expression of specific genes. Three hours of lecture per week. Prerequisites: BIO 243 or permission of the instructor. (Spring)

260. Animal Behavior. Examines animal behavior from an ecological and evolutionary perspective. Topics include social organization, mating systems, foraging, aggression, and animal learning. Students learn quantitative techniques in behavioral biology and conduct independent observations of animal behavior. Three hours of lecture and one recitation per week. Prerequisite: BIO 111 or PSY 141. (Fall)

263. Ecology. A survey of adaptations to the physical environment, dynamics of natural populations, interactions between species, and community structure. Three hours of lecture and one recitation per week. Prerequisites: BIO 111 and MTH 143 or 162. (Spring)

265. Evolution of Genes and Proteins. Deals with various phenomena at the molecular level that are of evolutionary significance. Topics include methods of analyzing DNA and amino acid sequences, rate and patterns of nucleotide substitution, evolution of genetic codes, biases in the usage of synonymous codons, evolution of transposons and retrotransposons, evolution of multigene families, extranuclear genomes, and other current, controversial issues. Two and one-half hours of lecture. Permission of the instructor is required for all students. (Fall)

268. Laboratory in Molecular Genetics. Experiments with pro- and eukaryotic organisms (*Escherichia coli*, yeast, and *Drosophila*), studying fundamental genetic and molecular phenomena. Exercises include isolation of mutants, recombinant DNA and cloning techniques, enzyme assays, gel electrophoresis techniques, restriction nuclease cleavage analysis, and Southern and Western hybridizations. Two four-hour laboratories and one recitation per week. Satisfies the laboratory requirement for the B.A. in biology and B.S. in molecular genetics. Prerequisite: BIO 202 or permission of instructor. (Spring)

272. Advanced Evolutionary Genetics. This graduate survey course is designed to cover the areas that are usually included in courses on evolutionary biology, population genetics, and molecular evolution. The special emphasis of this course is on the impact of modern genetics on our understanding of evolutionary processes. Three hours of lecture per week. Prerequisite: BIO 205 or permission of instructor. (Fall)

292. Field Ecology Laboratory. Experience in field techniques in ecological research is gained during field studies. Students learn how to formulate hypotheses and conduct research in the field

and conduct independent research projects. Emphasis then shifts to the analysis of data and presentation of results. Prerequisite: permission of instructor. Not open to freshmen or sophomores. (Spring)

391. Independent Study. A special program of reading in advanced aspects of cellular, developmental, or population biology, molecular genetics, plant biology, or bioenergetics may be arranged according to the needs and interests of the individual students. Such courses are normally supervised by any faculty member of the Department of Biology. (Fall and Spring)

395. Independent Research. A special program of laboratory or field work in advanced aspects of biological science may be arranged with a faculty member of the Department according to the interests of individual students. (Fall and Spring)

451. Advanced Molecular Biology. Molecular mechanisms of maintenance, propagation, and expression of genetic material. Topics include transcription, translation, gene regulation and replication, repair and recombination of DNA. Experimental approaches to the understanding of these processes is emphasized and students read the original research literature. Prerequisite: BIO 202 or permission of instructor. (Fall)

452. Topics in Molecular Biology. Topics are selected from areas not covered in BIO 451. Examples might include: regulation of cell cycle, post-translational protein modification, translation frameshifting, protein splicing, RNA editing, transposable elements, replication of retroviruses, unusual DNA structure (looping, bending, triple helix). Prerequisite: BIO 451 or BCH 402 or permission of instructor. (Spring)

Other biology courses with numbers of 400 and above, although intended primarily for graduate students, are open to qualified juniors and seniors by permission of the instructor. See Official Bulletin: Graduate Studies.

MICROBIOLOGY AND IMMUNOLOGY

Nicholas Cohen, Ph.D. (Rochester)

Professor of Microbiology and Immunology and of Psychiatry

Barbara H. Iglewski, Ph.D. (Pennsylvania) *Professor of Microbiology and Immunology and Chair of the Department*

Wallace J. Iglewski, Ph.D. (Pennsylvania) *Professor of Microbiology and Immunology*

Jack Maniloff, Ph.D. (Yale) *Professor of Microbiology and Immunology and of Biophysics*

Robert E. Marquis, Ph.D. (Michigan) *Professor of Microbiology and Immunology and of Dental Research*

David W. Scott, Ph.D. (Yale) *Dean's Professor of Immunology, Professor of Oncology in Microbiology and Immunology*

Virginia Clark, Ph.D. (Rochester) *Associate Professor of Microbiology and Immunology*

John G. Frelinger, Ph.D. (California Institute of Technology) *Associate Professor of Oncology in Microbiology and Immunology*

Edith Lord, Ph.D. (California, San Diego) *Associate Professor of Oncology in Microbiology and Immunology*

Dennis J. McCance, Ph.D. (University of Birmingham, UK) *Associate Professor of Microbiology and Immunology*

Marilyn A. Menegus, Ph.D. (Cornell) *Associate Professor of Microbiology and Immunology, of Pathology, and of Pediatrics*

Richard P. Phipps, Ph.D. (Medical College of Virginia) *Associate Professor of Oncology in Microbiology and Immunology*

Richard Silver, Ph.D. (Georgetown) *Associate Professor of Microbiology and Immunology*

Maurice Zauderer, Ph.D. (M.I.T.) *Associate Professor of Oncology in Microbiology and Immunology*

Richard Barth, Ph.D. (Roswell Park) *Assistant Professor of Oncology in Microbiology and Immunology*

Patrik Bavoil, Ph.D. (California, Berkeley) *Assistant Professor of Microbiology and Immunology*

J. Scott Butler, Ph.D. (Illinois, Urbana) *Assistant Professor of Microbiology and Immunology*

Stephen Dewhurst, Ph.D. (Nebraska) *Assistant Professor of Microbiology and Immunology*

Constantine Haidaris, Ph.D. (Cincinnati) *Assistant Professor of Microbiology and Immunology*

Dwight J. Hardy, Ph.D. (Louisiana) *Assistant Professor of Microbiology and Immunology*

M. Alanna Ruddell, Ph.D. (Case Western Reserve) *Assistant Professor of Microbiology and Immunology*

Lisa A. Weymouth, Ph.D. (Pennsylvania) *Assistant Professor of Microbiology and Immunology*

Mary Anne Courtney, Ph.D. (Miami) *Instructor in Microbiology and Immunology and of Medicine*

Peter Z. Allen, Ph.D. (Columbia) *Professor Emeritus of Microbiology and Immunology and of Dental Research*

J. Roger Christensen, Ph.D. (Cornell) *Professor Emeritus of Microbiology and Immunology*

J. Donald Hare, M.D. (Rochester) *Professor Emeritus of Microbiology and Immunology and Associate Professor of Medicine*

Albert L. Ritterson, Ph.D. (California, Los Angeles) *Professor Emeritus of Microbiology and Immunology*

All members of the faculty may serve as preceptors of MBI 395. The Department of Microbiology and Immunology annually has up to 10 teaching assistants serving as laboratory instructors in introductory courses.

Microbiology, the study of microorganisms, encompasses bacteriology, virology, mycology, and parasitology and is inseparable from molecular biology, genetics, physiology, and immunology. Consequently, the bachelor of science degree program in microbiology integrates course work in many disciplines

in order to provide undergraduates with basic knowledge of the field. This program utilizes the resources of the Department of Microbiology and Immunology of the School of Medicine and Dentistry and the Clinical Microbiology Laboratories of Strong Memorial Hospital to provide undergraduates with a background in general and medical microbiology.

Students earning the B.S. in biological sciences: microbiology will possess a strong foundation in the basic introductory sciences (chemistry, biology, biochemistry), related areas (mathematics and physics), microbiology, and liberal arts. They will be well prepared to continue graduate education in microbiology, another biological science area, or a health care profession.

MICROBIOLOGY CONCENTRATION

Students should declare the concentration toward the end of their sophomore year. During the junior and senior years, advisors from the Department of Microbiology and Immunology will supervise a concentrator's progress. Microbiology is one of the B.S. tracks in the Program in Biology and Medicine. With satisfactory performance and completion of degree requirements, students will be recommended for the degree of B.S. in biological sciences: microbiology.

REQUIREMENTS FOR CONCENTRATION IN MICROBIOLOGY

During the freshman and sophomore years, students considering a concentration in microbiology are advised to complete the following courses, all of which are requirements for the microbiology B.S. track.

- Four semesters of chemistry, including two semesters of organic chemistry.
- Two semesters of calculus.
- One semester of statistics, differential equations, or computer science.
- BIO 111, 121, and 150.

Additional requirements for the B.S. in microbiology are:

- MBI 220 and 221.
- Three additional advanced microbiology courses (400 level).
- Two semesters of physics.
- One laboratory course in biology and one or two biology diversification courses.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

220. An Introduction to Microbiology and Immunology. Introduces the student to important aspects of microbiology by examining selected microorganisms in some detail. Specific emphasis is given to structure, genetics, metabolic regulation, and interaction between the organism and its environment. Where appropriate, a comparative approach is stressed. Prerequisites: BIO 121, 150. (Fall)

221. Microbiology Laboratory. Exercises, demonstrations, and field trips are closely related to topics mentioned in MBI 220, which is taken concurrently. (Fall)

395. Undergraduate Research in Microbiology. For qualified and interested students, research experience in the laboratory of Department faculty members may be arranged. Arrangements need to be made well in advance. (Fall, Spring)

414. Mechanisms of Microbial Pathogenesis. An examination of the molecular mechanisms by which bacteria cause disease. The emphasis is on understanding how bacteria colonize the host, evade host immune defenses, and cause damage to the host, as well as understanding the regulation of synthesis, structure/function, and mode of action of bacterial toxins. Prerequisites: MBI 220, 221. (Spring, every other year)

421. Microbial Genetics. An in-depth examination of some representative genetic systems in fungi, bacteria, and bacterial viruses. Prerequisite: MBI 220. (Spring, every other year)

431. Microbial Physiology. Focuses on relationships between microbial cell structure and cell functions, and on the physiologic processes involved in microbial adaptation. Global, cellular, and molecular aspects of microbial physiology are considered. Prerequisites: BIO 150, MBI 220. (Spring, every other year)

445. Industrial Microbiology. A consideration of both microbiological and engineering aspects of industrial fermentations, bioreactors, sterilization and disinfection, sewage treatment, food processing and environmental problems. The course includes lectures on genetic engineering, process energetics and economics, as well as laboratory exercises. Prerequisites: Organic chemistry, calculus, and an introductory biology course, or permission of the instructor. (Fall)

456. General Virology. Provides an introduction to bacterial, animal, and plant virology. Topics covered are general methodology or virus research, virus structure, biochemistry of viral replication, and general features of virus-host cell interaction. Prerequisites: BIO 150 and either MBI 220 or BIO 202. (Spring, every other year)

473. Immunology. Cellular and humoral response to antigenic substances; interaction of antibody and antigen; structure and genetics of antibody; T- and B-cell recognition and interaction; immune regulation. Prerequisites: BIO 121 and 150 and at least one 200-level course in a biological science. (Fall)

NEUROSCIENCE

COMMITTEE ON NEUROSCIENCE

James R. Ison, Ph.D. (Michigan)
Professor of Psychology and of Toxicology and in the Center for Visual Science

Carol Kellogg, Ph.D. (Rochester)
Professor of Psychology and Associate Professor of Pharmacology; Chair of the Committee

Peter Lennie, Ph.D. (Cambridge)

*Professor of Psychology and in the
Center for Visual Science*

Dale W. McAdam, Ph.D. (Iowa)

*Professor of Psychology and Associate
Professor of Neurology*

Jerome Schwartzbaum, Ph.D. (Stanford)

Professor of Psychology

William E. O'Neill, Ph.D. (SUNY,

Stony Brook) *Associate Professor of
Physiology*

Ernest J. Nordeen, Ph.D. (California,

Irvine) *Assistant Professor of
Psychology and of Neurobiology
and Anatomy*

Kathy W. Nordeen, Ph.D. (California,

Irvine) *Assistant Professor of
Psychology and of Neurobiology
and Anatomy*

Neuroscience is the study of the nervous system and therefore involves the study of many disciplines. The program in neuroscience, which leads to the bachelor of science in biology with specialization in neuroscience, has been designed to give the students a strong background in the basic sciences (biology, chemistry, physics), related areas (mathematics, statistics), and neurobiology, including laboratory experience. The program is designed to accommodate students with a wide variety of interests and future career plans. It is a track program in the Program in Biology and Medicine (see page 50).

The program in neuroscience is offered by the College of Arts and Science in cooperation with the School of Medicine and Dentistry. Faculty from the two campuses teach in the neurobiology courses and serve as advisors.

REQUIREMENTS FOR THE B.S. IN BIOLOGICAL SCIENCES: NEUROSCIENCE

1. NSC 201, Basic Neurobiology; NSC 203, Laboratory in Neurobiology; NSC 301 or 302, Senior Seminar in Neuroscience (2 credit hours each).
2. Biology Core: BIO 111, Biology of Organisms; BIO 121, Genetics; BIO 150,

Introduction to Biochemistry (common to all tracks in the Program in Biology and Medicine).

3. Biology Diversification: two courses selected from outside the Neuroscience Program.

4. Advanced Neuroscience Courses: three required; at least two should be from Group A and no more than one from Group B.

a. NSC 202, Developmental and Comparative Neurobiology; NSC/PSY 243, Neurochemical Foundations of Behavior; NSC/PSY 241, Neurobiology of Behavior; NSC/PSY 255, Sensory Systems.

b. A course in behavior taken from the Natural Science Division of Psychology or, with permission, a course in behavior taken from the Social Science Division of Psychology (see page 142).

5. Allied fields must include: CHM 103/105, 104/106, 203/205, and 204/206; MTH 161 and 162, or equivalent; PHY 113 and 114; and a course in statistics, computer science, or differential equations.

First Year

| | |
|-------------------------------|--------------------------------|
| CHM 103 or 105 Mathematics | CHM 104 and 106 Mathematics |
| English | BIO 111 |
| College elective | College elective |

Second Year

| | |
|----------------|----------------|
| NSC 201 | NSC 203 |
| CHM 203 or 205 | CHM 204 or 206 |
| BIO 121 | BIO 150 |
| Elective | Elective |

Third Year

| | |
|---------------------------------------|-----------------------------------|
| PHY 113 | PHY 114 |
| Advanced neuro- science course | Advanced neuro- science course |
| Biology diversifi- cation elective | Elective |
| Elective | Elective |

Fourth Year

| | |
|-------------------------------------|-----------------------------------|
| NSC 301 or 302 | Advanced neuro- science course |
| Statistics | Elective |
| Biology diversifi- cation course | Elective |
| Elective | Elective |

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

201. Basic Neurobiology. An introductory course that covers diverse topics including basic neuronal and glial structure and ultrastructure, synaptic transmission, membrane structure, mechanism of excitation and conduction in neurons, and neuronal integration and regulation. Introductory biology and chemistry are recommended. (Fall)

202. Developmental and Comparative Neurobiology. Surveys the subtopics of neural development including morphogenesis of the nervous system, trophic influences of neurons on the cells they innervate, specificity of neuronal connections, neural and glial interrelationships, and neurochemical, neuroanatomical, and behavioral aspects. Prerequisite: NSC 201. (Spring)

203. Laboratory in Neurobiology. Introduces students to techniques used in the study of neuroscience. Procedures include gross brain dissection, histologic staining and microscopic examination of brain tissue, electrophysiologic analysis of neural tissue, neurochemical approaches to the study of the nervous system, stereotaxic surgery and behavioral observation. Prerequisite: NSC 201. (Spring)

241. Neurobiology of Behavior. Survey of biological substrates of behavior focusing on integrative mechanisms of the brain and their expression in sensory, motor, motivational, and mnemonic functions. Same as PSY 241. Prerequisite: NSC 201 or permission of instructor. (Fall)

243. Neurochemical Foundations of Behavior. This course presents an introduction to the field of neurochemistry by surveying topics such as cerebral metabolism, neurochemical transmission, neuropharmacology, and membrane chemistry. The chemistry of the brain is analyzed in terms of its contribution

CHEMISTRY

to the role of the brain in the regulation of physiology and behavior. Suggested prerequisites: PSY 141 or NSC 201 or NSC/PSY 241; BIO 150 or IND 401. Same as PSY 243. (Fall)

255. Sensory Systems. A large part of the brain is concerned with the analysis of information that impinges on the sense organs. This course deals with the operation of the sense organs—the principles of their operation and how their design balances many conflicting demands—and with the subsequent analysis by higher centers of the signals sent by the sense organs. Prerequisites: NSC 201 or PSY 151 or permission of the instructor. Same as PSY 255. (Spring)

301, 302. Seminar in Neuroscience. To be taken for one semester. The emphasis is on "neuroscience as a scientific career." Students read and lead discussions of issues of general professional concern, for example, peer review and the evaluation of research, the function of the federal research agencies, science education and teachings, and scientific ethics. As a group, they prepare for and attend at least three colloquia in neuroscience, and prepare three brief reviews of current research problems for class presentation, discussion, and critique.

Further information is available from Professor Carol Kellogg, Chair, Committee on Neuroscience, Room 186, Meliora Hall.

Robert K. Boeckman, Ph.D. (Brandeis)
Professor of Chemistry

Richard F. Borch, Ph.D. (Columbia),
M.D. (Minnesota) *James P. Wilmot
Distinguished Professor of Pharma-
cology and Professor of Chemistry*

Robert G. Bryant, Ph.D. (Stanford)
*Dean's Professor of Radiology, Pro-
fessor of Biophysics and of Chemistry*

Frank P. Buff, Ph.D. (California
Institute of Technology) *Professor
of Chemistry*

Richard S. Eisenberg, Ph.D. (Columbia)
Professor of Chemistry

James M. Farrar, Ph.D. (Chicago)
Professor of Chemistry

William D. Jones II, Ph.D. (California
Institute of Technology) *Professor of
Chemistry*

Jack A. Kampmeier, Ph.D. (Illinois)
Professor of Chemistry

Andrew S. Kende, Ph.D. (Harvard)
*Charles Frederick Houghton Professor
of Chemistry*

Robert W. Kreilick, Ph.D. (Washington
University) *Professor of Chemistry*

Thomas R. Krugh, Ph.D. (Pennsylvania
State) *Professor of Chemistry*

George L. McLendon, Ph.D. (Texas
A&M) *Professor of Chemistry*

John S. Muentner, Ph.D. (Stanford)
Professor of Chemistry

Shaul Mukamel, Ph.D. (Tel Aviv)
Professor of Chemistry

Richard H. Schlessinger, Ph.D. (Ohio
State) *Professor of Chemistry*

Wolf-Udo Schröder, Ph.D. (Darmstadt)
Professor of Chemistry

Henry M. Sobell, M.D. (Virginia)
*Professor of Biophysics and of
Chemistry*

Douglas H. Turner, Ph.D. (Columbia)
Professor of Chemistry

David G. Whitten, Ph.D. (Johns
Hopkins) *C. E. Kenneth Mees
Professor of Chemistry and Chair*

Joseph P. Dinnocenzo, Ph.D. (Cornell)
Associate Professor of Chemistry

R. J. Dwayne Miller, Ph.D. (Stanford)
Associate Professor of Chemistry

Anne B. Myers, Ph.D. (California,
Berkeley) *Associate Professor of
Chemistry*

Joshua L. Goodman, Ph.D. (Yale)
Assistant Professor of Chemistry

Eric T. Kool, Ph.D. (Columbia)
Assistant Professor of Chemistry

Thomas R. Rizzo, Ph.D. (Wisconsin)
Assistant Professor of Chemistry

Marshall D. Gates, Jr., Ph.D. (Harvard)
*Charles Frederick Houghton Professor
Emeritus of Chemistry*

John R. Huizenga, Ph.D. (Illinois)
*Tracy H. Harris Professor Emeritus of
Chemistry and of Physics*

William H. Saunders, Jr., Ph.D. (North-
western) *Senior Faculty Associate in
Chemistry*

Approximately two postdoctoral fellows, 50 graduate teaching fellows, and five specially chosen undergraduates assist the faculty in the presentation of the teaching program. The majority of the teaching assistants are used in the lower level, high enrollment courses to help the students with questions and problem solving that arise out of the lectures and/or homework assignments.

There are three adjunct faculty members who teach selected courses.

The Department of Chemistry is committed to the search for new insights into problems in chemistry and to the presentation of our understanding of chemistry to students at all stages of the educational spectrum, from the beginner to the accomplished scholar. Thus, the Department presents programs of teaching and research for undergraduate, graduate, and postdoctoral students. The size and attitudes of our Department create a rich interplay among these programs. Each program stimulates and nourishes the others. Our research and teaching goals are complementary ambitions. We want students to catch both our ideas and our enthusiasm. All faculty teach undergraduate students; all faculty are actively involved in chemical research. An undergraduate student gets the benefits of facilities and a community of faculty and students dedicated to the contemporary ideas and problems in chemistry; the faculty values the challenges and the stimulation of presenting

their ideas to others and the collaboration with students which leads to new understanding. Students move easily through the spectrum of departmental activities. Undergraduates are an integral part of the research programs of the Department; it is common to find a laboratory with an undergraduate, a graduate student, a postdoctoral student, and a faculty member working side by side. In a similar fashion, some of the teaching programs in the Department involve faculty, postdoctoral students, graduate students, and advanced undergraduates working as a team to present ideas and techniques to beginning students.

Chemistry is a rich and fascinating subject which ranges in concern from macromolecular biopolymers to problems in subatomic structure and in time scales from eons to picoseconds. The skills of chemists range from sophisticated levels of mathematical abstraction to the elegant conception and execution involved in the synthesis of complex, naturally occurring molecules. The chemist's view of the atomic and molecular structure of the world is one of the major intellectual forces which shape modern thought. The chemist's skill and understanding have revolutionized many areas of modern society, such as agriculture, clothing and shelter, health care, and energy resources. The Department hopes, of course, to prepare and stimulate students to professional achievement and accomplishment in chemistry. At the same time, we recognize the fundamental nature of our discipline and its proper role as the basis and complement to study and accomplishment in a host of other areas. A very large number of our students will find their fascination and aspirations in related or interdisciplinary fields. We aim to give them the insights and the skills in chemistry which will support their work in these areas.

GENERAL COURSE INFORMATION

The first year chemistry offerings consist of CHM 103 and 105 in the fall semester and CHM 104 and 106 in the spring.



These courses are intended for all students following programs requiring two or more years of chemistry, including those seeking careers in health professions. The courses in each semester follow the same basic curriculum, differing only in the depth of coverage and mathematical skills used in developing and applying concepts to specific problems. CHM 105 and 106 are thus enriched versions of CHM 103 and 104, respectively.

The basis for enrolling in CHM 103 or 105 is mainly a matter of high school background, mathematical skills, and to a lesser extent at the beginning, long-term interest. Generally, if a student has achieved a math SAT score of 620 or higher, or has taken AP chemistry or calculus in high school, he or she should enroll in the enriched studies course, CHM 105. Performance and developing academic interest during the first semester determine which course to enter in the second semester, CHM 104 or 106. Prospective chemistry majors can take either CHM 105 or 103, and 106 and 104 during their first year of study. The program in the first year thus offers complete flexibility, and avoids the problem of having to choose a specific sequence before a student's interests have developed adequately.

Engineering students taking only one semester of chemistry can enroll in either CHM 105 or 103 depending on their background and quantitative skills.

During the second year, organic chemistry is offered with a lecture and a laboratory course each semester. The organic chemistry lectures are CHM 203 and 205 in the fall, and 204 and 206 in the spring. CHM 203 and 205 are both introductory organic chemistry courses with CHM 205 having greater depth of organic synthesis and reaction mechanisms. CHM 204 is intended for students planning to go no further in chemistry, while CHM 206 is designed for students planning further study in chemistry. CHM 210 should be taken with 206.

The Department offers undergraduate programs leading to both B.A. and B.S. degrees. In general, the programs differ in the choice and timing of courses in the junior and senior years; an early choice between programs is not required. Between the two programs, the students can arrange a chemistry major which covers the fundamentals as essential background for a specific career in some other area, tailor-made to suit specific interests of the particular student,

or which provides rigorous and thorough preparation for professional work in chemistry. A minor in chemistry is also available. Specific programs are described below.

B.A. PROGRAM IN CHEMISTRY

The basic course and laboratory work in chemistry are identical in the B.A. and B.S. programs. The B.A. program makes fewer specifications at the advanced level and encourages a wide range of elective courses. It is particularly suitable for students with interdisciplinary scientific interests in the health professions, biology, physics, geological sciences, engineering, or education. B.A. students may elect advanced courses in chemistry, including independent research, and can, thereby, create a professional curriculum best suited to their individual interests. The B.A. program is suitable for all students, even those seeking professional careers in chemistry. This is especially true if graduate study is planned. The flexibility of the B.A. program makes it well suited to students with interests in the health professions.

REQUIREMENTS FOR THE B.A. IN CHEMISTRY

- CHM 103/105 and 104/106
- CHM 203/205, 204/206, 207/209, 210
- CHM 251 and 252
- CHM 211, 215, and 222
- MTH 161, 162, 163. One additional course in mathematics, computer science, or statistics is strongly recommended.
- PHY 113–114. Students wishing a more rigorous background in physics are advised to take PHY 121–123 or 121, 142, and lab 182 instead of 113–114.
- Knowledge of BASIC or FORTRAN computer programming is required for junior- and senior-level courses. This requirement may be met by taking noncredit courses offered each term by the Computing Center or by independent study.
- German is recommended for the foreign language requirement, although fulfillment of the College language requirement in any language is acceptable for the B.A.

- Additional courses in physics, mathematics, and other sciences such as biology, geology, etc., may be taken as part of the concentration.

A B.A. candidate who wishes to meet requirements for full membership in the American Chemical Society upon graduation should take, in addition to minimum requirements, CHM 216 plus one 400-level chemistry lecture course.

B.S. PROGRAM IN CHEMISTRY

The B.S. program is designed primarily for students who anticipate professional careers in chemistry and related science. The program provides the range of knowledge, skills, and experience required for work as a professional chemist or for entry into graduate studies in chemistry. The fundamental work is completed by the end of the third year, leaving the senior year free for graduate-level course work, a full year of independent research with one of the Department faculty, and an advanced laboratory course (CHM 216). The B.S. program meets all of the requirements for full membership in the American Chemical Society.

REQUIREMENTS

- CHM 103/105 and 104/106
- CHM 203/205, 204/206, 207/209, 210
- CHM 251 and 252
- CHM 211, 215, 216, and 222
- CHM 393 (senior research, 8 credits total)²
- 400-level chemistry course³
- MTH 161, 162, 163, plus one additional course in mathematics, computer science, or statistics⁴
- PHY 121–123 or 121, 142, 143, and lab 182
- Knowledge of FORTRAN or BASIC programming language is required for junior- and senior-level courses. This requirement may be met by taking noncredit courses offered each term by the Computing Center.
- The College language requirement must be fulfilled in either German, French, or Russian, with German the recommended choice.

While the required courses leading to a B.S. in chemistry may be scheduled with some flexibility (e.g., the mathematics and physics courses), the following program is recommended:

First Year

| | |
|-------------|-------------|
| CHM 103/105 | CHM 104/106 |
| MTH 161 | MTH 162 |
| Elective | PHY 121 |
| Elective | Elective |

Second Year

| | |
|-------------|-----------------------|
| CHM 203/205 | CHM 206 |
| CHM 207/209 | CHM 210 |
| MTH 163 | PHY 123, 182 |
| PHY 122 | Elective ⁴ |
| Elective | Elective |

Third Year

| | |
|-------------------------|-------------------------|
| CHM 251 | CHM 252 |
| CHM 211 | CHM 222 |
| CHM 215 | CHM 216 ¹ |
| Elective ^{4,5} | Elective ^{4,5} |
| Elective | Elective |

Fourth Year

| | |
|----------------------------|-------------------------|
| CHM 393 ² | CHM 393 ² |
| 400-level CHM ³ | Elective ^{4,5} |
| Elective | Elective |
| | Elective |

REQUIREMENTS FOR A MINOR IN CHEMISTRY

- CHM 103/105 and 104/106
- Four of the following: CHM 203 and 207/205 and 209, 204/206, 211, 222, 251, 252

¹ CHM 216 can be replaced by an approved advanced laboratory course in another science department.

² Eight credit hours of CHM 393 (senior research) are required after completion of CHM 252 and 222 for a B.S. degree.

³ The 400-level chemistry course may be taken anytime during the junior or senior year.

⁴ Students must select one course from the following: MTH 164, a 200-level mathematics course, a course in computer science, a 4-credit programming course, or a course in statistics. With the exception of the mathematics courses, chemistry department approval is required. This course may be completed at any time.

⁵ Careful consultation with the faculty is necessary to choose an appropriate program. Students are urged to include advanced work in related sciences consistent with their professional aims, such as more mathematics and physics for graduate work in physical chemistry, biology for graduate work in biochemistry, etc.

Courses at the 400-level may be included with the permission of the instructor. Prerequisites for advanced courses, such as the mathematics and physics prerequisites for courses in physical chemistry, must be taken in addition to the six required chemistry courses.

Each minor will be assigned a faculty advisor who must approve the student's proposed program, normally at the end of the sophomore year. Particular attention should be given to the intellectual coherence of the program in terms of the student's goals. Two courses with substantial overlap of content, such as 103/105, 203/205, 251/451, etc., should not be included in a program.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

101. Chemistry in Society. A single-semester course intended for prospective social science majors. Thermodynamics, kinetics, equilibria, and introduction to organic chemistry. No laboratory; lecture discussions pertaining to acid rain, the ozone layer, and designer drugs.

103. Chemical Concepts, Systems, and Practices I. An introductory course dealing with the properties of chemical systems primarily from a macroscopic perspective. Subjects include stoichiometry and atomic basis of matter, properties of gases, liquids, and solids, chemical equilibrium, acids and bases, solubility equilibria, oxidation-reduction reactions, and chemical thermodynamics. Prerequisites: high school chemistry, trigonometry, and analytical geometry.

104. Chemical Concepts, Systems, and Practices II. Second term of introductory course with emphasis on microscopic properties of chemical systems and descriptive chemistry. Atomic structure, chemical bonding, spectroscopy, chemical kinetics, descriptive chemistry of main group and transition elements.



Laboratory work includes analytical methods in chemistry. Prerequisite: CHM 103 or 105.

105. Chemical Concepts, Systems, and Practices III. An honors level version of 103 covering the same material in greater depth and utilizing calculus where appropriate. Stoichiometry, and the atomic basis of matter, properties of gases, liquids, and solids, chemical equilibrium, acids and bases, solubility equilibria, oxidation-reduction reactions, and chemical thermodynamics. Prerequisites: high school chemistry, trigonometry, and analytical geometry. Recommended: high school AP chemistry or calculus or math SAT score of 600 or higher.

106. Chemical Concepts, Systems, and Practices IIIH. An honors level version of 104 covering the microscopic properties of chemical systems and descriptive chemistry. Atomic structure, chemical bonding, spectroscopy, chemical kinetics, descriptive chemistry of main group and transition elements. Laboratory work includes analytical methods in chemistry. Prerequisite: CHM 103 or 105.

203. Organic Chemistry I. An introduction to organic chemistry which focuses on chemical bonding, structure and stereochemistry, reactions and reaction mechanisms of organic compounds. Prerequisites: CHM 103/105 and 104/106 or the equivalent; co-registration in CHM 207 or 209.

204. Organic Chemistry II. A continuation of a two-semester sequence in the study of organic chemistry. Topics covered include the reactivity of various

functional groups, approaches to organic synthesis, reactivity of conjugated systems, polymers and molecules of biological significance. Prerequisites: CHM 203 or 205 or the equivalent plus one semester of organic laboratory (CHM 207 or 209 or the equivalent); co-registration in CHM 208 or 210.

205. Organic Chemistry IIIH. An honors level version of CHM 203 which provides a more intense treatment of introductory organic chemistry. Subjects include chemical bonding, structure and stereochemistry, reactions and reaction mechanisms of organic compounds. Prerequisites: CHM 103/105 and 104/106 or the equivalent; co-registration in CHM 209 (recommended) or 207.

206. Organic Chemistry III. A detailed examination of the reactivity of complex organic molecules. The course focuses on mechanistic and synthetic aspects of organic molecules and will focus also on modern aspects of spectroscopy in organic chemistry. Prerequisites: CHM 203 or 205 or the equivalent plus one semester of organic laboratory (CHM 207 or 209 or the equivalent). Co-registration in CHM 210 is strongly recommended.

207. Organic Chemistry I Laboratory. Credit—1 hour. A one-laboratory session per week course which provides an introduction to the characterization and reactivity of organic molecules. The course provides an introduction to modern laboratory techniques used in organic chemistry. Prerequisite: co-registration in CHM 203 or 205.

208. Organic Chemistry II Laboratory. Credit—1 hour. A continuation of the laboratory sequence begun in CHM 207.

Meets one laboratory period per week. Prerequisites: CHM 207 or 209; co-registration in CHM 204 or 206.

209. Organic Chemistry III Laboratory. Credit—2 hours. Modern laboratory techniques. Recommended for students planning advanced work in chemistry and related sciences. This laboratory meets for two laboratory periods per week. Prerequisite: co-registration in CHM 203 or 205.

210. Organic Chemistry IIIH Laboratory. Credit—2 hours. A laboratory course meeting two laboratory periods per week; a continuation of the advanced laboratory using modern laboratory techniques begun in CHM 209. This laboratory is required for chemistry majors. Prerequisites: CHM 207 or 209; co-registration in CHM 204 or 206.

211. Inorganic Chemistry. Synthesis, structure, and properties of inorganic compounds. (Fall)

215. Inorganic/Organic Laboratory I. Credit—2 hours. Laboratory techniques applied primarily to inorganic synthesis and instrumental analysis. Prerequisite: registration in or credit for CHM 211. (Fall)

216. Inorganic/Organic Laboratory II. Credit—2 hours. Continuation of 215 with emphasis on organic and instrumental techniques. Prerequisite: CHM 215. (Spring)

219. Computers in Chemistry. An introductory course on the use of computers in the laboratory sciences, with special emphasis on data collection and reduction. Includes an introduction to BASIC and FORTRAN and to mini-computer assembly language and systems. No previous computer experience or math sophistication is required. (Fall)

222. Experimental Physical Chemistry Laboratory. Physical methods for chemical problems. Prerequisites: CHM 251 and registration in CHM 252; knowledge of FORTRAN computer programming. (Spring)

251. Physical Chemistry I. Introduction to quantum mechanics and kinetic theory of gases. Problem oriented. Prerequisites: PHY 121–123 or 113–114, MTH 163. (Fall)

252. Physical Chemistry II. Thermodynamics and chemical equilibria. Prerequisites: PHY 121–123 or 113–114, MTH 163. (Spring)

***391. Independent Study.** Individual study of advanced topics arranged by students. Prerequisite: registration in or credit for CHM 211. (Fall and Spring)

***393. Senior Thesis Research.** Independent research directed by faculty member. To be arranged during semester preceding registration. CHM 222, 216, expected. Written report required. (Fall and Spring)

****402. Biophysical Chemistry I.** Introduction to the theory and application of NMR, ESR, fluorescence, and UV-visible spectroscopic techniques as used in biochemical problems. (Spring-odd years)

****404. Biophysical Chemistry II.** This course explores how fundamental interactions determine the structure, dynamics, and reactivity of proteins and nucleic acids. Examples are taken from the current literature with emphasis on thermodynamic, kinetic, theoretical, and site-directed mutagenesis studies. Prerequisite: CHM 252 or its equivalent. (Spring-even years)

411. Advanced Inorganic Chemistry I. Bonding of inorganic complexes, mainly ligand field theory; applications of group theory; kinetics and mechanisms of inorganic reactions. (Fall)

****412. Advanced Inorganic Chemistry II.** Electronic structures of inorganic compounds, especially metal complexes; applications of group theory; spectroscopic and physical methods, including X-ray crystallography. Prerequisite: CHM 211 or 411. (Spring)

****414. Advanced Inorganic Chemistry III.** Inorganic reactions and mechanisms; electron transfer chemistry; catalytic reactions; photochemistry. Prerequisite: CHM 411 or 211 with permission of the instructor. (Fall)

421. Introduction to Polymer Chemistry. Introduction to the chemistry of macromolecules. The course focuses on the general synthetic schemes for preparing polymers, their characterization,

and general aspects of structure/property relations in polymers. Prerequisites: Organic Chemistry and Physical Chemistry or equivalent.

****423. Physical Chemistry and Structural Characterization of Polymers.**

Various aspects of the physical chemistry of macromolecules are described in the context of the direct experimental observation of these properties. Particular emphasis is given to the interpretation of characterization data from both solution and bulk measurements on polymers, as well as comparison to theoretical predictions. Prerequisite: CHM 421 or equivalent or consent of instructor.

****424. Synthetic Polymer Chemistry.**

The fundamentals of synthesizing high polymers from monomers is the major focus of this course. Advances and new concepts in polymer synthesis are covered. Industrially important polymers are considered in terms of polymer design synthesis and properties. Prerequisite: CHM 421 or equivalent or consent of instructor.

***433. Advanced Physical Organic Chemistry I.** Quantum chemistry and bonding. Woodward-Hoffman rules, spectroscopic techniques, and photo-physical processes. (Fall)

***434. Advanced Physical Organic Chemistry II.** Structure and reactivity; kinetics, catalysis, medium effects, transition state theory, kinetic isotope effects, reactive intermediates, and mechanisms. (Spring)

***435. Organic Reactions.** A survey of reactions of organic substances with emphasis on those with practical synthetic utility including discussion of mechanism, scope and limitations, and stereochemical issues. (Fall)

***436. Advanced Structure Determination.** Strategies and tactics including methods of retrosynthetic analysis for the synthesis of complex organic molecules. Topics are discussed in the context of case studies from the recent chemical literature with digression to cover new chemical reactions as appropriate. (Spring)

***451. Quantum Chemistry I.** Introduction to quantum chemistry covering quantum mechanical principles, simple

*Taken with consent of the instructor.

**Offered in alternate years.

COGNITIVE SCIENCE

systems, atoms, molecules, and spectroscopy. Required of all graduate students in physical chemistry. (Fall)

***452. Quantum Chemistry II.** Continuation of CHM 451. Heisenberg representation, advanced theories of electronic structures, angular momentum, perturbation theory, scattering theory, and semiclassical techniques are covered. Prerequisite: CHM 451. (Spring)

455. Thermodynamics and Statistical Mechanics. Introductory statistical mechanics, thermodynamics, and chemical kinetics. (Fall)

****458. Molecular Spectroscopy and Structure.** Rotational, vibrational, and electronic spectroscopy of diatomic and polyatomic molecules. Symmetry and group theory. Nonlinear laser spectroscopy and magnetic resonance. Prerequisites: CHM 451 or CHM 251 and 222 or permission of instructor.

****460. Elementary Chemical Kinetics.** An introduction to the microscopic approach to chemical reactions, including rate laws and elementary reactions, potential energy surfaces and molecular collision dynamics, photodissociation, and energy transfer. Prerequisite: CHM 451. (Spring)

***461. Advanced Experimental and Computation Laboratory.** A lecture and laboratory designed to prepare students for graduate research in experimental physical chemistry. Extensive computer programming is required to analyze and interpret experimental data. Prerequisites: CHM 251 and computer programming. (Spring)

***466. Nuclear Chemistry I.** Radioactivity; nuclear masses and thermodynamics; nuclear models and theory of reactions, fission, decay, and interaction of nuclear radiations with matter. (Fall)

Cognitive science is an interdepartmental concentration leading to a bachelor's degree. The concentration program is supervised by the Cognitive Science Curriculum Committee.

CURRICULUM COMMITTEE

F. Jeffrey Pelletier, Ph.D. (California, Los Angeles) *Professor of Philosophy and Computer Science; Luce Professor of Cognitive Science; Director of the Cognitive Science Cluster*

Gregory Carlson, Ph.D. (Massachusetts) *Professor of Linguistics*

Michael Tanenhaus, Ph.D. (Columbia) *Professor of Psychology*

David Braun, Ph.D. (California, Los Angeles) *Assistant Professor of Philosophy*

Mark Fulk, Ph.D. (SUNY, Buffalo) *Assistant Professor of Computer Science; Chair of the Committee*

GENERAL INFORMATION

Cognitive science is an interdisciplinary field combining work done in cognitive psychology, artificial intelligence and computer science, and some aspects of linguistics and philosophy. It also has strong links to education and the neurological sciences. What ties these seemingly diverse disciplines together is their common goal of achieving an understanding of how people and animals perform various cognitive activities such as thinking, learning, using language, etc., and a common perception that computational ideas of some kind can help us make progress toward this goal. Each discipline can contribute to our understanding of these activities through its own perspective and with its own research techniques and methods. By formulating a sound interdisciplinary program in which one studies the relevant aspects of all these disciplines, students will be able to acquire a broad and firm understanding of cognitive science.

Depending upon the details of their concentration, students of cognitive science are well prepared to do graduate work in many of the traditional disci-

plines associated with the program as well as in graduate programs in cognitive science itself. Those not wishing to go on to do graduate work will have many of the same opportunities open to them as do students who major in the traditional disciplines. The opportunities open will, of course, depend partly upon the focus of one's program. All students in the program will benefit from the broad interdisciplinary study of cognitive science.

The faculty members interested in the Cognitive Science Program include members of the Departments of Computer Science, Foreign Languages, Literatures, and Linguistics, Psychology, Philosophy, and Physiology, the Center for the Sciences of Language, the Center for Visual Science, the Graduate School of Education and Human Development, and the Center for Brain Research.

Students who wish to concentrate in cognitive science should pick up a concentration proposal form in the College Center for Interdisciplinary Studies, which is located in Lattimore 206. Members of the Cognitive Science Curriculum Committee serve as faculty advisors for the program and are available to help students plan their concentrations.

The bachelor's degree with honors is awarded according to three criteria: (1) successful completion of 12 credits of honors coursework (a 391 honors research course in a participating department, COG 393, Senior Project, and an advanced-level course or seminar chosen from a list of 10 offerings); (2) completion of a senior thesis; and (3) an oral defense of the thesis. Detailed information about the requirements is available in the College Center for Interdisciplinary Studies in Lattimore 206.

The bachelor's degree with distinction is awarded to students with a sufficiently high concentration grade-point average: 3.25 for distinction, 3.50 for high distinction, and 3.75 for highest distinction.

It is possible for students to earn the degree with both distinction and honors.

*Taken with consent of the instructor.

**Offered in alternate years.

REQUIREMENTS FOR A CONCENTRATION IN COGNITIVE SCIENCE

For the concentration in cognitive science a minimum of 11 courses is required, including the following seven core courses and one track sequence.

Core Courses

- COG 101. Introduction to Cognitive Science
- COG 102/LIN 201. Introduction to Linguistics
- COG/PSY 141. Biopsychology (Prerequisite: PSY 101)
or
- PSY 151. Sensation and Perception (Prerequisite: PSY 101)
or
- PSY 241. Neurobiology of Behavior (Prerequisite: NSC 201 or permission from the instructor)
- COG/PHL 210. Logic
- COG/CSC 240. Introduction to Artificial Intelligence (Prerequisite: EE 171 or CSC 181)
- COG/PHL 254. Philosophy of Psychology
- COG 271. Seminar in the Philosophy of Cognitive Science

A track consists of a coherent group of at least four courses which focus in more depth on some particular facet of cognitive studies. Tracks may be designed individually to reflect a student's particular interests. Students are strongly encouraged to discuss the formation of their track with a member of the faculty in cognitive science. Tracks must be ultimately approved by the Cognitive Science Curriculum Committee.

A track may be organized as an in-depth introduction to a particular discipline (for example, a neuroscience track consisting of NSC 201, 202, 203, and 391, with chemistry and biology prerequisites) or a multidisciplinary approach to a particular topic (for example, a "vision" track consisting of PSY 151, 255, 353, and CSC 391, with math prerequisites),

or a particular topic within a particular discipline (for example, an "epistemology" track within philosophy consisting of PHL 217, 243, 391, and 252).

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

101. Introduction to Cognitive Science.

This course introduces students to the goals and methods of cognitive science. (Spring)

102. Introduction to Linguistics. Principles of structural analysis of speech phenomena. Examination of material from a wide variety of languages. (Fall and Spring)

141. Biopsychology. A survey of biological insights and implications for our understanding of human behavior. (Spring)

210. Logic. Precise methods for formalizing arguments, demonstrating their validity, and proving theorems in first-order symbolic logic. (Fall)

240. Introduction to Artificial Intelligence. Survey of concepts and problems in artificial intelligence research. Information processing models. Case studies of computer programs, basic principles, applications. Introduction to the LISP programming language. (Spring)

254. Philosophy of Psychology. A study of philosophical topics relating to psychology. What is a mind and can it be studied scientifically? Behaviorism. Justifying psychological theories. Freedom and determinism. The ethics of psychological research. (Spring)

271. Seminar in the Philosophy of Cognitive Science. Topics include discussions of current research topics and papers from the literature. (Spring)

COMPUTER SCIENCES

There are several ways for undergraduates to major in computer sciences. Most students will probably find one of the options under 1 will satisfy their interests in computer science. However, there are several programs addressing more specialized interests indicated in 2 through 5, and the University aims to have programs flexible enough to satisfy a broad range of interests in computer science.

1. Two degrees in computer sciences are offered through the Department of Mathematics—a B.A. in computer sciences: mathematics, and a B.S. in computer sciences: applied mathematics. Requirements for these degrees are listed on page 118.

2. The 3-2 program offered by the Department of Computer Science allows a student to earn a bachelor's degree in an undergraduate major and a master's degree in computer science in five years instead of the usual six.

3. A student may plan a specialization in computer science within the Cognitive Science Program (see page 67). This program offers a multidisciplinary approach to topics such as human knowledge, belief, reason, thinking, perception, inference, and learning. Additional information is available from the Center for Special Degree Programs.

4. Computer science may be used as an option in the Integrated Sciences Program (see page 112). CSC 181 or EE 171 are considered introductory courses, and all 200-level courses are considered advanced courses.

5. A student may set up an individualized major in the Interdepartmental Degree Program (see page 113). This option requires the approval of the Committee on Interdepartmental Individualized Concentrations.

In addition, computer engineering may be studied through the College of Engineering and Applied Science in the Department of Electrical Engineering or in that college's interdepartmental program (see pages 171 and 186).

The William E. Simon Graduate School of Business Administration offers an opportunity to earn the M.B.A. degree in a 3-2 program with a concentration in computers and information systems (see pages 201-202).

Advanced undergraduates have unusual opportunities to work directly with faculty members in the Department of Computer Science on academically challenging research projects, in which particular emphasis is currently placed on the areas of artificial intelligence, distributed computing, programming languages, and the theory of computation.

A student interested in partial training in computer science in support of a degree program in another discipline should consider a core sequence of courses such as CSC 181, 220 and MTH/CSC 286 and 288.

The programming courses offered by the Department of Computer Science use Apple Macintoshes and IBM PCs, and the University's VAX and Pyramid computers. Programming is done both in batch and interactive environments, using such programming languages as Pascal, LISP, PROLOG, and Modula-2. Undergraduates taking advanced Computer Science courses may also be given permission to use other computers on campus, including the Department's extensive collection of VAX, SUN, Symbolics, Texas Instruments, Xerox, and other computers.

DEPARTMENT OF COMPUTER SCIENCE

- James F. Allen, Ph.D. (Toronto)
Professor of Computer Science
- Bruce W. Arden, Ph.D. (Michigan)
Professor of Electrical Engineering and of Computer Science
- Dana H. Ballard, Ph.D. (California, Irvine)
Professor of Computer Science
- Christopher M. Brown, Ph.D. (Chicago)
Professor of Computer Science
- Henry E. Kyburg, Jr., Ph.D. (Columbia)
Burbank Professor of Moral and Intellectual Philosophy and Professor of Computer Science



- F. Jeffrey Pelletier, Ph.D. (California, Los Angeles)
Professor of Philosophy, Luce Professor of Cognitive Science, and Professor of Computer Science
- Lenhart K. Schubert, Ph.D. (Toronto)
Professor of Computer Science
- Thomas J. LeBlanc, Ph.D. (Wisconsin)
Associate Professor of Computer Science and Chair of the Department
- Joel I. Seiferas, Ph.D. (M.I.T.)
Associate Professor of Computer Science
- Paul E. Dietz, Ph.D. (Cornell)
Assistant Professor of Computer Science
- Robert J. Fowler, Ph.D. (Washington)
Assistant Professor of Computer Science
- Mark A. Fulk, Ph.D. (Buffalo)
Assistant Professor of Computer Science
- Lane A. Hemachandra, Ph.D. (Cornell)
Assistant Professor of Computer Science
- Danny D. Krizanc, Ph.D. (Harvard)
Assistant Professor of Computer Science
- Randal C. Nelson, Ph.D. (Maryland)
Assistant Professor of Computer Science
- Michael L. Scott, Ph.D. (Wisconsin)
Assistant Professor of Computer Science

The Department uses 10 to 15 teaching assistants as graders or recitation section leaders.

The Department of Computer Science offers an intense research-oriented program leading to the master of science and doctor of philosophy degrees, and a 3-2 program for undergraduates leading to the bachelor's and master's degrees. For further information regarding computer science programs for undergraduates, see above.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

108. Applying Computers with and without Programming. A practical introduction to structured problem solving on personal computers intended for students in the social sciences and business. Solution techniques using a general-purpose programming language are compared with alternative techniques

using application packages, including statistical packages, database systems, and spreadsheets, as well as graphical and programmable user interfaces. Examples and exercises emphasize applications. No prerequisites. (CSC 108 and CSC 110 cannot both be taken for credit.)

181. Introduction to Computer Science. Algorithmic formulation and solution of problems. Programming in high-level language. Introduction to computer science concepts. CSC 181 or EE 171 required for further computer science courses. Knowledge of Pascal assumed. (Fall and Spring)

216. Mathematical Logic I. Propositional calculus, functional calculus of first and higher order, the decision problem, consistency, completeness. Same as MTH 216. (Fall)

217. Uncertain Inference. The exploration of various measures of uncertainty proposed in both philosophy and computer science. Prerequisite: PHL 210 or equivalent. Same as PHL 217. (Spring)

220. Data Structures. Linked lists, trees, stacks, queues, hash-coding. Sorting, searching, construction of scanners, and symbol tables. Prerequisites: EE 171 or CSC 181 and MTH 200 or equivalent. (Spring)

233. Number Theory and Cryptology. Divisibility, primes, congruences, pseudo-primes. Classical, public-key, and knapsack ciphers. Other topics in number theory and applications to computer sciences as time permits. Same as MTH 233. (Spring)

238. Combinatorial Mathematics. Permutations and combinations; enumeration through recursions and generating functions; Polya's theory of counting; finite geometries and block designs; counting in graphs. Same as MTH 238. (Spring)

240. Introduction to Artificial Intelligence. Introduction to the concepts, problems, and techniques of artificial intelligence, including programming in an AI-language. Prerequisite: EE 171 or CSC 181. (Spring)

247. Natural Language Processing. Introduction to techniques for building computer programs that process and understand natural languages such as English. Prerequisites: CSC 240, PHL 210, LIN 201. (Spring)

248. Theory of Graphs. Paths, circuits, trees. Bipartite graphs, matching problems. Unicursal graphs. Hamiltonian circuits, factors. Independent paths and sets. Matrix representations. Planar graphs. Coloring problems. MTH 235 recommended. Same as MTH 248. (Offered alternately with MTH 238.) (Spring)

252. Programming Systems. Introduction to the design and implementation of programming languages, with an emphasis on imperative languages. Virtual machines and computer organization. Fundamental language concepts: names, values, types, abstraction, control flow, referencing environments. Parallel programming models: processes, synchronization, message passing. Compilation and interpretation: parsing, semantic analysis, code generation, optimization. Course projects include the implementation of a small compiler. Prerequisite: CSC 220. (Fall)

256. Computer Systems. Introduction to computer architecture and operating systems, including parallel systems. Processor and memory organization, address translation, caching. Implementation of processes, scheduling, and synchronization. Memory management. Device management and file systems. Protection and authorization. Distributed programming: fault tolerance, availability, network management. Multiprocessor architectures, cache coherence, scalability. Course projects include the implementation of a small operating system. Prerequisite: CSC 252. (Spring)

280. Introduction to Numerical Analysis. The numerical solution to mathematical problems by computer. Linear systems, approximation, integration, and differential equations. Floating point arithmetic and consequent pitfalls of computation. Prerequisites: CSC 220 and MTH 162. Same as MTH 286. (Alternate years with CSC 288.) (Spring)

286. Introduction to the Theory of Computation. Introduction to automata theory, formal languages, computability, and computational complexity. Prerequisites: CSC 220 and MTH 162. Same as MTH 286. (Alternate years with CSC 288.) (Spring)

288. Introduction to Design and Analysis of Computer Algorithms. Introduction to general data structures and programming techniques for the design of time- and space-efficient algorithms. Prerequisites: CSC 220 and MTH 162. Same as MTH 288. (Alternate years with CSC 286.) (Spring)

309. Topics in Computer Science. Special topics for advanced undergraduates in such areas as programming languages, artificial intelligence, and the theory of computation. Prerequisite: permission of the instructor. (Fall and Spring)

391. Independent Study in Computer Science. Special work arranged individually. Consent of the Department required. (Fall and Spring)

458. Advanced Systems. Advanced material in computer architecture, programming languages, and operating systems, with an emphasis on parallel systems. Syllabus may vary with instructor; typical topics include debugging and performance analysis, locality management, parallel languages, parallelizing compilers, real-time and fault-tolerant systems, scalability, and scheduling. Prerequisite: CSC 256/456. (Fall)

ECONOMICS

Thomas Cooley, Ph.D. (Pennsylvania)
*Professor of Economics and Applied
 Statistics in the William E. Simon
 Graduate School of Business Admin-
 istration and of Economics*

Stanley Engerman, Ph.D. (Johns
 Hopkins) *John Munro Professor of
 Economics and Professor of History*

Robert R. France, Ph.D. (Princeton)
Professor of Economics

Eric A. Hanushek, Ph.D. (M.I.T.)
*Professor of Economics and of Political
 Science*

Ronald Winthrop Jones, Ph.D. (M.I.T.)
Xerox Professor of Economics

*Robert G. King, Ph.D. (Brown)
Professor of Economics

Walter Y. Oi, Ph.D. (Chicago) *Elmer
 B. Milliman Professor of Economics*

Adrian Pagan, Ph.D. (Australia National
 University) *Wilson Professor of
 Economics*

Charles E. Phelps, Ph.D. (Chicago)
*Professor of Political Science and of
 Economics and Chair of Community
 and Preventive Medicine*

Charles Plosser, Ph.D. (Chicago) *Fred
 H. Gowen Professor of Economics and
 Finance in the William E. Simon
 Graduate School of Business Admin-
 istration and Professor of Economics*

Alan Stockman, Ph.D. (Chicago)
*Professor of Economics and Director
 of Undergraduate Studies*

William L. Thomson, Ph.D. (Stanford)
*Professor of Economics and Director
 of Graduate Studies*

Jeffrey Banks, Ph.D. (Cal Tech)
*Associate Professor of Political Science
 and of Economics*

Marcus Berliant, Ph.D. (California,
 Berkeley) *Associate Professor of
 Economics*

*Marianne Baxter, Ph.D. (Chicago)
Assistant Professor of Economics

John Boyd, Ph.D. (Indiana)
Assistant Professor of Economics

Bruce Hansen, Ph.D. (Yale)
Assistant Professor of Economics

Hanan Jacoby, Ph.D. (Chicago)
Assistant Professor of Economics

James A. Kahn, Ph.D. (M.I.T.)
Assistant Professor of Economics

*Siu Fai Leung, Ph.D. (Chicago)
Assistant Professor of Economics

*Kenneth McLaughlin, Ph.D. (Chicago)
Assistant Professor of Economics

*Masao Ogaki, Ph.D. (Chicago)
Assistant Professor of Economics

*Changyong Rhee, Ph.D. (Harvard)
Assistant Professor of Economics

*Rangarajan K. Sundaram, Ph.D.
 (Cornell) *Assistant Professor of
 Economics*

Michael Wolkoff, Ph.D. (Michigan)
*Lecturer in Economics and in Public
 Policy and Deputy Chair of the
 Department of Economics*

Lionel Wilfred McKenzie, Ph.D.
 (Princeton) *Wilson Professor
 Emeritus of Economics*

W. Allen Wallis, A.B. (Minnesota)
*Professor Emeritus of Economics and
 Statistics*

*Teaching assistants supervise recitation
 and homework sections of ECO 108,
 207, 208, 209, and 231. Approximately
 one course per semester is taught by an
 advanced part-time graduate instructor.*

The Department of Economics offers
 a program of study leading to the B.A.
 degree and, at the graduate level, to the
 M.A. and Ph.D. degrees. The Depart-
 ment also offers minors in economic
 theory and in applied economics. The
 Department also offers undergraduates
 the opportunity to earn citations of
 achievement in six different subfields.

The undergraduate program emphasizes
 the understanding of modern tools of
 economic analysis and their application
 to contemporary policy issues. Those
 completing an appropriate program
 should be adequately prepared for grad-
 uate work in economics and other
 professional schools. A more detailed
 description of the program of the
 Department of Economics is available
 from the Department office.

A substantial number of economics
 majors will earn a Certificate in Manage-
 ment Studies (see page 115). In addition,
 some students complete their concen-
 tration requirements by the end of the
 junior year and apply to 3-2 programs
 in Public Policy Analysis (see page 149)
 or in the William E. Simon Graduate
 School of Business Administration (see
 page 201). If accepted, they begin grad-
 uate work in their senior year and obtain
 an M.S. or M.B.A. degree at the end of
 their fifth year.

REQUIREMENTS FOR CONCENTRATION IN ECONOMICS

- One semester of calculus (MTH 141,
 150, 161, or 171). Additional calculus
 (through 143, 152, 162, 172, or be-
 yond) is recommended.
- One semester of probability and
 statistics; STT 165 (or 201) is recom-
 mended. STT 211, 212, or MTH 152,
 while accepted, is weaker preparation
 for ECO 231.
- ECO 108 (must not be taken after any
 200-level economics course; 200-level
 economics course can be substituted).
- ECO 207, 209, and 231 (all completed
 by end of junior year).
- Four additional economics courses
 (200 level or above, except 394; five if
 ECO 108 is not taken).
- A "C" average in the above economics
 courses.
- Two courses beyond the introductory
 level in an allied field, subject to ap-
 proval by the faculty advisor.
- Graduation with high or highest dis-
 tinction requires enrollment in the
 Senior Seminar or an independent
 study course in economics resulting
 in a research paper as well as distin-
 guished performance in other eco-
 nomics courses.

Further information about the require-
 ments for the concentration is available
 from the Department office.

*These faculty have applied for one or two semesters of
 leave in 1991-92.

CITATIONS OF ACHIEVEMENT

Students who concentrate in economics can also earn citations of achievement in any one of six fields. The Department offers citations of achievement in: macroeconomics, finance, applied microeconomics, mathematical economics, managerial economics, and economic theory and applications. More information is available from the Department office.

REQUIREMENTS FOR A MINOR IN ECONOMICS

ECONOMIC THEORY

- ECO 207
- ECO 209
- Two of the following 200-level economics courses: 208, 231, 256, 274, 282, or 288
- One statistics course: STT 165, 201, 211, or 212

APPLIED ECONOMICS

- ECO 207
- ECO 209
- Three additional 200-level economics courses
- One statistics course: STT 165, 201, 211, or 212

SCHEDULING

ECO 108, 207, 209, and 231 are offered in fall, spring, and summer. ECO 208, 211, 216, 217, 223, 229, 234, 238, 251, 263, 269, 270, and 389 are generally offered once or twice each year. The remaining courses are generally offered every other year.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

108. Principles of Economics. The fundamentals of microeconomic and macroeconomic theory, with applications; preparation for subsequent economics courses. (Fall and Spring)

181. Inflation, Unemployment, and Macroeconomic Policy. Discussion and analysis of contemporary economic problems and policies for non-economics majors. No prerequisites. (Fall)

207. Intermediate Microeconomics. Economic equilibrium under competition and monopoly; the distribution of wages, rent, interest, and profits. (Fall and Spring)

208. Topics in Microeconomic Theory. The major topics covered include general equilibrium analysis, problems of intertemporal allocation of resources, the economics of uncertainty, and other topics as time permits. Prerequisites: calculus and ECO 207. (Fall)

209. Intermediate Macroeconomics. National income accounting concepts; their changes and fluctuations as explained by theories of income determination. Prerequisite: ECO 207. (Fall and Spring)

211. Money, Credit, and Banking. The institutions which generate the money supply. The influence of monetary and fiscal policy on economic stability and growth. Prerequisites: ECO 207 and 209. (Fall and Spring)

216. Financial Markets: Concepts and Institutions. An introductory analysis of risks and returns on specific securities and of economic and regulatory forces shaping contemporary financial markets. Prerequisite: ECO 207. (Fall and Spring)

217. Financial Markets: Theories and Evidence. Economic analysis of security price dynamics in an efficient asset market and of optimal portfolio selection and its implications for asset pricing. Prerequisite: ECO 216. (Spring)

221. Macro Models of Labor. Models of the aggregate labor market, particularly the empirical and theoretical aspects of unemployment. Policy questions related to dealing with the labor market such as unemployment compensation are also studied. Prerequisites: ECO 207 and 209. (Spring)

222. Income Distribution. Examines U.S. income distribution and modern economic and statistical theories which attempt to explain it. Areas covered in-

clude education, poverty, economic mobility, and discrimination. Prerequisites: ECO 207 and 231. (Spring)

223. Labor Markets. Human resources; the determination of wages, employment, hours, and labor force participation; the effects of trade unions and government. Prerequisite: ECO 207. (Fall)

224. Economics of Sports and Entertainment. The markets for professional and amateur sports and entertainment are analyzed. Impacts of market organization and public policy on attendance, salaries, and profits are examined.

227. American Economic Growth. American economic history from the colonial period to the 1980s including discussions of growth in the colonial economy, slavery in the American south, the rise of "big business," causes of the depression in the 1930s, and the economic conditions of the period after World War II.

228. Economics of Afro-American Slavery. The profitability and economic viability of the slave system and the effect of slavery on distribution of income as well as on the level and rate of growth of Southern per capita income are examined.

229. Monetary Theory. Factors governing the demand and supply of money, the relationships between money and levels of prices, employment and interest rates. Prerequisite: ECO 209. (Fall)

231. Econometrics. Regression analysis applied to time series and cross-section data, simultaneous equations; analysis of variance. Prerequisite: STT 165, 201, 211, or 212. (Fall and Spring)

234. Regulation of Economic Activity. Analysis of the impact of government regulation in transportation, safety, and health on economic welfare and efficiency. Same as PPA 434. Prerequisite: ECO 207. (Spring)

236. Economics of Health. Analysis of factors that affect supply and demand in the market for medical care: risk, insurance, externalities, ethics, regulation. Same as PPA 436. Prerequisite: ECO 207. (Spring)

- 237. Economics of Education.** Costs and returns to investment in education; public policy decisions about education; educational finance. Same as PPA 447. Prerequisite: ECO 207. (Spring)
- 238. Economics of Energy.** Deals with theories of exhaustible resources, regulatory policy, and industrial organization as related to energy markets, particularly oil and natural gas. Same as PPA 438. (Fall)
- 248. Risk and Insurance.** Applies theories of risk and insurance to issues of public policy. Same as PPA 448. Prerequisites: ECO 207 and calculus. (Spring)
- 251. Industrial Organization—Theory and Evidence.** An examination of the market structure, conduct, and performance of contemporary American industry. Assessment of industry concentration, market control, and associated pricing and innovative behavior is emphasized. Same as PPA 451. Prerequisite: ECO 207. (Fall)
- 253. Economics and Social Conditions of African Americans.** Economic development of African Americans during the twentieth century. Same as AAS 253. Prerequisite: ECO 207.
- 256. Game Theory.** A formal introduction to game theory and its applications to economics and political science. Prerequisite: ECO 207. (Fall)
- 261. State and Local Public Finances.** Examination of local taxation, provision of services, and intergovernmental fiscal relations. Same as PPA 461. Prerequisite: ECO 207. (Spring)
- 263. Public Finance and Fiscal Policy.** Government tax and expenditure policies and their effect on resource allocation and income distribution. Same as PPA 463. Prerequisite: ECO 207. (Fall)
- 264. Urban Economics: Prospects for Metropolitan America.** Examines conditions of urban America with emphasis on issues that are of particular importance to policy makers. Same as AAS 264 and PPA 464. Prerequisite: ECO 207.
- 265. Law and Economics.** Economic analysis of property rights, contracts, torts and civil procedure, crimes and criminal procedure, government regulation and controls, and alternative legal rules and systems. Prerequisite: ECO 207. (Spring)
- 269. International Economics.** Trade patterns and comparative advantage; commercial policy and the distribution of gains from trade; balance of payments problems. Prerequisite: ECO 207. (Fall)
- 270. International Finance.** The economics and institutions of flexible and fixed exchange rates, international money markets and Eurocurrencies, international debt and direct investment, and the balance of payments. Prerequisite: ECO 207 and 209. (Spring)
- 272. Theories of International Relations.** A survey of approaches to theory building in international relations, with some emphasis on attempts to explain war and its causes. Same as PSC 272. (Fall)
- 274. Mathematical Economics.** Economic issues in consumer and producer theory treated in a formal, mathematical manner. Prerequisite: calculus and ECO 207. (Fall)
- 282. Political Economy of Governmental Behavior.** An introduction to some recent developments in explaining and evaluating government behavior. Same as PSC 282. (Fall)
- 288. Topics in Game Theory and Social Choice.** Topics in the economics and politics of public choice. Same as PSC 288 and PSC 488. (Spring)
- 302. American Maincurrents: Politics and Economics through Reconstruction.** Overview of U.S. national development from Colonial times to Reconstruction. Economy and politics in relation to culture and thought. Same as PSC 302. (Spring)
- 371. Evolution of the World Economic Order Since the Sixteenth Century.** This course deals with the economic relations between the developed and less developed parts of the world since the sixteenth century. Attention is given to the impact of slavery and the slave trade upon Africa, Europe, and the Americas, and to the role of overseas trade in European and American development and its impact on the rest of the world. Same as HIS 371/471 and AAS 371. (Spring)
- 385. The Atlantic Slave Trade and Africa, 1650–1850.** The main thrust of the course shows the extent to which the Atlantic slave trade retarded the development of capitalism in Africa between 1650 and 1850, and so creating the conditions for the imposition of European colonial domination on the continent from the late nineteenth century. Same as HIS 385/AAS 375. (Fall)
- 389. Senior Seminar.** Supervised research on an economic problem or policy issue, culminating in papers that serve as a basis for seminars. Taken in senior year or with permission of instructor. (Spring)
- 390. Supervised Teaching of Economics.** Responsibility for one recitation section, under the instructor's supervision. Departmental approval required.
- 391. Independent Study.** By arrangement with the Department to permit work beyond regular course offerings.
- 394. Internship.** Not for concentration credit.
- 433. Public Policy Modeling.** Considers the application of microeconomic theory and organizational analysis to public policy problems. Conceptual ideas are illustrated in a variety of diverse areas such as environmental quality, welfare reform, health insurance, and educational finance. Same as PPA 433. (Spring)
- 471. Modern Value Theory I.** A rigorous treatment of microeconomics including the theory of the firm, consumer behavior, and market structure. (Fall)
- 472. Modern Value Theory II.** Introduction to general equilibrium analysis, including modern treatment of existence, stability, and comparative statics properties; elements of capital theory.
- 475. Macroeconomics I.** A theoretical overview of aggregate economic analysis, focusing on the neoclassical and Keynesian models. The effects of government monetary, expenditure, and tax policies on real activity and the level of prices are developed within these alternative analytical frameworks. (Fall)

ENGLISH

476. Macroeconomics II. Further topics in aggregate economic analysis, including the relationship of economic growth to government debt and monetary policies; the welfare cost of inflation; money demand and supply; and monetary theories of business fluctuations.

480. Mathematical Statistics. Introductory treatment of the elements of probability theory (combinatorics, probability spaces, distribution functions, characteristic functions); theory of point estimation (maximum likelihood, method of moments, robust estimation, non-parametric estimation); statistical hypothesis testing (statistical decision theory, parametric inference, non-parametric inference).

481. Mathematical Economics I. Introduction to mathematical techniques in economics. These include basic analysis and linear algebra, difference and differential equations, and convex optimization using the Kahn-Tucker theorem. Applications to the theory of the consumer and the firm are discussed.

483. Introduction to Mathematical Statistics. Credit—2 hours. Elements of probability theory and statistics as employed in the econometrics sequence ECO 484–485. (Fall)

484. Regression Analysis for Econometrics. Credit—2 hours. Estimation and hypothesis testing in the standard linear model. Linear restrictions; dummy variables; multicollinearity; weighted least squares; specification error. Prerequisite: ECO 483 or departmental permission. Same as APS 514. (Fall)

485. Elements of Econometrics. Credit—3 hours. Extensions of the general linear model to handle serial correlation, heteroskedasticity, simultaneity, maximum likelihood estimation and testing. Diagnostic checking of estimated models. Problems in the analysis of individual unit data—qualitative dependent variables and sample self-selectivity. Prerequisite: ECO 231. Same as APS 515. (Spring)

Daniel Albright, Ph.D. (Yale)
Professor of English

*Paula Backscheider, Ph.D. (Purdue)
Professor of English

David Bleich, Ph.D. (New York University)
Professor of Education and of English

Morris Eaves, Ph.D. (Tulane)
Professor of English and Chair of the Department

Cyrus Hoy, Ph.D. (Virginia)
John B. Trevor Professor of English

Bruce Johnson, Ph.D. (Northwestern)
Professor of English

James William Johnson, Ph.D. (Vanderbilt)
Professor of English

Russell A. Peck, Ph.D. (Indiana)
Professor of English

Jarold W. Ramsey, Ph.D. (Washington)
Professor of English

Frank Shuffelton, Ph.D. (Stanford)
Professor of English

Thomas Gavin, M.A. (Toledo)
Associate Professor of English

George Grella, Ph.D. (Kansas)
Associate Professor of English

*Kenneth R. Gross, Ph.D. (Yale)
Associate Professor of English

*Thomas G. Hahn, Ph.D. (California, Los Angeles)
Associate Professor of English

*Bette London, Ph.D. (California, Berkeley)
Associate Professor of English

James Longenbach, Ph.D. (Princeton)
Associate Professor of English and Director of Graduate Studies

Russ McDonald, Ph.D. (Pennsylvania)
Associate Professor of English

John Michael, Ph.D. (Johns Hopkins)
Associate Professor of English and Director of Undergraduate Studies

Constance Penley, Ph.D. (California, Berkeley)
Associate Professor of English

David R. Sewell, Ph.D. (California, San Diego)
Associate Professor of English

Lisa Cartwright, Ph.D. (Yale)
Assistant Professor of English

Sarah Higley, Ph.D. (California, Berkeley)
Assistant Professor of English

Barbara Jordan, M.A. (Boston)
Assistant Professor of English

*Rosemary Kegl, Ph.D. (Cornell)
Assistant Professor of English

Joyce Middleton, Ph.D. (Maryland)
Assistant Professor of English

Joanna Scott, M.A. (Brown)
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Joseph H. Gilmore Professor Emeritus of English

Richard Gollin, Ph.D. (Minnesota)
Professor Emeritus of English and Senior Faculty Associate

McCrea Hazlett, Ph.D. (Chicago)
Professor Emeritus of English

Howard C. Horsford, Ph.D. (Princeton)
Professor Emeritus of English

Kathrine Koller, Ph.D. (Johns Hopkins)
Joseph H. Gilmore Professor Emeritus of English

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Part-time instructors and part-time assistant lecturers are not included in the above list.

The Department of English offers work leading to a concentration for the B.A. degree and, at the graduate level, to the M.A. and Ph.D. degrees. The Department also offers undergraduate minors in writing (creative writing, journalism, or English composition) in English literature, and in theater.

The program of concentration in English is designed to give students knowledge of English and American literary works in their historical and cultural contexts, and to develop writing skills, as well as critical abilities for reading in a variety of periods, genres, and methodologies.

*These faculty have applied for one or two semesters of leave in 1991–92.

A student preparing to concentrate in English should get in touch with the Department's Director of Undergraduate Study, usually early in the second semester of the sophomore year. All majors are urged to consult their advisors regularly to maintain a coherent program which benefits their particular interests.

The English Honors Program is open to English majors by invitation (usually in the first semester of the junior year); students who successfully complete the Program's three-semester course of independent, intensive study (including the writing of an Honors essay) will receive a degree with Honors in English.

GENERAL COURSE INFORMATION

Students wishing to take any English course numbered 200 or higher are to have satisfied the College freshman writing requirement and to have taken at least one additional course in literature. Courses numbered between 111-117 and 171-179 may be taken as electives, but do not ordinarily count toward satisfaction of either College or departmental concentration requirements.

Courses numbered 200-390 are customarily open to sophomores, juniors, seniors, and qualified freshmen; approval of the instructor may be required for enrollment in some courses.

REQUIREMENTS FOR CONCENTRATION IN ENGLISH

A minimum of 12 courses is required, 10 in English and two in an allied field. Seven of the 10 must be in English courses at the 200 or 300 level.

1. Concentrators must take three of the following courses, ideally by the end of the sophomore year: ENG 140, 150, 151, 155.

2. Of the seven English courses at the 200 or 300 level:

- a. One must be in American literature.
- b. Two must be in literature written before 1789 and two in later literature. Only one advanced Shakespeare

course may be counted toward the pre-1789 requirement; a second may be counted as an advanced elective, however. Courses in film studies do not count as literature courses before or after 1789.*

c. Two must be courses in major British or American literary figures—Chaucer (206), Shakespeare (209, 210), Milton (213), or others to be determined and announced annually by the Department, and listed under "ENG 335. Studies of Major Literary Figures."

d. Two must be 300-level special studies or seminar courses (320-375, 396).

e. At least five must be taken in residence at the University of Rochester.

3. Of the 12 courses, two must be advanced courses in an allied field; normally these will be in a single department, but two thematically related courses in different departments may be used with approval. Courses in British and American history, non-English literature, women's studies, African-American studies, linguistics, philosophy, religion, or art history are highly recommended.

Permission of the instructor is required for 113, 114, 115, 116, 117, 124, 178, 179, 360, 361, and 396.

REQUIREMENTS FOR A MINOR IN ENGLISH

The Department of English offers three minor fields of study, one in literature and two in areas tangential to literary study but separate from it. The latter two (the minor in writing with its three tracks and the minor in theater) emphasize the practical sides of the discipline and are open to English majors as well as nonmajors. (The minor in English literature is not, of course, open to English majors.) All three minors stipulate a minimum of six courses, five of which must be taken in residence. No

*ENG 200, 245-248, 250, 251-259, 337, 339, 360, 361 do not qualify as courses in "literature written before or after 1789"; they all qualify as electives for the seventh course beyond the 100 level, however. Special studies and seminar courses number 320-339 may or may not count, depending on their content in a given seminar: questions should be directed to the Director of Undergraduate Studies.

more than two courses in one's major may be counted toward the minor. Students wishing to minor in English should contact the Director of Undergraduate Study in English.

THE MINOR IN ENGLISH LITERATURE

a. ENG 150. English Literature I.

b. ENG 151. English Literature II.

or

ENG 155. Classical American Literature.

c. Four additional courses in British or American literature, three of which must be on the 200 or 300 level.

NOTE: Writing courses on the 100 level (i.e., 103-109, 115, 116) will not count as a "fourth additional course" toward the minor in English literature.

THE MINOR IN WRITING

Students minoring in writing must choose one of the three tracks:

Journalism

Six courses are required:

a. ENG 113. Reporting and Writing the News.

b. At least one of the following courses:

ENG 115. Seminar in Writing.

ENG 116. Creative Writing.

ENG 117. Editing Practicum.

ENG 375. Rhetoric and Style.

c. At least two of the following courses:

ENG 114. Journalism Workshop, administered by the Department of English and Gannett Newspapers.

ENG 392. Research Project in Journalism.

English 394. Internship in Journalism.

d. Additional courses, if needed, to be chosen from 200-level courses in literature or criticism. These courses may be taken in the Departments of Religion and Classics or Foreign Languages, Literatures, and Linguistics, as well as English.

Creative Writing
Six courses are required:

Creative Writing

Six courses are required:

a. At least two courses numbered ENG 116. Creative Writing (poetry, fiction, or playwriting).

b. At least one advanced creative writing course:

ENG 360. Advanced Creative Writing: Poetry.

ENG 361. Advanced Creative Writing: Fiction.

c. ENG 375. Rhetoric and Style.

or

ENG 245. Practical Criticism.

d. Additional courses, if needed, to be chosen from the Department's offerings in writing or from 200-level literature courses within the College.

English Composition

Six courses are required:

a. ENG 115. Seminar in Writing.

b. ENG 375. Rhetoric and Style.

c. At least one of the following courses:

ENG 392. Research Project in Writing.

ENG 394. Internship.

d. Additional courses, as needed, to be chosen from the following:

ENG 113. Reporting and Writing the News.

ENG 116. Creative Writing (poetry, fiction, or playwriting).

200-level literature courses within the College of Arts and Science.

THE MINOR IN THEATER

The minor in theater consists of a minimum of six courses taken from the following four categories. No more than two courses included in one's major may be counted toward the minor.

a. Theater.

Two courses from the following list, one of which must be either ENG 177 or 178.

ENG 175. History of Theater.

ENG 176. Drama and Theater.

ENG 177. Stage Craft.

ENG 178. Acting.

b. Dramatic Literature.

Two courses from the following list are required.

ENG 109. Introduction to Dramatic Literature.

ENG 144, 209, 210, or 340. Shakespeare.

ENG 233. Medieval Drama.

ENG 234. Elizabethan and Stuart Drama.

ENG 235. Restoration and Eighteenth-Century Drama.

ENG 236. Modern Drama.

ENG 335. Major Author, if the author happens to be a playwright.

Courses in dramatic literature in foreign languages or religion and classics, such as: CLT 241, Tragedy and the Representation of Pain; CLT 245, Dialectics and Aesthetics: Brecht; CLT 252, Theory of Modern Theater; FR 262, Twentieth-Century French Theater; SP 262, Golden Age Drama; SP 283, Twentieth-Century Spanish American Drama.

c. Fine Arts and Music.

One of the following is required.

A course in art history.

A course in drawing or sculpture.

Two semesters (4 credits) of ballet or modern dance.

Dance History and Film.

A course in music history.

Two semesters (4 credits) of voice.

A combination of courses in opera coaching, opera workshop, musical theater (ESM, minimum of 4 hours credit).

d. Apprenticeship.

One course from the following list is required.

ENG 333. Plays in Production

ENG 394. Internship with GeVa Theatre

ENG 116. Playwriting

SCHEDULING

The following courses are usually offered in both fall and spring semesters:

ENG 103, 104, 105, 107, 108, 109, 115, 116, 140, 142, 144, and 155.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

101. English as a Second Language. Credit—4 hours. A review of writing skills, both syntactic and rhetorical,

through a controlled writing workshop.

This course also focuses on vocabulary development and oral presentation skills.

102. The English Language. The study of English grammar and usage with some attention to the history and development of usage, to conventional modes of communication, and to issues in language.

***103. Writing and Thinking.** Introduction to effective writing, argument, and research of different kinds. Study of reading organized on thematic principles. Eight to 10 required essays, ranging in length from 300 words to 3,500 words.

104. Fictions and Realities. A writing course based on book-length and shorter fiction and nonfiction, with attention to different genres and modes of discourse in various disciplines. Emphasis on mastery of rhetorical strategies in writing (six to eight essays).

***105. Ventures in Composition.** The sections of this course are part of the Freshman Ventures program and are linked to courses in other fields; students enrolled in 105 must have been accepted into a Venture. Readings are selected in coordination with the other courses (six to eight essays).

106. Film Literature. Learning to describe and explain style, narrative, and ideology in an international array of films from several periods and genres.

***107. The Lyric in English.** Representative major poets, illustrating poetic exploration of human experience (six to eight essays).

***108. Narrative Literature.** Representative ways of dealing with experience in narrative forms; readings drawn primarily from works in English (six to eight essays).

***109. Dramatic Literature.** World drama of many periods, illustrating the representations of experience within theatrical conventions (six to eight essays).

*ENG 103, 104, 105, 106, 107, 108, 109, and 190 all include substantial amounts of writing and satisfy the College's primary writing requirement. ENG 104, 107, 108, and 109 may be counted toward the upper-level writing requirement if the student has already satisfied the primary writing requirement. English courses counting toward the upper-level writing requirement are listed in each semester's "Schedule of Courses."

110. Introduction to Literature.

From the Renaissance to modern periods. Closed to juniors and seniors concentrating in English.

111. Specialized Types of Composition.

Credit—2 hours. Specialized types of writing in the humanities, natural sciences, social sciences, or medicine.

113. Reporting and Writing the News.

A laboratory course (requiring typing) on the fundamentals of gathering, assessing, and writing news. (Fall)

114. Journalism Workshop.

A workshop administered by the English Department and the Gannett Newspapers. (Spring)

115. Seminar in Writing.

Students read essays from a range of contexts in the arts and sciences, and are likely to write personal essays as well as expository analyses of literature, art, film, and popular culture. Continued emphasis on mastery of voice, argument, and rhetorical strategy with attention to the political nature of language or the relation of language to ideology. Prerequisite: Primary Writing Course.

116. Creative Writing. Short story, poetry, and playwriting workshops; comparison of student work with the best achievements in imaginative writing.

117. Editing Practicum. Practicum-seminar on editing a newspaper, with special attention to the *Campus Times*.

123. Speech. Practice in effective small-group communication and the presentation of expository and persuasive speeches.

124. Forensics. Practice in formal address: argumentative, ceremonial, and expository presentations to large groups.

132. Introduction to the Art of Film. The primary visual, aural, and narrative structures and conventions by which motion pictures create and comment upon significant human experience. Same as AH 112.

133. Introduction to Film History: Silent Cinema. An introduction to silent film, necessary for an understanding of cinema in general; sound film is offered second semester.

134. Introduction to Film History: Sound Cinema. An introduction to the sound film.

140. Classical and Scriptural Backgrounds of English Literature. The great tradition, from Homer, Greek drama, Plato, and Virgil to the Bible and Dante. Required of all English majors. (Fall and Spring)

142. Issues in British and American Literature. The study of a significant literary group, movement, or theme chosen by the instructor. May be repeated for credit. (Fall and Spring)

144. Introduction to Shakespeare. A selection of his major plays. (Fall and Spring)

147. Early American Literature and American Studies. The colonial and early national search for and creation of the "American" as reflected in myths, politics, and literature. (Spring)

150. English Literature I. An introductory study of early English literature, its forms and themes, and the development of our literary tradition.

151. English Literature II. Major themes and central ideas in English literature of the eighteenth, nineteenth, and twentieth centuries.

155. American Literature. Significant achievements by American writers of poetry, fiction, and other prose in the nineteenth and twentieth centuries. (Fall and Spring)

174. Issues in Technical Theater. Special topics in technical theater: Costume design and construction, technical direction, stage management, and theatrical make-up. (Fall and Spring)

175. History of the Theater. The cultural, economic, artistic, and architectural history of the theater from Greek and Roman to modern times.

176. Drama and Theater. Plays of various kinds, with scene studies and discussion of the relation of dramatic texts to suitable production.

177. Stage Craft. An introductory course to the theories, methods, and practice of set construction, power tools, rigging, stage lighting, drafting, sound, and scene painting. Lab participation in theater program productions required.

178. Acting. Training in the techniques by which individual actors set forth the characters recorded in dramatic texts. Prerequisite: ENG 176. (Fall)

179. Directing Practicum. Training in the methods by which actor and director embody the dramatic text: emphasis on studio practice. Limited to one or two students already directing a play that semester. Prerequisite: ENG 176.

190–199. Preceptorials. Freshman-level courses on special topics.

200. History of the English Language. English sounds, inflections, syntax, and vocabulary, emphasizing the structure of present-day English. Same as LIN 233.

201. Old English Literature. Literature written in England before the Norman Conquest. Latin works will be read in translation; vernacular works, in the original. (Fall)

202. Beowulf. A detailed study of the Old English epic and selected analogues. Prerequisite: ENG 201.

206. Chaucer. The principal works of Chaucer, in their historical and intellectual context. Readings in Middle English. (Fall and Spring)

207. Middle English Literature. Poetry, prose, and drama of the thirteenth, fourteenth, and fifteenth centuries, exclusive of Chaucer. Readings in Middle English. (Fall)

208. The English Renaissance. Sixteenth-century literature from Sir Thomas More to Spenser, with some attention to the continental background. (Fall)

209. Shakespeare, 1590–1600. Study of selected plays with concentration on comedies and histories. (Fall)

210. Shakespeare, 1601–1611. Study of selected plays with concentration on tragedies and romance. (Spring)

212. English Literature of the Early Seventeenth Century. Leading poets and prose writers from Donne and Bacon to 1660.

213. Milton. The works of Milton in their historical and intellectual context. (Fall)

214. Restoration and Eighteenth-Century Literature (1660–1780). A survey of the development of one or more literary modes: prose, poetry, drama, or criticism. (Spring)

215. The Age of Dryden and Pope. A survey of the major works of the period with emphasis on poetry and satire.



216. The Age of Johnson (1740–1798). Literature of the second half of the eighteenth century with special attention to the writings of Samuel Johnson and his circle.

217. Romantic Literature. Major writers, other than novelists, of the early nineteenth century, with particular emphasis on poets from Blake through Keats. (Fall)

218. Victorian Literature (1830–1900). The major intellectual, cultural, and artistic developments of the Victorian period, in prose, drama, verse, and related arts. (Spring)

219. Victorian Poetry and Poetics. A study of the major Victorian poets from Tennyson to the early Yeats, and of the critical problems they confronted. (Spring)

220. Early American Literature. From 1630 to 1830, including Puritan nonfiction and poetry; exploration narrative; and fiction, drama, and poetry of the Revolutionary and early national eras.

221. The American Renaissance. From 1830 to 1865, including Emerson and the Transcendental movement, abolitionist writing and slave narrative, representative fiction and poetry by Poe, Whitman, Melville, Stowe, others. (Fall)

222. American Realists. From 1886 to 1912, including poetry by Dickinson and Frost; realist and naturalist fiction by Twain, Wharton, James, Dreiser; representative nonfiction and philosophy. (Fall)

223. American Moderns. From 1913 to 1941, including Eliot, Stevens, Cather, Faulkner, Hemingway, Fitzgerald, O'Neill, W. C. Williams, and others. (Spring)

224. American Contemporaries. From 1941 to the present; the most influential poetry, drama, and fiction of postwar America. (Spring)

226. African-American Writers. Major autobiographies and novels by African-American writers such as Frederick Douglass, Richard Wright, Maya Angelou, and Toni Morrison. (Spring)

227. Native American Literature. A survey of the continuities of Native American literary art through study of both traditional narratives and songs and contemporary Indian writing.

228. Rise of the Woman Writer. A study of the first professional women writers in England, their place in society, and their contribution to literature and literary history. Representative writers include Aphra Behn, Eliza Haywood, Anne Finch, Susannah Centlivre, and Frances Burney.

229. Women Novelists. The female tradition in the novel, including works by such British and North American writers as Austen, the Brontës, Eliot, Wharton, Cather, Woolf, Lessing, Morrison, and Atwood. (Spring)

230. The Early British Novel. The novel from its beginnings to the early nineteenth century, emphasizing such novelists as Defoe, Fielding, Richardson, and Austen.

231. The English Novel from Austen to Conrad. Emphasizing such novelists as Dickens, Thackeray, Eliot, and Hardy. (Spring)

232. The Twentieth-Century English Novel. The novel from 1900 to the present, emphasizing such novelists as Conrad, Joyce, Woolf, and Lawrence. (Fall)

233. Medieval Drama. English drama from its beginnings until 1580, including material from the mystery cycles, moralities, and early Tudor drama.

234. Elizabethan and Jacobean Drama. English Renaissance drama through 1642, exclusive of Shakespeare. (Fall)

235. Restoration and Eighteenth-Century Drama. A study of English drama from 1660 to 1800, with special attention to its relationship to literary and social history. (Spring)

236. Modern Drama. Great modern dramas from Ibsen to Ionesco as reflectors of the main currents in modern thought and feeling. (Fall)

237. Modern Poetry. An introduction to representative twentieth-century poetry. (Fall)

238. Contemporary Literature. A survey of fiction, poetry, and drama from World War II to the present.

239. Contemporary Poetry. Poetry in English from around 1945 to the present, emphasizing latter-day transformations and rejections of the vision and style of High Modernism.

245. Literary Criticism. An introduction to the history, the theory, and especially the practice of criticism.

250. The Art of Film. Same as AH 273. (Fall)

251. Popular Film Genres. An intensive study of selected types of popular films in their larger cultural context.

252. Issues in Film. The course takes up particular concepts, ideas, ideology in film, often spanning periods, nations, and genres.

253. Studies in a Director. A course in the works and career of an outstanding and identifiable film director: Hitchcock, Warhol, Huston, Bunuel, Renoir, etc.

254. Film History. This course may approach a national cinema, a director, a movement, or a genre with an emphasis on period or historical context.

255. Film Criticism. An introduction to the history, the theory, and especially the practice of criticism.

256. Studies in a National Cinema. Films from a particular (foreign) national cinema—Japanese, German, French, Italian, and others from various periods.

257. Media Studies. This course addresses the history and theory of a range of communications media and visual technologies in science, industry, and popular culture.

300-level Special Studies and Seminars

Most of the 300-level offerings are special courses limited in enrollment. The content of these courses is not specified, because it will be determined from the interests of students and instructors and will vary from time to time. Annual schedules will describe the content of a given course in a given semester and will indicate prerequisites for admission, if any.

320. Studies in Medieval Literature.

321. Studies in Renaissance and Seventeenth-Century Literature.

322. Studies in Restoration and Eighteenth-Century Literature.

323. Studies in Nineteenth-Century Literature.

324. Studies in Twentieth-Century Literature.

325. Studies in American Literature.

328. Studies in the Lyric.

329. Studies in Film.

330. Studies in Poetry and Poetics.

331. Studies in Prose.

332. Studies in Fiction.

334. Studies in the History of Ideas.

335. Studies of a Major Literary Figure.

336. Studies of a Literary Group.

337. Studies in Literary Criticism.

338. Studies in a Literary Mode.

339. Studies in Women's Literature.

340. Problems in Shakespeare.

346. Problems in Literary Criticism.

350. Issues in American Criticism and Culture.

351. Issues in Literature and History.

352. Issues in Popular Culture.

355. Issues in Critical Theory.

360. Advanced Creative Writing:

Poetry. Seminar in poetry writing.

Emphasis on individual development of style.

361. Advanced Creative Writing:

Fiction. Seminar in fiction writing.

Emphasis on individual development of style.

370. Literature and Cultural Identity.

372. Gender, Writing, and Representation.

373. Literature and the Visual Arts.

375. Rhetoric and Style. Stylistic analysis through rhetorical models from various modes throughout literary history. (Spring)

380. Movement. Credit—2 hours.

381. Studies in Theatrical Design.

An in-depth study of the theories and methods of scene design, lighting design, and costume design. Topics will vary each time the course is offered. Prerequisite: ENG 177.

382. Advanced Acting. An intensive acting course designed to refine and improve the skills of students with previous background and experience.

383/385. Plays in Production.

Credit—2 hours.

384/386. Plays in Production.

Credit—4 hours.

391. Independent Study in English.

(Reading course.)

392. Tutorial. A major author, theme, or genre. Tutorial groups, limited to five students, meet one hour a week.

394. Internship in English. May not be counted as one of the 11 courses for the major. (Spring)

396. Honors Seminar. (Fall)

397. Honors Thesis. (Spring)

399. Honors Thesis. For students completing the English Honors Program.

ENG 396–399 are limited to students completing the English Honors Program.

400-level Courses

Qualified undergraduates may enroll in advanced seminars at the 400 level, generally offered in the evening, by permission of the Director of Undergraduate Study and the Director of Graduate Study in English and the instructor.

FILM STUDIES

Film studies offers an interdepartmental concentration leading to a bachelor's degree. A minor in film studies is also available.

FILM STUDIES PROGRAM FACULTY

William B. Hauser, Ph.D. (Yale)

Professor of History

James W. Johnson, Ph.D. (Vanderbilt)

Professor of English

John E. Mueller, Ph.D. (California, Los Angeles) *Professor of Political Science and of Film Studies*

Kaja Silverman, Ph.D. (Brown)

Professor of English

John J. Waters, Ph.D. (Columbia)

Professor of History

George Grella, Ph.D. (Kansas)

Associate Professor of English and of Film Studies and Director of the Program

Constance Penley, Ph.D. (California, Berkeley) *Associate Professor of English*

Sharon Willis, Ph.D. (Cornell)

Associate Professor of French

Lisa Cartwright, Ph.D. (Yale)

Assistant Professor of English

*Jan-Christopher Horak, Ph.D.

(Westfälische Wilhelms-Universität, Münster) *Assistant Professor of English and of Film Studies and Curator of Film at the International Museum of Photography at George Eastman House*

*Paolo Cherchi Usai, Ph.D. (Genoa)

Assistant Professor of English and of Film Studies and Assistant Curator of Film at George Eastman House

*Mark Brady, M.F.A. (SUNY, Buffalo)

Instructor in Filmmaking

Richard M. Gollin, Ph.D. (Minnesota)

Professor Emeritus of English and of Film Studies

REQUIREMENTS FOR FILM STUDIES

The film studies concentration offers students an opportunity to explore motion pictures as an art form and as a cultural phenomenon. It consists of specific film courses offered by participating departments, and it provides opportunity for screening and analysis of centrally important films in the history of cinema from the core collection in the Film Studies Center. The archival resources of the International Museum of Photography at George Eastman House are also available for course work and for special research projects. Twenty or more film courses are offered annually by six departments; a list is made available each semester in time for preregistration.

The concentration in film studies consists of at least eight film courses and four related non-film courses. The film courses should include the following:

1. An introductory film course, taken as early as possible: AH 112/ENG 132, Introduction to the Art of Film; and
2. A course in film theory.
3. Four required kinds of film courses:
 - a course in a foreign national cinema
 - a course in a period or problem of film history
 - a course studying a single genre
 - a course in filmmaking.
4. The two additional film courses may be selected according to the student's individual interests. A list of film courses is made available each year at registration time.

5. The four related non-film courses should be in subjects or methodologies especially helpful to the study of motion pictures. One of the four must be concerned with the visual arts, such as painting, sculpture, or photography; and one must be concerned with narrative arts, such as the short story, novel, or drama. The remaining two can be selected from a wide range of courses offered by the College, according to the student's individual interests, subject to advisorial approval.

Double-majoring in film studies and another field is encouraged, though not more than two courses may be proposed in common for the two majors.

Film studies concentrators may, if they wish, include in their senior year an independent reading or research course, FS 391, or an independent project that calls upon the knowledge and discrimination acquired while completing these requirements.

FS 394, film internships at television stations and local industries, and abroad, are open to film students under the sponsorship of the Undergraduate Studies Committee of the Film Studies Program. In addition, film production course work can be taken elsewhere for credit at the University.

Students will be admitted to the concentration on recommendation of their advisor and with Committee approval. Alternative, individualized concentrations for studying motion pictures may also be proposed.

Graduates may enter the industry at low levels, though many plan to take additional work at the graduate level before seeking employment, and most use the major as a rich and satisfying course of study in the liberal arts before proceeding on to professional schools in business, law, or other fields.

REQUIREMENTS FOR A MINOR IN FILM STUDIES

- ENG 133 or 134/(AH 111). Introduction to the History of Film
- ENG 132/(AH 112). Introduction to the Art of Film
- SA 251. Introduction to Filmmaking
- Three additional film courses, chosen in consultation with the faculty advisor

Further information is available from Associate Professor Constance Penley, Morey 319, or from Professor George Grella, Director, Film Studies, Rush Rhees 427, University of Rochester, Rochester, New York 14627.

COURSES OF INSTRUCTION

For full course descriptions see the departmental course listings. Note that many film courses are cross-listed between two departments.

Art and Art History

- AH 111. Introduction to the History of Film.** Same as ENG 133, ENG 134.
AH 112. Introduction to the Art of Film. Same as ENG 132.
AH 273. Feminist Film Theory.
AH 280. The Choreography of Fred Astaire.
SA 251. Introduction to Filmmaking.
SA 252. Filmmaking II.

English

- 106. Writing about Film.**
132. Introduction to the Art of Film. Same as AH 112.
133. Introduction to Film History: Silent Cinema.
134. Introduction to Film History: Sound Cinema.
146. Special Topics. Science Fiction Films.

FOREIGN LANGUAGES, LITERATURES, AND LINGUISTICS

250. The Art of Motion Pictures. Moving Image Technology (Fall); Animation (Spring)

251. Popular Film Genres. Horror; Detective; Screen Comedy; the Western.

252. Issues in Film: American Male Image.

253. Studies in a Director.

254. Studies in Film History.

255. Film Criticism.

256. Studies in a National Cinema: New German Cinema.

257. Media Studies.

329. Special Studies. Individual Creativity and the Studio System; Drama and Literature on Film; Discoveries in Film; Avant Garde Film; Original Films.

Film Studies

201. Special Studies. Individual Creativity and the Studio System.

286. Narrative in Classical World Cinema. Same as CLT 386.

391. Independent Study.

394. Internship.

Foreign Languages, Literatures, and Linguistics

CLT 214. Visual Analysis.

LIT 220. Chinese Fiction and Film.

History

140. The Western Hero.

286. Film Images of the War in Asia.

Political Science

270. International Politics.

Thomas G. Bever, Ph.D. (M.I.T.)
Professor of Psychology and of Linguistics

Gregory N. Carlson, Ph.D. (Massachusetts)
Professor of Linguistics

Charles M. Carlton, Ph.D. (Michigan)
Professor of French and of Romance Linguistics

Patricia Herminhouse, Ph.D. (Washington University)
Karl F. and Bertha A. Fuchs Professor of German Studies

*Demetrius Moutsos, Ph.D. (Chicago)
Professor of Linguistics

Robert ter Horst, Ph.D. (Johns Hopkins)
Professor of Spanish

*Philip R. Berk, Ph.D. (Pittsburgh)
Associate Professor of French Literature

Robert Blake, Ph.D. (Texas)
Associate Professor of Spanish and Mercer Brugler Distinguished Teaching Professor

*Gerald A. Bond, Ph.D. (Yale)
Associate Professor of French and of German Literature and Associate Chair of the Department

*Rosemary Feal, Ph.D. (SUNY, Buffalo)
Associate Professor of Spanish

David Pollack, Ph.D. (California, Berkeley)
Associate Professor of Japanese and of Chinese

*Claudia Schaefer, Ph.D. (Washington University)
Associate Professor of Spanish

Sharon Willis, Ph.D. (Cornell)
Associate Professor of French

Ali Behdad, Ph.D. (Michigan)
Assistant Professor of Comparative Literature

*Thomas DiPiero, Ph.D. (Cornell)
Assistant Professor of French

Eva Geulen, Ph.D. (Johns Hopkins)
Assistant Professor of German

*Susan Gustafson, Ph.D. (Stanford)
Assistant Professor of German

Stephen Hutchings, Ph.D. (Durham, U.K.)
Assistant Professor of Russian

Laura A. Janda, Ph.D. (California, Los Angeles)
Assistant Professor of Russian

Teresa L. Jillson, Ph.D. (Oregon)
Assistant Professor of French

Beth Jørgensen, Ph.D. (Wisconsin)
Assistant Professor of Spanish

Yoshihisa Kitagawa, Ph.D. (Massachusetts)
Assistant Professor of Japanese Linguistics

*Itziar Laka, Ph.D. (M.I.T.)
Assistant Professor of Linguistics

*Kathleen Parthé, Ph.D. (Cornell)
Assistant Professor of Russian

Donatella Stocchi-Perucchio, Ph.D. (Cornell)
Assistant Professor of Italian

Ted Supalla, Ph.D. (California, San Diego)
Assistant Professor of Linguistics

Wadda Rios-Font, M.A. (Harvard)
Instructor in Spanish

Ines Cuadrado, M.A. (Rochester)
Senior Lecturer in Spanish

Anne D. Lutkus, Ph.D. (Indiana)
Senior Lecturer in French and Language Coordinator

Luisa O'Keefe, B.A. (Nazareth College)
Senior Lecturer in Italian

Andrée R. Shahin, Ph.D. (Rochester)
Senior Lecturer in French

Mariko Tamate, B.A. (Meiji University)
Senior Lecturer in Japanese

Carlos M. Cruz, M.A. (Rochester)
Supervisor of the Language Services Center

Wilhelm Braun, Ph.D. (Toronto)
Professor Emeritus of German Literature

Delos Lincoln Canfield, Ph.D. (Columbia)
Professor Emeritus of Spanish

James Doolittle, Ph.D. (Princeton)
Professor Emeritus of French Literature

Ronald V. Harrington, Ph.D. (Harvard)
Professor Emeritus of Russian and Senior Faculty Associate

*These faculty have applied for one or two semesters of leave in 1991-92.



Antanas Klimas, Ph.D. (Pennsylvania)
*Professor Emeritus of German and
of Linguistics and Senior Faculty
Associate*

Frederick W. Locke, Ph.D. (Harvard)
*Professor Emeritus of Classics and
of Comparative Literature*

Gerhard Loose, Ph.D. (Leipzig)
*Professor Emeritus of German
Literature*

Nathan Rosen, Ph.D. (Columbia)
*Professor Emeritus of Russian
Literature*

Stanley M. Sapon, Ph.D. (Columbia)
Professor Emeritus of Psycholinguistics

Bernard N. Schilling, Ph.D. (Yale)
*John B. Trevor Professor Emeritus of
English and of Comparative Literature*

Kurt Weinberg, Ph.D. (Yale) *Professor
Emeritus of French, of German, and
of Comparative Literature*

Charles Wivell, Ph.D. (Washington)
*Senior Faculty Associate in Chinese
Literature*

A supplementary staff of part-time faculty, foreign exchange students, and teaching assistants is assigned to aid in the instruction of basic languages.

The Department of Foreign Languages, Literatures, and Linguistics offers programs of study in the major modern foreign languages and literatures as well as in linguistics leading to the B.A. degree and, on the graduate level, to the M.A. and Ph.D. degrees as well.

LANGUAGE INSTRUCTION

Language instruction is offered on all levels, from elementary to advanced, in seven modern languages: Chinese, French, German, Italian, Japanese, Russian, and Spanish. Students wishing to enter a language sequence should consult with a departmental advisor for proper placement, which will be based on the student's previous training as revealed by scores on standard placement tests (CEEB or tests periodically offered by the University Testing Service). Departmental advisors are available during freshman orientation and preregistration periods.

Students who have satisfied the Foreign Language Proficiency requirement of the College of Arts and Science and wish to enter advanced language or literature courses should consult with advisors in their field of interest. Students interested in course credit for advanced placement should see the undergraduate advisor in the language.

Even for nonconcentrators, foreign language skills provide an extra edge in applying for graduate study or for employment that requires travel or work in the international community. Programs such as the Certificate in Management Studies (see page 115) in combination with a language concentration offer students wider career horizons.

ADVANCED COURSES OF STUDY

Students with advanced knowledge of a language (i.e., with five or more semesters of college study completed) can choose courses from three broad areas. Literature courses permit the student to understand and appreciate the finest written monuments of a given society. Culture courses examine nonliterary texts of all kinds, from film to fashion. Advanced language courses provide further study of language itself—its production, history, and structure.

The Department also offers two programs which cut across individual languages:

Comparative literature studies literature from perspectives which cross traditional boundaries. International by definition, comparative literature systematically and thoughtfully questions linguistic and cultural limits. It opposes ethnocentrism and interrogates gender boundaries. It examines literature in relation to its historical context and establishes a dialogue between art forms. Courses in comparative literature encourage the participation of students from all disciplines, for the field entails not only the acquisition of knowledge but also the formation of critical attitudes and interpretive skills. (A program in comparative arts, based on the comparative study of literature and the visual arts from several different interpretive perspectives is under consideration for the fall semester.)

Linguistics offers students an opportunity to engage in the scientific and historical study of the complexities of sound, form, and meaning which distinguish human language. Questions of how languages are learned and how they are socially differentiated touch upon the concern of philosophers and social scientists. Majors in linguistics first receive basic training in general linguistic theory. Subsequently, they may concentrate in an advanced area of linguistics, such as syntax or semantics, or in computational linguistics, psycholinguistics, sociolinguistics, or the description and history of specific languages.

SPECIAL PROGRAM IN RARELY TAUGHT LANGUAGES

Special instruction is provided in a number of foreign languages which are of increasingly greater importance, either for their inherent linguistic properties or for their geopolitical significance. Such courses are intended for students who wish to avail themselves of languages not ordinarily offered in the American university. Most instruction takes place

in the language laboratory, with periodic consultation with and verification by the teacher. Aural and oral skills are emphasized. Among the languages available for study are Czech, Modern Greek, Portuguese, Romanian (which has its own listing on page 92), and Yiddish. (See page 95.)

Students wishing to study one of these languages should first make their interest known to the head of the linguistics section in the Department of Foreign Languages, Literatures, and Linguistics. Final approval will be given by the chair of the Department. Students must have fulfilled the University of Rochester foreign language requirement, if applicable. Students will make arrangements with the supervisor of the Language Laboratory for participation in the program on a regular basis. Attendance is mandatory. Periodic quizzes will be given (every two weeks), and there will be a final examination. The final grade will be assigned on the basis of the quizzes and the final examination.

CONCENTRATION PROGRAMS

The Department offers course work and concentrations toward the B.A. degree in French, German, Italian, Japanese, Russian, Spanish, and linguistics; it offers minors in comparative literature and theory, French, German, Japanese, Latin American, linguistics, Russian, and Spanish studies. The Department also offers four semesters of study in American Sign Language. (Instruction in Classical Greek, Latin, and Hebrew is offered in the Department of Religion and Classics.)

Programs within the major languages are balanced between advanced language preparation and literary and cultural studies. In upper-level courses, the reading and most of the writing and lecturing will be in the original language. Concentrators are strongly urged to enlarge their background for literary studies by taking related courses in history, fine arts, music, philosophy, and English literature.

Linguistics majors are encouraged to develop fluency in a foreign language or competence in mathematics or computer programming. Laboratory facilities include: the Verbal Behavior Laboratory and the Language Services Center. Psychoacoustic and psycholinguistic facilities are maintained in the Department of Psychology. In addition, selected students may carry out projects at the National Technical Institute for the Deaf at Rochester Institute of Technology.

STUDY ABROAD OPPORTUNITIES

The Department encourages students to plan a minimum of one semester of foreign study. The University is affiliated with the Institute of European Studies, which offers programs in France (Paris, Nantes), Japan (Tokyo and Nagoya), Spain (Madrid), and Mexico City, as well as with the Council on International Education Exchange programs in the Soviet Union (Leningrad) and the People's Republic of China (Beijing, Nanjing, and Fudan). Qualified students may also participate in internship programs in the German Bundestag, the French National Assembly, and the Spanish Cortes, as well as in various political, business, medical, and performance internships in Bonn, Paris, and Madrid offered in conjunction with European Programs Abroad. The Department also sponsors special intensive language programs abroad during the month of June for students of French in Brittany (in western France), for students of German in Marburg, West Germany, for students of Italian in Palermo and Rome, and for students of Russian in Kalnin in the USSR. Students interested in studying abroad should consult with their departmental advisor and seek the assistance of the Academic Advising Office.

Upperclass students are eligible for exchange fellowships with the University of Cologne (Germany) and the University of Haute-Bretagne (Rennes, France); the awards cover full tuition and living expenses for one academic year.

Through the bequest of Mildred R. Burton, travel fellowships and summer study grants are available in annual competitions administered by the Department. Requirements include having completed one year of foreign language study at the University.

STUDENT TEACHING

Concentrators interested in student teaching experience for the purpose of New York State certification should consult with the Graduate School of Education and Human Development as well as their advisor.

REQUIREMENTS AND RECOMMENDATIONS FOR CONCENTRATIONS

French

1. Concentrators are required to take the following courses:
 - a. Four core courses: FR 200, 202, 205, and 206
 - b. At least four other courses above 206. In order to achieve a balance to the student's program, at least two of the following group must be included: 208, 209, 210, 220, 230, 231, 240
 - c. FR 389, the Undergraduate Seminar.
2. In addition, four allied courses are required:
 - a. Two courses above the introductory level in closely related fields such as French history, art, etc.
 - b. Two courses in linguistics or another literature.
3. The successful completion of the Undergraduate Seminar qualifies students for consideration of admission to the Honors Program. Arrangements for this independent study are made through the undergraduate advisor.
4. Concentrators are strongly urged to consult with the French undergraduate advisor before registering for courses.
5. Concentrators are urged to consider studying in a French-speaking country for a year, a semester, or during the summer. The University is affiliated with the Institute of European Studies program in Paris and Nantes, and the European



Programs Abroad internship in the French National Assembly. Work done in an approved study abroad program may be given concentration credit up to a maximum of four courses in French and two in allied fields.

6. Concentrators intending either to teach French on the secondary level or to do graduate work in French are advised to acquire a reasonable facility in another foreign language.

German

1. Concentrators are required to take the following courses:

- a. Four core courses: GER 200, 202, 203; 205 or 206. The core provides a linguistic, methodological, and intellectual base for advanced work.
 - b. Four additional courses to be determined in consultation with the student's advisor. At least two of these must be numbered 230 or higher. In order to achieve a reasonable balance to the concentration, at least one course should focus on the period before 1848, and at least one other on the period 1848–1933.
 - c. GER 389, the Undergraduate Seminar. This seminar allows students to integrate their previous work around the study of a particular problem.
2. In addition four allied courses, normally above entry level, are required:
- a. CLT 201 or LIN 201
 - b. Three of the following courses, at least two of which must be from the same track:
 - History and Society: HIS 215, 216, 217, 225, 226, PSC 281 (plus at least one of the two-credit courses GER 220–229)
 - Language and Linguistics: LIN 203, 235, 264, or with the permission of the advisor: LIN 202, 204, 205, 213, 215
 - Literature and Art: Suitable courses above the introductory level in comparative literature, another national literature (including English), art, music, or philosophy.

3. The successful completion of the Undergraduate Seminar qualifies students for consideration of admission to the Honors Program. Arrangements for this independent study are made through the undergraduate advisor.

4. Concentrators are strongly urged to consult with the German undergraduate advisor before registering for courses.

5. Concentrators are urged to consider studying in a German-speaking country for a year, a semester, or during the summer. The University is affiliated with the Institute of European Studies at Freiburg and the European Programs Abroad internship programs in Bonn and Cologne. Work done in an approved study abroad program may be given concentration credit up to a maximum of four courses in German and two in allied fields.

6. Students intending either to teach German on the secondary level or to undertake graduate work are advised to acquire at the minimum, reading proficiency in at least one other foreign language.

Japanese

1. Concentrators are required to take the following courses (note that course numbers may change from year to year):

- a. Eight semesters of Japanese (JPN 101–102, 105–106, 202–203, 220–221)
 - b. Japanese linguistics (JPN 210)
 - c. Japanese literature (JPN 240, 250, 251)
2. In addition, four upper-level courses in Japanese civilization, history, religion, art, etc. are required.
3. Concentrators are required to consult with the Japanese undergraduate advisor before registering for courses.

4. Concentrators are urged to study in Japan for a year, a semester, or a summer. The University is affiliated with the Institute of European Studies at Nanzan University in Nagoya and with Sophia University in Tokyo, Japan. Work done in an approved study abroad program may be given concentration credit up to a maximum of two courses in Japanese and four in allied fields.

Russian

1. Concentrators are required to take seven courses in Russian and Russian literature beyond RUS 106:

- a. Two from this group: RUS 107, 200, 201
- b. RUS 202
- c. One course from each of these groups:
 - LIT 128 (same as HIS 128), RUS 129
 - RUS 261, 269
 - RUS 263, 264, 265
 Majors are required to take the special recitation sections for all 200-level literature courses.
- d. A senior essay, RUS 393, will be written in close consultation with a faculty advisor in linguistics or literature.

2. In addition, four allied courses, normally above entry level, are required in fields such as Russian history, political science, linguistics, comparative literature or another national literature, including English. At least two of these allied courses must be taken in departments other than FLLL.

3. Concentrators are urged to consider studying in the Soviet Union for a semester or during the summer. Work done on the Council on International Education Exchange program or an approved program may be given concentration credit up to a maximum of two courses in Russian and two in allied fields.

4. Students intending to undertake graduate work in Russian are advised to acquire, at the minimum, reading proficiency in French or German.

Spanish

1. Concentrators are required to take at least eight 200-level courses in Spanish:
 - a. A common core consisting of: SP 200 or 201, 202 or 204, 203
 - b. At least five additional courses in either language or literature or both above the 200 level.
2. Concentrators are required to consult with the Spanish undergraduate advisor before registering for courses.
3. In addition, two courses in related fields, to be determined in consultation with the student's advisor, are required.
4. Concentrators are urged to consider studying in a Spanish-speaking country for a year, a semester, or during the summer. The University is affiliated with the Institute of European Studies at Madrid and Mexico City and the European Programs Abroad internship in the Cortes, Madrid. Work done in an approved study abroad program may be given concentration credit up to a maximum of four courses in Spanish and two in allied fields.
5. Students intending to undertake graduate work in Spanish are advised to acquire, at the minimum, reading proficiency in at least one other foreign language.

Linguistics

1. A minimum of eight courses above LIN 201 in linguistics is required:
 - a. Three from LIN 202, 203, 204, and 205
 - b. Two from LIN 212, 213, 214, 215, 216, 217, and 218
 - c. Three from the remaining 200-level courses.
2. Also required are four selected courses above the introductory level in an allied field: anthropology, computer science, education, English, foreign languages, mathematics, philosophy, or psychology.
3. The exact choice of courses within the concentration will depend on the student's main interest and will be worked out with the undergraduate advisor.

REQUIREMENTS AND RECOMMENDATIONS FOR MINORS

Minor in Comparative Literature and Theory

The minor in comparative literature and theory provides students with work in a wide range of theories of the nature of literary texts and critical approaches to them. The minor is intended to supplement the study of a national literature or of any program based in another text-based discipline (e.g., history, art, philosophy, film, psychology, anthropology). A total of six courses is required:

1. CLT 201. Interpreting Culture (4 credits)
2. CLT 210. Introduction to Critical Theory *or* CLT 220. Introduction to Cultural Studies (4 credits)
3. Three other 200- or 300-level courses in comparative literature or literary theory, to be chosen in close consultation with the undergraduate advisor in comparative literature. At least two of the courses must be in CLT. With the prior approval of the advisor for CLT, the student may choose one of the three courses from the advanced-level offerings in a national literature or from another discipline: such a course should offer direct contact with original and critical texts, and contribute materially to the student's work in the minor. (12 credits)
4. CLT 390. Senior Seminar. Original and independent work on a topic of interest to the student. (4 credits)

Not more than two of the six courses may be counted toward the student's major.

Minor in Linguistics

The minor in linguistics requires five courses in linguistics beyond the 101 level. The courses must include LIN 202 (Transformational Grammar and English Syntax) and LIN 203 (Phonology), plus three others at the 200-level.

Students who wish to broaden their competence in a specific area should consult with the undergraduate linguistics advisor to plan a track in one of the following areas: phonology, psycholinguistics, syntax and semantics, sociolinguistics, computational linguistics, historical and descriptive linguistics.

Minors in Modern Languages

Language minors give students sufficient facility in the use of a foreign language to read sources in the major field with ease, to converse with at least some facility, and to have knowledge of other lands, their history, their institutions and their artistic achievements. The minor is not thought of as giving students a total picture of a field that is too large even for an undergraduate major. Rather, it is to give students a coherent set of courses from which they can branch out into the more thorough study of their given field.

Students minoring in languages are urged to consider studying abroad for a year, a semester, or during the summer. The University is affiliated with the Institute of European Studies programs in Freiburg, Nantes, Paris, Tokyo, Nagoya, Madrid, and Mexico City as well as Council on International Exchange programs in Leningrad, Beijing, Nanjing, and Fudan. Students are also encouraged to investigate internship opportunities available through European Programs Abroad in Bonn, Paris, and Madrid. Up to three advanced courses done in an approved study abroad program may be approved for credit towards the minor.

Minor in French

The minor in French requires five courses beyond FR 105. These will normally include FR 106 (Intermediate French II), FR 200 (Advanced French), FR 202 (Introduction to French Literature), FR 205 (Contemporary France), and FR 206. With permission of the undergraduate advisor, another 200-level course may be substituted for one of the above.

Minor in German

The minor in German requires five courses beyond GER 106. These normally include GER 200 (Advanced German), GER 202 (Contemporary German Issues), GER 203 (Introduction to German Literature), GER 205 (Texts and Contexts: 1740–1848), or GER 206 (Texts and Contexts: 1871–1945), plus two additional courses at the 200 level in German. With the permission of the advisor, students may substitute GER 106 (Intermediate German II) or one course from another department for another 200-level course.

Minor in Italian

The minor in Italian requires four courses beyond IT 106. These will normally include IT 202 (Introduction to Medieval and Renaissance Literature) and IT 203 (Introduction to Modern and Contemporary Italian Literature) and two additional 200-level Italian courses.

Minor in Japanese

The minor in Japanese requires JPN 101–102 and 105–106, plus two additional courses to be chosen in consultation with the department advisor from the following list, or from any higher-level Japanese language courses.

- LIN 210. Japanese Linguistics
- LIT 240. Masterpieces of Japanese Literature
- LIT 250. Modern Japanese Fiction
- AH 224. The Arts of Japan
- AH 227. Popular Arts of Pre-Modern Japan
- HIS 177. Traditional Japanese Culture
- HIS 276. Japan and Pearl Harbor
- HIS 277. Modern Japan
- HIS 378. Urban-Industrial Japan

Minor in Russian

The minor in Russian requires five courses beyond RUS 105. These will normally include RUS 106 (Intermediate Russian II), RUS 200 (Advanced Russian Language I), and three additional courses at the 200 level in Russian. With permission of the advisor, students may substitute one course from another department for one of the 200-level courses in Russian, provided that this course is directly concerned with Russian culture or history.

Minor in Spanish

The minor in Spanish requires five courses beyond SP 105. These will normally include SP 106 (Intermediate Spanish II), 200 or 201 (Advanced Spanish Language I and II), and two additional courses in Hispanic literatures, language, or linguistics at the 200 level, taken on campus or abroad. The student's minor program should be approved by the Spanish section at its beginning stage.

Minor in Latin American Studies

The minor in Latin American studies can serve to complement the student's major field of concentration by giving him or her a broad view of Latin American cultures and their relations to the United States and the rest of the world.

Five courses with Latin American content are required for the minor, of which three must be at the 200 level from the Department of Foreign Languages, Literatures, and Linguistics, and two from related areas such as history, political science, and anthropology. The minor must be approved by the Spanish section in its beginning stages.

Normal offerings in the Department of Foreign Languages, Literatures, and Linguistics include:

- SP 204. Introduction to Spanish American Literature
- SP 206. Spanish American Civilization

- SP 285. Contemporary Spanish American Literature
- SP 230. Latin American Women: Historical and Literary Perspectives
- SP 290. Undergraduate Seminar: Topics in Spanish American Literature
- LIT 150. Topics in Afro-Latin American Culture

In history:

- HIS 283. Modern Latin American History
- HIS 298. U.S. and Latin America

In anthropology:

- ANT 201. Ancient Mexico and Central America
- ANT 241. America's First Civilizations
- ANT 243. Ethnohistorical Study of Ancient Mesoamerica
- ANT 245. Religion in Ancient Mesoamerica

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991–92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

LITERATURE IN TRANSLATION—**GENERAL**

The series LIT 101 through 103 is intended to introduce the student to the richness and variety of the Western literary canon. The courses stress close reading of major texts. The sequence may be taken in any order.

128. Russian Civilization. Study of Russian culture through an analysis of major themes and developments in Russian art, literature, music, and religion. Same as HIS 128.

143. The Civilizations of China and Japan. Introduction to the civilizations of China and Japan through their most important writings.

201. Tragedy. A study of tragic themes and tragic modes, with texts chosen from the Greeks to the modern period.

- 205. European Literature of the High Middle Ages.** Major trends in literary thought and technique, 1050–1350. Emphasis upon the ideals of the court, the cathedral, and the monastery with respect to man and the universal order.
- 210. The Japanese Film.** A study of the Japanese film as cultural text.
- 228. Plato and Logopoiesis.** A line-by-line study of Plato's *Phaedo* and *Symposium* with a view to understanding each dialogue in itself and Plato's philosophic art of poetic composition. Some major themes are intensively explored, such as the soul and its parts, the immortality of the soul, the nature of learning, and Eros and philosophic passion.
- 391. Independent Study.**

LITERATURE IN TRANSLATION—
ITALIAN

- 206. Dante's *Inferno*.** Course sequence consists of detailed reading of the *Inferno* and examines the theological, political, and literary context it evokes.
- 207. Dante's *Purgatorio* and *Paradiso*.** Continuation of LIT 206.
- 208. Boccaccio's *Decameron*.** A thorough reading of the *Decameron*, with particular attention to the literary traditions which the text absorbs and manipulates, and to the medieval intellectual debates in which it engages.
- 210. Italian *Trecento*.** Readings from Dante, Boccaccio, and Petrarca in the cultural context of thirteenth- and fourteenth-century Europe. (Fall)

LITERATURE IN TRANSLATION—
JAPANESE

- 143. China and Japan.** An introduction to the cultures of the East through its fundamental texts.
- 240. Masterpieces of Japanese Literature.** Great works of traditional literature, including *The Tale of Genji*, military romances, Noh drama, Haiku poetry, etc.
- 250. Modern Japanese Fiction.** A survey of the most important modern Japanese fiction, including works by Soseki, Tanazaki, Kawabata, Mishima, Abe, Oe, Kaiko.

LITERATURE IN TRANSLATION—
RUSSIAN

- 128. Russian Civilization.** Study of Russian culture through an analysis of major themes and developments in Russian art, literature, music, and religion. Same as RUS 128/HIS 128. Optional upper-level writing requirement.
- 261. Russian Literature: Classics to Moderns (1830–1930).** Russian literature from Pushkin to Mayakovsky; tracing literary developments from the rise of realism to the end of modernism. Optional upper-level writing requirement.
- 263. Chekhov and His Contemporaries.** The climax of Russian civic, lyric, and psychological realism in the works of Chekhov, late Tolstoy, Bunin, Gorky, and others. Symbolism as a reaction to realism and as the beginning of literary modernism in Russia. Optional upper-level writing requirement.
- 264. Literature of the Russian Revolution.** From 1905–1934 Russia went through simultaneous cultural and political revolutions which gave birth to exciting experiments in the arts as well as in the organization of society. The antecedents of the two revolutions, their brief alliance, and the demise of both in 1934. The end of the avant-garde and the rise of Socialist Realism.
- 265. Soviet Literature.** After looking briefly at the period of high socialist realism, this course concentrates on the revival of Russian literature in post-Stalinist period. Examines the "Thaw" in culture and politics, emigré and dissident literature, and recent Russian urban and village prose. Optional upper-level writing requirement.
- 269. Tolstoy and Dostoevsky.** Selected major works of Russia's two greatest novelists. Same as REL 263. Optional upper-level writing requirement.

LITERATURE IN TRANSLATION—
SPANISH

- 150. Topics in Afro-Latin American Culture.** This course examines the black experience in Latin America (the Caribbean, Brazil, etc.) in its varied cultural

expressions such as art, literature, and film. The intent of the course is to offer to a wide audience an opportunity to explore these (overlooked) topics in English.

COMPARATIVE LITERATURE

- 100. Introduction to Comparative Literature.** Introduces freshmen and sophomores to the interdisciplinary, international, and intercultural possibilities of comparative literature. (Fall)
- 102. Topics in Comparative Literature.** An introduction to topics of interest in the field of comparative literature. Close critical scrutiny of cultural difference as manifested in a variety of literary texts and cultural phenomena. (Spring)
- 145. The Experience of Otherness.** Problems of cultural diversity: the immigrant experience, the philosophy of the melting-pot, mainstream vs. periphery, cultural appropriation and expropriation, languages of the norm and of transgression. (Spring)
- 201. Interpreting Culture.** Designed to develop awareness of the importance of interpretation in cultural life, the role of cultural difference therein, and its effect on the formation of attitudes toward self, others, and the world. Students discuss questions of the epistemological background of semiotics, goals of interpretation, uses and misuses of analysis, the implications of being a "subject" confronted with an "object." (Fall)
- 210. Introduction to Critical Theory.** Problems of culture and meaning in the Marxist, feminist, and psychoanalytic traditions, and in structuralism and post-structuralism. (Spring)
- 214. Feminism and Visual Analysis.** An introduction to techniques of visual analysis from a feminist perspective. Examines various visual objects in relation to feminist critiques and feminist theories of visual representation. A central theme is the relation of feminist theory to feminist art practice, and to disciplinary structures in general. (Spring)

220. Introduction to Cultural Studies. Introduces the investigation of theories of culture and questions about identity and alterity in critical discourse and explores the relationship between high culture and popular culture. (Fall)

221. Constructions of Masculinity in Literature and Theory. The construction and defense of masculinity forms the core of this course which relies on theoretical models developed in recent feminist scholarship to reach a radical critique of traditional myths of maleness. (Spring)

230. Third World Women. Explores women in Third World cultures in terms of the historical roots of ideologies and traditions, the reception and interpretation of Western feminism, and women's participation in the production of culture in their respective societies.

231. Confessional Modes in Literature. Approaches the concept of genre with relation to autobiography and confessions to establish a framework for the study of identity and subjectivity. (Fall)

241. Tragedy and the Representation of Pain. Tragic form in literature (Greek, Shakespearean, and modern drama) and the visual arts (Renaissance and post-Renaissance painting). (Fall)

245. Dialectics and Aesthetics: The Dramatic Legacy of Bertolt Brecht. Attention to the construction and function of a dialectical view of literary tradition and history, using Brecht's work as an example. (Fall)

251. Literature and Psychoanalysis. Designed to acquaint students with history of psychoanalytic theory, working at the intersection of psychoanalytic, linguistic, and narratological theories of representation. (Fall)

252. Theory of Modern Theater. (Spring)

253. Language Theory and Semiotics in the Eighteenth Century. The development of language theory as it relates to the concept of Enlightenment and to the aesthetics of the time with particular attention to debates on the functional nature of language and its origin. Focuses

both on the establishment of a genuine semiotic and on presentational-literary reflection of language. Same as GER 253. (Spring)

264. Genres of Painting. An investigation of the generic structure and meaning of portraiture, still life, landscape, history painting, and the nude. (Fall)

AMERICAN SIGN LANGUAGE

101. Beginning American Sign Language I. An introductory course in American Sign Language (ASL), the language developed and used by the deaf community in most areas of North America.

102. Beginning American Sign Language II. Continuation of basic study of the language and culture; an opportunity to build receptive and expressive sign vocabulary; use of the signing space; further use of nonmanual components including facial expression and body postures as parts of ASL grammar.

105. Intermediate American Sign Language I. Emphasizes further development of receptive and expressive skills. Introduction to language forms used in ASL poetry and to the features of culture as they are displayed in art and the theater.

106. Intermediate American Sign Language II. Consists of intensive practice involving expressive and receptive skills in complex grammatical structures, dialogues, and storytelling. Successful completion of this course fulfills the foreign language requirement.

CHINESE

101. Elementary Chinese I. Credit—6 hours. Introduction to modern spoken Mandarin. Emphasis will be on developing the students' ability to speak and comprehend the most widely used dialect of modern Chinese. (Fall)

102. Elementary Chinese II. Credit—6 hours. Continuation of CHI 101, and an introduction to elementary readings in Chinese.

105. Intermediate Chinese I. Continuing study of spoken Mandarin and vernacular written materials. Prerequisite: CHI 102 or equivalent. (Fall)

106. Intermediate Chinese II. Continuation of CHI 105.

202. Advanced Chinese I. Readings in newspapers and periodicals, with emphasis upon materials from the People's Republic of China. Prerequisite: CHI 106 or equivalent. (Fall)

203. Advanced Chinese II. Continuation of CHI 202.

221. Modern Chinese Literature I. Readings in early modern Chinese literature.

222. Modern Chinese Literature II. Readings in contemporary Chinese literature.

FRENCH

101. Elementary French I. Fundamentals of the grammar, culture, and pronunciation of the language. Emphasis is on developing communicating skills, principally speaking but including listening, reading, and writing.

102. Elementary French II. Continues the work of the beginning course. There is an added emphasis on reading comprehension and vocabulary building.

103. French Review. Builds on basic speaking and comprehension skills learned in high-school courses or in an introductory college course. Work centers on active use of "real life" language skills. Successful completion of this course fulfills the College of Arts and Science foreign language requirement.

104. Conversational French. Credit—2 hours. Emphasis on speaking skills with focus on current issues in French culture and society. Prerequisite: FR 102 or equivalent. May be taken concurrently with FR 105 or 106. May be taken twice for credit. (Fall and Spring)

105. Intermediate French I. Intermediate level study of French and French culture. Special emphasis on the geography of France and contemporary French culture and on development of reading, discussion, and composition skills. Prerequisite: score of 500 on national test or permission of instructor. (Fall and Spring)

106. Intermediate French II. Continuation of FR 105 with emphasis on a historical approach to French culture. Continued attention given to reading, discussion, and compositional skills.

107. French in France. An intensive, conversation-grammar review course at the intermediate level. Students meet and live with French people a month in May and June, learn about French culture and have opportunities for side trips and tours to places of historical and aesthetic importance. (Higher-level students may register for FR 207.)

NOTE: FR 202, 203 are ordinarily prerequisites for all 200-level courses in French literature.

200. Advanced French. Intensive practice in speaking and writing the language; review of grammar on an advanced level. (Fall and Spring)

202. Introduction to French Literature I. Introduction to the interpretation of modern French literature with emphasis on techniques of analysis. Major genres, short story, lyric, drama are covered. (Fall)

204. Advanced Conversational French. Credit—2 hours. Prerequisite: FR 200 or equivalent. May be taken twice for credit.

205. Contemporary France. An introduction to the social structures, institutions, and value systems which make up contemporary French society. Analysis of their manifestations in contemporary political structures and events, philosophy, art, film, the media, etc.

207. French in France. See FR 107.

208. The Linguistic Structure of French. Analysis of the contemporary French phonological and grammatical systems; reference to dialectal variations. A significant portion of the course is devoted to practical work on phonetics. Same as LIN 263. (Fall)

209. History of the French Language. Diachronic analysis of French as one of the Romance languages: its formation, development, and present state. Examination of selected texts.

210. Medieval France. A survey of medieval literature and culture. Works to be read in modern French include *La Chanson de Roland*, *Yvain*, and *La Quête du Graal*.

220. The French Renaissance. Introduction to the intellectual and aesthetic currents of the Renaissance; readings in Rabelais and Montaigne. (Spring)

225. Renaissance and Baroque Poetry in France.

230. The Baroque. Major texts of the late sixteenth and early seventeenth centuries. Theater, comic novels, short fiction, and poetry are covered.

231. The Classical Tradition. Major dramatic, lyric, and *moraliste* texts of the late seventeenth century: Racine, Molière, La Fontaine, La Rochefoucauld, and La Bruyère. (Fall)

240. The Eighteenth Century. Study of major authors of the French Enlightenment, as well as their predecessors and contemporaries, including Marivaux, Montesquieu, Voltaire, Prevost, Rousseau, Diderot, Sade, and Laclos.

250. The Nineteenth Century. Topics in nineteenth-century French culture, especially those that consider the relations among the various literary genres and between these genres and other disciplines, e.g., visual arts, philosophy, history, music. (Fall)

251. French Poetry from Baudelaire to Surrealism.

252. Nineteenth-Century French Novel. Analysis of selected works by major nineteenth-century novelists including Balzac, Stendhal, Flaubert.

260. The Twentieth Century. Topics in twentieth-century French culture, especially those that consider the relations among the various literary genres and between these genres and other disciplines, e.g., visual arts, philosophy, history, music. (Spring)

261. The Twentieth-Century Novel.

262. Twentieth-Century French Theater. Analysis of selected theatrical works of the twentieth century. To include study of production and text and the varying relationships between the two in the context of modern society.

271. Constructions of Masculinity in Literature and Theory. The construction and defense of masculinity forms the core of this course, which relies on theoretical models developed in recent feminist scholarship to reach a radical critique of myths of maleness. Same as CLIT 221. (Spring)

275. Literature and Psychoanalysis. Study of the intersection of psychoanalytic, linguistic, and narratological theories of representation. (Fall)

280. French Film. A study of French film from its beginnings through the New Wave.

299. Studies in Translation. Advanced work in translation into and from French. Prerequisite: FR 200 or equivalent. (Spring)

388. Critical Perspectives. Coordination of the intensive study of a major French author with the reading and evaluation of a variety of critical perspectives on his work, such as Marxist, psychoanalytic, structuralist, and post-structuralist. (Fall)

389. Undergraduate Seminar.

391. Independent Study. Study of special linguistic or literary problems under the direction of a member of the faculty.

393. Senior Essay. A paper based on independent study; may be written by concentrators. Students should normally register for this course in the fall term of their senior year.

GERMAN

101. Elementary German I. Introduction to the structure of modern German and its basic vocabulary. Training in speaking, comprehension, reading, and writing through classroom instruction and recitation periods. (Fall)

102. Elementary German II. Continuation of GER 101. (Spring)

103. German Review. Builds on basic speaking and comprehension skills learned in high-school courses or in an introductory college course. Work centers on active use of "real life" language skills. Successful completion of the course fulfills the College of Arts and Science foreign language requirement.

104. Conversational German. Credit—2 hours. Emphasis on speaking skills with focus on current issues in German culture and society. Prerequisite: GER 102 or equivalent. May be taken concurrently with GER 105 or 106 and may also be taken twice for credit. (Fall and Spring)

105. Intermediate German I. Readings in modern German culture and civilization. Special attention to grammatical review, vocabulary, and reading skills. Prerequisite: Score of 500 on national test or permission of instructor. (Fall)

106. Intermediate German II. Continuation of GER 105 with ongoing grammatical review and increasing attention to conversation and composition. (Spring)

107. German in Germany. Credit—4 hours (based on evaluation). An intensive program offered in German at all levels in conjunction with *Speak and Write* in Marburg, West Germany, during the month of June. Instruction by native Germans with University of Rochester faculty member in residence. Includes side trips and excursions in this historic area. Higher-level students may register for GER 207.

108. Business German. Readings in German to introduce students to the language and thought of business, finance, and research, typically taken from business reports, financial journals, and textbooks used in management schools.

114. German for Reading. Credit—4 hours. An accelerated course leading to the ability to translate texts both in the sciences and the humanities. After a quick introduction to grammar, texts of increasing difficulty are read. No attempt is made to speak or to write compositions in German.

NOTE: GER 200 and 202 or their equivalents are normally prerequisite for all 200-level courses in German.

200. Advanced German. Readings on current issues. Objectives include enabling students to converse freely in German on a variety of topics and the review of grammar on an advanced level with particular attention given to writing style and idiomatic German. (Fall)

202. Contemporary German Issues. An examination of major issues in German society since 1945—the division of Germany, coming to terms with the past, the European community, controversies concerning the press, the women's movement, peace, and foreign workers—as reflected in literary and nonliterary texts. (Spring)

203. Introduction to German Literature. Introduction to the interpretation of German literary texts with emphasis on the terms and techniques of analysis. (Fall)

205. Texts and Contexts: 1740–1848. Examination of literary and nonliterary texts as they reflect and influence the development of cultural and social thought from the beginning of the Enlightenment to the years of social revolution. (Spring)

206. Texts and Contexts: 1871–1945. Examination of literary and nonliterary texts as they reflect and influence the development of cultural and social thought from the establishment of the Wilhelminian empire to the end of the Third Reich. (Spring)

207. German in Germany. See GER 107.

210. The German Play. Close background study, interpretation, and performance of a German play, chosen from a group of readings selected according to interests, ability, and composition of the class. (Spring)

221. Readings in German Cultural History: Eighteenth Century. Credit—2 hours. The reading and interpretation of significant historical and cultural texts from the eighteenth century.

222. Readings in German Cultural History: Nineteenth Century. Credit—2 hours. The reading and interpretation of significant historical and cultural texts from the nineteenth century.

223. Readings in German Cultural History: Twentieth Century. Credit—2 hours. The reading and interpretation of significant historical and cultural texts from the twentieth century.

230. Language and Style. Free composition and translation into German of texts of varying difficulty and different stylistic peculiarities.

245. Dialectics and Aesthetics: The Dramatic Legacy of Bertolt Brecht.

Brecht's work in its location within an earlier tradition of writers whose dramatic theory and practice likewise question and seek to change the social order as well as within the dialogue of authors contemporary with his oeuvre. Attention to the construction and function of a dialectical view of literary tradition and history.

248. New German Cinema. Study of major directors and films from the movement known as New German Cinema, 1962 to present.

253. Semiotics in the Eighteenth Century. Focuses on the development of a "semiotic theory" in the 18th century by Condillac, Rousseau, Herder, and Lessing within the context of modern theoretical frameworks established by Saussure, Foucault, Austin, Kristeva, and Derrida. Same as CLIT 253.

268. The Essential Goethe. Focuses on Goeth's major achievements as a poet, literary critic, natural scientist, and statesman in Weimar.

270. German Romanticism. Examines the origins, crises, and resolutions of problems in aesthetics, religions, politics, and philosophy facing authors of the Romantic period in Germany.

275. Nineteenth-Century Literature. Readings in alternate years of major writers from the period 1820–1848 or 1848–1890, with special attention to the persistence/rejection of classical ideals, the quest for emancipatory forms of social organization, the rise of industrialism, and the emergence of a realistic aesthetic and new forms of belief.



- 280. Vienna at the Turn of the Century.** Examination of art, ideas, and social currents in the final years of the Austrian Empire. Includes the work of Schnitzler, Hofmannsthal, Freud, Herzl, Zweig, Klimt, Schiele, and others.
- 281. Literature of the Turn of the Century.**
- 282. The Weimar Republic: Literature, Art, and Politics: 1918–1933.** Focuses on relations between art and politics with special attention to Berlin as a cultural and intellectual center.
- 389. Undergraduate Seminar.** Special topics.
- 391. Independent Study in German.**
- 393. Senior Essay.** A paper based upon independent study; may be written by concentrators, preferably in the fall term of their senior year.
- 399. Practicum in German.** Investigation of special topics in German language, literature, or linguistics.

ITALIAN

- 101. Elementary Italian I.** An introductory study of the structure of the Italian language in its spoken and written forms. (Fall)
- 102. Elementary Italian II.** A continuation of IT I. (Spring)
- 104. Conversational Italian.** Credit—2 hours. Emphasis on speaking skills. Prerequisite: IT 102 or equivalent. May be taken twice for credit.
- 105. Intermediate Italian I.** Continuing study of modern Italian geared to enhance speaking, reading, and writing skills. Includes grammar review. Prerequisite: IT 102 or equivalent. (Fall)
- 106. Intermediate Italian II.** Continuation of IT 105. (Spring)

- 202. Introduction to Modern Italian Poetry.** (Spring)
- 203. Introduction to Modern Italian Narrative.** (Spring)
- 206. Dante's *Inferno*.** Primarily a detailed reading of the *Inferno*; examines the theological, political, and literary context it evokes. (Fall)
- 207. Dante's *Purgatorio and Paradiso*.** Continuation of IT 206. (Spring)
- 208. Boccaccio's *Decameron*.** A thorough reading of the *Decameron*, with particular attention to the literary traditions which the text absorbs and manipulates, and to the medieval intellectual debates in which it engages.
- 210. Italian *Trecento*.** Readings from Dante, Boccaccio, and Petrarca in the cultural context of thirteenth- and fourteenth-century Europe. (Fall)
- 212. Italian Cinema: 1935–1964.** Italian cinema experienced a dramatic rebirth after liberation in 1945. The course looks first at aspects of the cinema under Fascism, at new realism, and then at the revived commercial industry of the 1950s and early 1960s, emphasizing the variety and vitality of Italian cinema across the years.
- 220. Courtly Literature of the Renaissance.** Readings in Ariosto, Tasso, and Castiglione. Discussions to revolve around issues of genre, gender, class, race, and representation.
- 232. Detection as Genre and Metaphor: A Historical and Theoretical Perspective on Ancient, Modern, and Post-Modern Texts.** Reflects on the literary and theoretical phenomena of detective fiction, as well as on those instances in which we witness an interplay between the two. Readings for Italian credit include Gadda, Sciascia, Calvino, and Eco.

JAPANESE

- 101. Elementary Japanese I.** Credit—6 hours. Introduction to colloquial Japanese, with emphasis on developing speaking and comprehension skills. The writing system also is introduced for reading simple texts. (Fall)
- 102. Elementary Japanese II.** Credit—6 hours. Continuation of JPN 101. (Spring)
- 105. Intermediate Japanese I.** Credit—6 hours. Continuing study of colloquial Japanese through conversation practice and more intensive development of reading skills. Prerequisite: JPN 102 or equivalent. (Fall)
- 106. Intermediate Japanese II.** Credit—6 hours. Continuation of JPN 105. (Spring)
- 202. Advanced Japanese I.** This course aims at the improvement of student's overall proficiency in the Japanese language. Listening and speaking skills will be improved through the assignments based upon audiotapes, discussion, and role playing in Japanese. Prerequisite: JPN 106 or equivalent. (Fall)
- 203. Advanced Japanese II.** Continuation of JPN 202. Essays on Japanese literature and history. (Spring)
- 210. Japanese Linguistics.** The history and structure of the Japanese language. Same as LIN 232.
- 220. Readings in Japanese Culture I.** Various aspects of contemporary Japanese culture as found in magazines, journals, television, film, etc. Prerequisite: JPN 203 or approval from instructor.
- 221. Readings in Japanese Culture II.** A continuation of JPN 220.
- 240. Survey of Japanese Literature.** Majors attend LIT 240 with additional work in literary Japanese: *Genji*, *Heike*, Noh Drama, Kabuki, and Haiku.
- 250. The Modern Japanese Novel.** Majors attend LIT 250 with additional work in modern fiction in Japanese: Soseki, Tanizaki, Kawabata, Abe, Mishima, Oe, and Kaiko.

251. Japanese Cinema. This course examines films by a range of Japanese directors, from the 1930s to the present, focusing particularly on Ozu, Mizoguchi, Naruse, Oshima, Imamura, and Itami.

391. Independent Study in Japanese Language.

392. Practicum in Japanese.

ROMANIAN

101. Elementary Romanian I. Introductory explanation of the structure of modern Romanian and its basic vocabulary. Practice in hearing and speaking. Reading of texts. (Fall)

102. Elementary Romanian II. A continuation of ROM 101. (Spring)

105. Intermediate Romanian I. A continuation of Romanian in its spoken and written forms. Special attention to grammar review and systematic development of vocabulary. Reading in a variety of texts (contemporary press, literary classics). (Fall)

125. Romanian Life, Language, and Culture. Survey of life in contemporary Romania (art, folklore, history, politics, language, and literature). (Spring)

391. Independent Study in Romanian. Study of special linguistic problems under the direction of a member of the faculty.

RUSSIAN

101. Elementary Russian I. An introduction to the basic grammar of Russian, with particular emphasis on reading and speaking. (Fall)

102. Elementary Russian II. Completes the survey of basic grammar initiated in RUS 101. In addition, short texts are read. (Spring)

105. Intermediate Russian I. Emphasis on reading, writing, conversation, and further developing understanding of grammatical concepts introduced in first-year Russian. The building of vocabulary and comprehension skills is stressed. (Fall)

106. Intermediate Russian II. Continuation of RUS 105 with readings in unabridged fiction and nonfiction. Continuing grammatical review and increasing attention to conversation and composition. (Spring)

107. Russian in Tver'. An intensive, conversation-grammar review course at the intermediate to advanced level held at Tver' State University in the U.S.S.R. (Summer)

114. Russian Conversation. Emphasis on speaking skills. Prerequisite: RUS 106.

129. Soviet Culture. A series of lectures, films, excursions, and field trips designed to acquaint students with contemporary Soviet culture and political issues. Held at Tver' State University in the U.S.S.R. (Summer)

200. Advanced Russian I. Advanced work in reading, writing, grammar, and conversation. Analysis of the structure of Russian language.

201. Advanced Russian II. Continuation of RUS 200. (Fall)

202. Advanced Readings in Russian. Students read, discuss, and write about a selection of Russian texts, poetry, and prose of various periods. (Spring)

261. Russian Literature: Classics to Moderns (1830-1930). Russian literature from Pushkin to Mayakovsky; tracing literary developments from the rise of realism to the end of modernism. Optional upper-level writing requirement.

263. Chekhov and His Contemporaries. The climax of Russian civic, lyric, and psychological realism in the works of Chekhov, late Tolstoy, Bunin, Gorky, and others. Symbolism as a reaction to realism and as the beginning of literary modernism in Russia. Optional upper-level writing requirement.

264. Literature of the Russian Revolution. From 1905-1934 Russia went through simultaneous cultural and political revolutions which gave birth to exciting experiments in the arts as well as in the organization of society. The antecedents of the two revolutions, their brief alliance, and the demise of both in 1934. The end of the avant-garde and the rise of Socialist Realism.

265. Soviet Literature. After looking briefly at the period of high socialist realism, this course concentrates on the revival of Russian literature in the post-Stalinist period. Examines the "Thaw" in culture and politics, emigré and dissident literature, and recent Russian urban and village prose. Optional upper-level writing requirement.

269. Tolstoy and Dostoevsky. Selected major works of Russia's two greatest novelists. Same as REL 263. Optional upper-level writing requirement.

391. Independent Study.

393. Senior Essay. A paper based upon independent study; required of concentrators.

399. Practicum in Russian. Investigation of special problems in Russian.

SPANISH

101. Elementary Spanish I. Training in speaking, comprehension, reading, and writing through classroom instruction. (Fall and Spring)

102. Elementary Spanish II. Continuation of SP 101: classroom instruction. (Fall and Spring)

103. Review Spanish. Work centers on active use of "real life" language skills, with emphasis on communication. Variety of readings and class materials, both literary and journalistic. Language laboratory component; mandatory twice-weekly recitation. Successful completion of the course fulfills the College of Arts and Science foreign language requirement. Note: Culturally-based SP 103 courses will be offered to fulfill the requirement effective fall 1991.

104. Conversational Spanish. Credit—2 hours. Emphasis on speaking skills. Conducted in Spanish. Prerequisite: SP 102, 103, or equivalent. May be taken concurrently with SP 105 or 106 and may also be taken twice for credit. (Fall and Spring)

105. Intermediate Spanish I. Continuing study of modern SP in its spoken and written forms. Prerequisite: SP 102 or equivalent. (Fall and Spring)

106. Intermediate Spanish II. Continuation of SP 105. Intended to advance conversational skills and also provide an introduction to the reading of Spanish literature. (Fall and Spring)

200. Advanced Spanish Language. Review of grammar at advanced level with emphasis on the writing process; readings and discussions of literary and nonliterary texts. (Fall and Spring)

201. Advanced Spanish Language for Native Speakers. This course addresses the special needs of native Spanish speakers through a practical review of specific aspects of the written language and extensive composition practice. Introduction to modern literature written by Hispanic authors. (Fall)

NOTE: SP 202, 203, and 204 are offered in the order listed below in successive semesters. SP 200 or 201 is a prerequisite to all courses below.

202. Introduction to Modern Spanish Literature. A critical reading and analysis of representative works of poetry, drama, and fiction of nineteenth- and twentieth-century Spain.

203. Masterpieces of Spanish Literature to 1800. Survey from the late Middle Ages to the beginning of Romanticism; emphasis on the *siglo de oro*. (Fall)

204. Introduction to Spanish-American Literature. A survey from colonial to contemporary Spanish-American literature, through representative works of poetry, prose, and theater. (Spring)

205. Spanish Culture and Civilization. This course explores the making of modern Spain through the development of Spanish history and culture as seen in art, literature, film, etc.

206. Spanish-American Culture and Civilization. A survey of the development of Spanish-American culture and civilization from pre-Columbian times to the present. Main areas: history (political and social), "high" culture and "popular" culture. Emphasis on contemporary Spanish America. (Spring)

207. The Linguistic Structure of Spanish: Phonetics and Phonology.

An analysis of the linguistic characteristics of the Spanish sound system, including dialectal variation and problems of second-language acquisition of Spanish by English speakers. Highly recommended for prospective teachers of Spanish. Same as LIN 266.

208. The Linguistic Structure of Spanish: Syntax and Semantics. A presentation of topics from Spanish grammar within a modern linguistic framework, including the verbal system, aspectual choices, modal choices, and pronominal usage. Students are encouraged to apply their linguistic knowledge to literary or discursive examples. Same as LIN 267. (Fall)

209. History of the Spanish Language. Diachronic analysis of Spanish as one of the Romance languages; its formation, development, and present state. Examination of selected texts from the earliest period to modern times.

210. Topics in Hispanic Linguistics. Undergraduate seminar. Topics vary and may include Spanish dialectology, bilingualism, and Spanish sociolinguistics and pragmatics. Same as LIN 268. (Spring)

211. Medieval Spanish Literature. Study of representative texts: *Poema de mio Cid*, *Libro de buen amor*, and others through the fifteenth century. The transmission of medieval literature; relevant linguistic and social history; relations with Latin and Arabic cultures.

215. Topics in Afro-Hispanic Literature. This course examines the literature of Spanish America and the Caribbean that focuses on the black experience. The translated literary selections, representing all genres, will be situated in their respective socio-historical contexts, as well as analyzed with respect to the broad cultural traditions of Latin America.

230. Third World Women: Latin America. Socio-economic changes occurring in the twentieth century reinforce the need for a historical perspective and understanding of women's roles, status, and

activities (social, economic, and cultural) in Latin America. This course examines Latin American women intellectuals, activists, and feminists in the context of Third World perspectives (socialist feminism, colonial domination, revolutionary societies, etc.).

255. Spanish Poetry to 1700. Development of kinds and styles of poetry in Spain, with special attention to the Renaissance and Baroque poets from Garcilaso to Quevedo. (Fall)

257. The Picaresque Novel. Reading and discussion of works by selected authors of the picaresque genre from the sixteenth and seventeenth centuries: *Lazarillo de Tormes*, *El Buscón* by Quevedo; *Guzmán de Alfarache* by Mateo Aleman, and others.

258. El Quijote. Detailed reading and discussion of *Don Quijote*. Special attention is given to Renaissance concepts of literature.

259. Cervantes and the Rise of the European Novel. Conducted in English, with readings in English. Analysis of the *Quijote* and other works of Cervantes in the light of The English Novel as formed by Defoe, Fielding, and Scott.

262. Golden-Age Drama. Lope, Tirso, and Calderón as the creators of an original non-Aristotelian theater.

263. Representation of Woman in the Hispanic Baroque. The representation of woman in the Hispanic Baroque. Woman as created by male and female authors in Spain and Spanish America. (Spring)

276. Nineteenth-Century Spanish Prose. Examines the nineteenth century as a time of confrontation and contradiction; as a bridge between tradition and modernity, reason and superstition, cultural affirmation and revolution. Explores Spanish culture from the early 1800s through the crisis of 1898 in a broader European cultural context. Readings include: Moratín, Larra, Galdós, Clarín, Valera, Pardo Bazán, Marx, Darwin, Freud, and the artistic vision of Goya. (Spring)

277. Twentieth-Century Spanish Theater.

Explores trends in Spanish theater from the early twentieth century (Valle-Inclán, García Lorca, Benavente) through post-Civil War censorship and *posibilismo* (Casona, Buero, Sastre, Arrabal, Ruibal) to the most recent innovations of the 1970s and 1980s (Ana Diosdado, Antonio Gala, Francisco Nieva, Paloma Pedrero, etc.).

278. The Generation of 1898. The "Second Golden Age of Spain" and the end of the Spanish Empire considered within the broad cultural and social panorama of end-of-the-century Europe and the confrontation between traditional national values and the promises of twentieth-century "progress." Works by Valle-Inclán, Ganivet, Baroja, Azorín, Unamuno, Machado, Ortega y Gasset, and others are studied.

280. Modern Spanish Prose. Developments in the Spanish novel after the Civil War, from its resurgence with Cela to the "new realist" and experimental novels of the 1960s, 1970s, and 1980s. Emphasis on relationships between social and aesthetic considerations. Readings include works by Sender, Cela, Grosso, Matute, Ferrer, Goytisolo, Martín Santos, Martín Gaité, and others. (Fall)

282. Modern Spanish Poetry. Analysis of selected works of poetry from the generation of 1927 to the present. May include readings by Juan Ramón Jiménez, Rafael Alberti, Jorge Guillén, Federico García Lorca, Luis Cernuda, Pedro Salinas, etc.

283. Twentieth-Century Spanish-American Drama. Currents of this period, studied through the analysis of representative works by Florencio Sánchez, Roberto Arlt, Jorge Díaz, Elena Garro, René Marqués, Griselda Gambaro, and others. May include production of a one-act play in Spanish. (Fall)

284. Spanish-American "Modernismo." Detailed study of the poetry and prose of "modernista" writers, including Martí, Gutiérrez Nájera, Casal, Darío, Silva, Lugones, Herrera y Reissig. Special attention given to the importance of "modernismo" as a renovation of Spanish-American literary language.



285. Contemporary Spanish-American Prose. A study of selected works of contemporary prose: Borges, Cortázar, García-Márquez, Fuentes, and Donoso, Rulfo, and Carpentier, with emphasis on the rise of the "new" narrative in Latin America.

286. Spanish-American Colonial Literature. Readings of important literary and historical works from the Renaissance, Baroque, and Neo-Classical periods of Spanish America. Texts will include *cartas de relación*, diaries, chronicles of discovery and conquest, poetry (epic, lyric), satire, drama, and novel (chivalric, pastoral, picaresque).

287. Modern Spanish-American Poetry. Currents of twentieth-century Spanish-American poetry, from the avant-garde movements to the poetry of social commitment. Readings from works of Huidobro, Vallejo, Neruda, Guillén, Burgos, Paz, Mistral, Parra, and Cardenal.

288. Race and Gender in Afro-Hispanic Literature. This course examines the literature of Spanish America and the Caribbean that focuses on the black experience, with an emphasis on application of theoretical issues concerning race and gender. Not open to freshmen.

289. Topics in Spanish Literature. Undergraduate seminar. Topics vary and include: Cervantes' "novelas ejemplares," the modern Spanish short story, post-Franco literature, the arts and the Spanish Civil War, and other topics that consider the relations between literature and other disciplines (the visual arts, philosophy, history, music, etc.).

290. Topics in Spanish-American Literature. Topics vary from semester to semester. Possible topics include the modern Spanish-American short story, the confessional mode in Hispanic literature, surrealism and the avant-garde in art and Hispanic literature, nineteenth- and early twentieth-century novel, Mexican literature, and other areas of interdisciplinary study.

292. Popular Culture in Hispanic Society. A consideration of popular genres such as the comic, the detective story, the *fotonovela*, the *telenovela*, and the *novela rosa* within a broader cultural context. Examines popular interpretations and reflections of high culture and the crossover between them. Considers the subversion of popular genres, the function of satire and parody, and intertextual relations in order to discuss the uses, abuses, and mass consumption of these products.

294. Spanish Film. Devoted to the analysis of recent Spanish cinema. Beginning with the early post-Civil War period, the focus is on film as a narrative response to Spanish social reality. Considers the translation of other media (novels, short stories, etc.) to film and the interpretation of history through the medium of cinema. Includes films by directors such as Buñel, Patiño, Erice, Saura, García Sánchez, Almodóvar.

391. Independent Study.

393. Senior Essay. A paper based upon independent study; may be written by concentrators. Students should normally register for this course in the fall term of their senior year.

395. Colloquium on Literary Theory.

The colloquium provides a basic foundation in the theory and practice of literary criticism through study of specific critical methods or approaches with application to Hispanic texts.

399. Practicum in Spanish. Individual projects or investigation of special problems in Spanish.

RARELY TAUGHT LANGUAGES

NOTE: Bulk of work for these courses takes place in Language Laboratory with periodic verification by teacher. Aural and oral skills are emphasized. Credit by arrangement.

315. Portuguese. Contemporary Portuguese, the Romance standard of Portugal and Brazil.

320. Modern Greek. The language as spoken and written in the contemporary world.

340. Yiddish. Yiddish as it was spoken and written by the majority of Jewish Central European immigrants.

365. Czech. The course deals with both spoken and literary Czech and the difference between these two registers.

LINGUISTICS

100. Introduction to Language. The study of human language; its structure, history, and origins; language and culture.

201. Introduction to Linguistics. Introduction to methods of studying linguistic structures and to contemporary linguistic theory.

NOTE: This course is a prerequisite to all other linguistic courses. It may be taken concurrently with permission of the linguistics undergraduate advisor.

202. Transformational Grammar and English Syntax. The study of English syntax from the viewpoint of transformational grammar.

203. Phonology. The analysis of segmental sound structure of language employing current generative theory.

204. Semantics. An introduction to linguistic semantics.

205. Historical Linguistics. Examination of language change through time and space.

210. Japanese Linguistics. The history and structure of the Japanese language.

212. Syntactic Theory I. Comparison of current generative models of syntax; emphasis on description of English.

Prerequisite: LIN 202 or permission of instructor.

213. Advanced Phonology. A study of nonlinear models of phonological components. Prerequisite: LIN 203 or permission of instructor. (Spring)

214. Semantic Theory. An introduction to formal theories of linguistics of meaning. Prerequisite: LIN 204 or permission of instructor.

215. Phonetics. Introduces the principles of articulatory phonetics, with some discussion of acoustic phonetics; practice in the production, recognition, and transcription of sounds in various languages of the world.

216. Sociolinguistics. The study of language in its social context as viewed by linguists. Major credit for only one: LIN 216 or ANT 271. (Fall)

217. Psycholinguistics. This course is concerned with the psychological processes involved in language use. Topics covered include comprehension, production, acquisition, and applied psycholinguistics. Same as PSY 234. (Fall)

218. Computational Linguistics. Introductory survey of problems involved in constructing computer programs that "understand" natural language and the methods that have been developed to overcome these problems. Prerequisites: CSC 206, 240, or LIN 201, or permission of the instructor. Same as CSC 247. (Spring)

233. History of the English Language. English sounds, inflections, syntax, and vocabulary, emphasizing the structure of present-day English. Same as ENG 200. (Fall)

234. History of the French Language. Diachronic analysis of French as one of the Romance languages: its formation, development, and present state. Examination of selected texts. Same as FR 209.

236. History of the Russian Language. The formation and linguistic evolution of Russian as a Slavic language. Same as RUS 209.

237. History of the Spanish Language. Diachronic analysis of Spanish as one of the Romance languages; its formation, development, and present state. Examination of selected texts from the earliest period to modern times. Same as SP 209. (Spring)

238. Introduction to Indo-European Linguistics. A survey of Indo-European studies. Investigation of the development of the principal groups of the Indo-European languages. Prerequisite recommended: LIN 205. (Fall)

240. Grammatical Analysis. Morphological segmentation and classification; derivational and inflectional processes; phrase structure and constituent analysis; relationship of structures and transformations. Prerequisite: LIN 203. (Spring)

242. Language Development. Children's syntactic and semantic development of language, preverbal origins of communication, discourse competence, metalinguistic awareness, and literacy. Same as PSY 274.

243. Aesthetics and Language. Focus on linguistic stylistics in the study of oral texts. Evaluation of structuralism, semiotics, pragmatics, and phenomenology toward critique of textuality and its effectiveness in extralinguistic contexts. Same as ANT 228.

244. Psychology of Language. This course is concerned with the psychological processes involved in language use. Topics covered include comprehension, production acquisition, and applied psycholinguistics. Same as PSY 234.

245. Philosophy of Language. A study of philosophical questions about language and the general nature of language. Same as PHL 247. (Spring)

246. Acoustic Phonetics. Introduction to the physical and linguistic properties of the speech wave. Practical experience in laboratory phonetics. Prerequisite: LIN 215 or permission of the instructor. (Spring)

252. Language and Geography. Systematic study of variations in language as they relate to geography. (Fall)

- 254. Introduction to the Romance Languages.** Introduction to the Romance languages, major and minor, their history, and their structure. Reference to their current geopolitical significance. Prerequisite: knowledge of basic principles of linguistics or of a Romance language. (Spring)
- 256. Hispanic Dialectology.** Survey of dialectal variation, both in the Hispanic Peninsula and in Latin America. In addition to Spanish, reference to Catalan and Portuguese. (Spring)
- 261. The Structure of Modern English.** Systematic study of modern English through linguistic description and analysis. Same as ENG 248.
- 262. Structure of ASL.** An overview of the phonology, morphology, and syntax of American Sign Language, with emphasis on comparisons between signed and spoken languages.
- 263. The Linguistic Structure of French.** Analysis of the contemporary French phonological and grammatical systems; reference to dialectal variations. A significant portion of the course is devoted to practical work on phonetics. Same as FR 208. (Fall)
- 265. Linguistic Structure of Russian.** Synchronic analysis of Russian phonology and morphology, with particular emphasis on the verb system and word-formation. Prerequisite: RUS 106 or the equivalent, or permission of the instructor. Same as RUS 256/LIN 465.

- 266. The Linguistic Structure of Spanish: Phonetics and Phonology.** An analysis of the linguistic characteristics of the Spanish sound system, including dialectal variation and problems of second-language acquisition of Spanish by English speakers. Highly recommended for prospective teachers of Spanish. Same as SPN 207. (Fall)
- 267. The Linguistic Structure of Spanish: Syntax and Semantics.** A presentation of topics from Spanish grammar within a modern linguistic framework, including the verbal system, aspectual choices, modal choices, and pronominal usage. Students are encouraged to apply their linguistics knowledge to literary or discursive examples. Same as SPN 208. (Fall)
- 268. Topics in Hispanic Linguistics.** Undergraduate seminar. Topics vary and may include Spanish dialectology, bilingualism, and Spanish sociolinguistics and pragmatics. Same as SPN 210. (Spring)
- 269. Application of Linguistics to the Teaching of Foreign Languages.** Principles of major linguistic approaches to language—descriptive, contrastive, generative-transformational, etc.—as applied to the teaching and acquisition of foreign languages. (Spring)
- 391. Independent Study in Linguistics.**
- 399. Practicum in Linguistics.** Investigation of special problems in linguistics.

GEOLOGICAL SCIENCES

- Asish R. Basu, Ph.D. (California, Davis)
Professor of Geology and Chair of the Department
- Carlton E. Brett, Ph.D. (Michigan)
Professor of Geology
- *Lawrence W. Lundgren, Jr., Ph.D. (Yale)
Professor of Geology
- Curt Teichert, Ph.D. (Albertus)
Adjunct Professor of Geology
- Udo Fehn, Ph.D. (Munich)
Associate Professor of Geology
- Gautam Mitra, Ph.D. (Johns Hopkins)
Associate Professor of Geology
- Peter G. DeCelles, Ph.D. (Indiana)
Assistant Professor of Geology
- Judy A. Massare, Ph.D. (Johns Hopkins)
Assistant Professor of Geology
- Robert J. Poreda, Ph.D. (California, San Diego)
Assistant Professor of Geology
- J. Edward Hoffmeister, Ph.D. (Johns Hopkins)
Professor Emeritus of Geology
- Robert G. Sutton, Ph.D. (Johns Hopkins)
Professor Emeritus of Geology

The Department of Geological Sciences uses one or more teaching assistants in laboratory sections of most undergraduate laboratory courses.

The Department of Geological Sciences provides its students with four distinctive degree programs and with excellent opportunities for communicating and working with its faculty members and graduate students, both in and outside of the classroom. Each of the degree programs has been designed to serve special interests of the students and the particular demands associated with professional work in various areas of the earth sciences.

The degree programs include the B.A. and B.S. programs in geology, the B.S. in biology-geology (BIG), and the B.S. in geomechanics (GEM). The three B.S. programs are designed to give students the background for graduate work and

*These faculty members have applied for one or two semesters of leave in 1991-92.

professional careers in the earth sciences, and in those areas in which the earth sciences overlap with the life sciences, on the one hand, and with engineering, on the other. The B.A. program is designed to allow more flexibility in program design and is pursued not only by students preparing for graduate work in the earth sciences but also by students interested in law, management, and teaching. These students commonly carry double majors, such as geology and economics. Students may also obtain a minor in geology.

The Department has proposed in 1989 that two additional degree programs be added, one an Environmental Studies B.A. program and the other an Environmental Science B.S. program. Students planning graduate work or careers in environmental and resource management will find it useful to examine these proposed programs in choosing courses in geology.

The Department offers a Freshman Ventures Program (Resources, Environment, and Political Choice) illustrating interactions between geology and political science.

These programs are made possible by formal and informal linkages with other departments and programs, especially the Department of Biology, the Department of Mechanical Engineering, and the Committee on Individualized Interdepartmental Concentrations. In addition, the Department is affiliated with the West Indies Laboratory on St. Croix in the U.S. Virgin Islands and has offered a program there since 1972. Students participating in this program spend a semester at the laboratory studying marine geology and marine biology and receive a full semester of credit for their work.

The Department considers field experience to be a valuable part of geological training and incorporates field trips into the regular schedule of many of the undergraduate courses. Students take excursions within New York and adjoining states.

The Undergraduate Student Geological Organization (USGO) is active in providing special field trips, speakers from other universities and colleges, and social events throughout the academic year. Undergraduates are also involved with departmental research projects working with faculty in a variety of fields, including geophysics, geochemistry, paleontology, petrology, structural geology, stratigraphy, and environmental geology.

Graduate work and careers in most fields demand a broad general background in the basic sciences and mathematics, and students are strongly advised to take courses beyond the minimum requirements in these subjects. All students are encouraged to gain a proficiency in reading scientific material written in any of a number of foreign languages.

MINIMUM REQUIREMENTS FOR THE B.A. PROGRAM

- GEO 101 and seven courses beyond 101 selected from departmental offerings: GEO 201, 221, 224, 227, 235, 283 normally included. GEO 119 or 120 acceptable if taken in the freshman year.
- Four courses in related sciences, one of which must be in mathematics.

MINIMUM REQUIREMENTS FOR THE B.S. PROGRAM

- GEO 101, 201, 221, 224, 227, 235, 283, and three other geology courses.
- Field course; this requirement may be satisfied by participation in the marine geology program at St. Croix, by a 6–8 credit summer field course in geology,

or, under special circumstances, by other types of supervised field experience.

- MTH 161 through 164 or an equivalent series.
- Two semesters of chemistry.
- Three semesters of physics (121, 122, and 123).
- One semester of statistics; STT 212 is recommended.

In addition to the above courses, students are encouraged to take a 400-level course or do a thesis in the senior year.

(Students should start taking related science courses as freshmen.)

Listed below is a sample arrangement of courses. Considerable variations from this sample are possible to accommodate special needs.

B.S. PROGRAM IN GEOLOGY

First Year

| | |
|---------|------------------------------|
| MTH 161 | MTH 162 |
| CHM 103 | CHM 104 |
| GEO 101 | GEO 201 |
| English | Elective (hum. or soc. sci.) |

Second Year

| | |
|------------------------------|------------------------------|
| MTH 163 | MTH 164 |
| PHY 121 | PHY 122, 181 |
| GEO 221 | GEO 224 |
| Elective (hum. or soc. sci.) | Elective (hum. or soc. sci.) |

Third Year

| | |
|------------------------------|----------|
| PHY 123 | Elective |
| GEO 227 | GEO 235 |
| GEO 283 | STT 212 |
| Elective (hum. or soc. sci.) | Elective |

Fourth Year

| | |
|--------------|--------------|
| GEO Elective | GEO Elective |
| GEO Elective | Elective |
| Elective | Elective |
| Elective | Elective |

B.S. IN BIOLOGY-GEOLOGY

This program is intended for students interested in the areas of natural science in which geology and biology overlap. Such areas include marine science (oceanography, marine biology, and marine geology), limnology, paleontology, evolutionary studies, and environmental studies.

Requirements

- GEO 101, 201, and 221.
- At least three additional geology courses at the 200-level or higher. GEO 224, 235, and 283 are strongly recommended.
- BIO 111, 121, and 205.
- At least one course in whole-organism biology, such as BIO 125, 130, 131, or GEO 207.
- One additional course in biology or molecular biology. BIO 150 is strongly recommended.
- CHM 103 (or 105) and 104 (or 106).
- CHM 203 and 204, or two additional courses in geology and/or biology. (Note: students intending to do graduate work in biology should seriously consider taking the four-semester chemistry sequence.)
- MTH 141, 142, and 143 (or 161, 162 for those who qualify).
- PHY 113, 114 (or 121, 122).
- STT 212 (a computer course may be substituted).
- Field course: This requirement may be satisfied by participation in the marine science internship at St. Croix, by a 6–8 credit summer field course in geology or biology, or, under special circumstances, by other types of supervised field experience. Students participating in the St. Croix internship also may count their work there in lieu of one biology elective and one geology elective.

In addition to the above courses, students are encouraged to take a 400-level course or do a thesis in the senior year.

B.S. IN GEOMECHANICS

A four-year program in geomechanics is offered jointly with the Department of Mechanical Engineering for students interested in the application of the field of mechanics to problems associated with the atmosphere, rivers, lakes and oceans, and the solid earth. Students following this program should be well equipped for graduate work in a variety of fields, including geophysics, hydrology, structural geology and rock mechanics, engineering geology, limnology, and coastal and marine geology. (See also a description of the program in the section on Interdisciplinary Programs, College of Engineering and Applied Science.)

Requirements

For preparation in mathematics, the program requires MTH 161, 162 (or 141–143), 163, and 164. The required physics courses are PHY 121, 122, 123; the required chemistry course is CHM 103 (or CHM 105). In geology, GEO 101, 201, 224, and 283 are required and, in mechanical engineering, the requirements are ME 120, 123, 225, 226, and either 241 or 242.

In addition to the above courses, there are four technical electives, which may be any of the GEO or ME courses at the 200 level or higher, and one technical elective from any discipline, as agreed upon with the faculty advisor. The program includes three free electives to allow a strong minor in an area of particular interest to the student, or to broaden the scope of the curriculum.

REQUIREMENTS FOR A MINOR IN GEOLOGY

Six courses are required:

- GEO 101. Introduction to Physical Geology
- GEO 201. Evolution of the Earth
- Any four of the following:
 - GEO 221. Principles of Paleontology
 - GEO 224. Mineralogy
 - GEO 235. Physical Sedimentology
 - GEO 241. Petrology
 - GEO 281. Introduction to Geophysics
 - GEO 283. Structural Geology

A student taking this minor would have a broad grasp of geology and would be able to build upon it as a solid foundation for a major should his or her career plans change.

REQUIREMENTS FOR A MINOR IN ENVIRONMENTAL GEOLOGY

Six courses are required (four specified and two electives):

Specified

- GEO 101. Introduction to Physical Geology
 - GEO 220. Energy and Mineral Resources (GEO 119 or 120 may be substituted if taken in the freshman year)
 - GEO 247. Environmental Geochemistry
 - GEO 319. Geology and Public Policy
- Elective* (Any two of the following):
- GEO 212. Oceanography
 - GEO 230. Hydrogeology
 - GEO 235. Physical Sedimentology
 - GEO 283. Structural Geology
 - GEO 340W. Environmental Decisions

The environmental geology minor is intended especially for natural-science and social-science concentrators who are planning on further study or employment in environmental fields. It can also serve as the core for planning an Individualized Interdepartmental Environmental Concentration Program.

REQUIREMENTS FOR A MINOR IN MARINE GEOLOGY AND ECOLOGY

Five courses are required:

- GEO 101. Introduction to Physical Geology
- GEO 201. Evolution of the Earth
- GEO 221. Principles of Invertebrate Paleontology
- GEO 397. Marine Geology (St. Croix)
- GEO 398. Marine Ecology (St. Croix)

This minor provides students with the opportunity to take courses and do independent research at an active marine sciences laboratory. Two of the required courses are normally taught as part of

a fall semester internship at the West Indies Lab, St. Croix, U. S. Virgin Islands. Work at another marine lab may be substituted. Students enrolled in the internship program receive 16 credits towards graduation for their semester's work in St. Croix. Eight of those credits (two courses) count towards the minor.

GEOLOGY INTERNSHIP IN MARINE SCIENCES

Upperclassmen majoring in geology, biology-geology, and biology are encouraged to devote a semester to the study of marine sciences at the West Indies Laboratory located on St. Croix in the U.S. Virgin Islands. This program is administered by Fairleigh Dickinson University.

A sampling of topics that may be covered in the courses include marine ecology, marine biology, marine geology, and independent research.

Prerequisites for selection for the internship program are GEO 101, GEO 201, BIO 111, and either BIO 122 or GEO 221. In addition, all participants must pass a swimming test and are encouraged to have some training in scuba diving.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

101. Introduction to Physical Geology. Composition and formation of rocks and minerals. Processes active on the surface and interior of the earth. (Fall)

119. Environmental Management. An examination of natural resources such as oil, coal, uranium, seabed minerals, etc. that are of benefit to society. Basic geologic knowledge about each resource is presented, then risks associated with use are examined, as well as the uses of risk analysis in making resource policy. (Spring)



120. Energy and Mineral Resources. Energy sources presently in use, their availability, and their environmental and economic consequences. Alternative energy sources, their potentials and problems. The distribution and formation of mineral resources. Reserves, rates of production, and consumption of important minerals. (Spring)

201. Evolution of the Earth. Dynamic history of the earth, its age and evolution, and the origin and evolution of life as revealed by the geologic and fossil record. Prerequisite: GEO 101. (Spring)

205. Vertebrate Evolution. A survey of the fossil record of vertebrates, tracing the origin and evolution of the major vertebrate orders. Prerequisite: GEO 201 or permission of instructor. (Fall)

212. Oceanography. A comprehensive survey of the chemistry, physics, biology, and geology of ocean basins and sea water. Topics include: origin of ocean basins and sea water, climate control, coastline modification, and biological productivity. (Spring)

220. Energy and Mineral Resources. Same as GEO 120, but with more emphasis on science background in separate readings and discussion section. Intended for students in sciences and engineering. (Spring)

221. Principles of Invertebrate Paleontology. Introduction to the principles of paleontology and a review of the invertebrate organisms of the past. Field trips. Prerequisite: GEO 201. (Fall)

222. Advanced Paleontology. Intensive study of the applications and theoretical aspects of paleontology. Topics include biostratigraphy, paleobiogeography, macroevolution, and evolutionary his-

tory of the biosphere. Daily reading assignments; seminars several days of semester. (Spring)

224. Introductory Mineralogy. Introduction to crystallography, structure, crystal chemistry, classification and origin of important rock-forming minerals. Prerequisite: GEO 101 or permission of instructor. Two lectures and one laboratory. (Spring)

227. Optical Mineralogy. Principles of optical crystallography and their application in the identification of rock-forming minerals, mostly the silicates, with the polarizing microscope. Prerequisite: GEO 224 or permission of instructor. Two lectures and one lab. (Fall)

235. Physical Sedimentology. The basic principles of physical and chemical sedimentology are studied and applied to modern marine and nonmarine environments. The results are utilized to interpret the stratigraphic record. Prerequisite: GEO 201. (Spring)

241. Petrology. Distribution, description, classification, and origin of igneous and metamorphic rocks in the light of theoretical-experimental multicomponent phase equilibria studies; use of trace elements and isotopes as tracers in rock genesis; hand specimen and microscopic examinations of the major rock types. Prerequisite: GEO 224. Two lectures and one lab per week. (Spring)

247. Environmental Geochemistry. A course in the chemical and physical processes which shape our environment. These include groundwater flow, contaminant migration, ocean-atmosphere interactions, and chemistry of lakes, streams, and the oceans. Prerequisites: GEO 101, CHM 103, MTH 141.

248. Introduction to Geochemistry.

Origins of the earth, atmosphere, and oceans; thermodynamics, phase equilibria, element distributions, isotope geochemistry (both radioactive and stable), weathering, aqueous solutions, diagenesis, and major geochemical cycles. Prerequisites: GEO 101, CHM 103, 104, MTH 143 (or consent of instructor). (Fall)

251/252. Geological Field Trip. Consists of five-day geological field trips held after exam period at the end of spring semester. Preceded by introductory lectures. Pass-fail grading is based on participation and evaluation of field notebook.

277. Paleocology. Environmental reconstruction based on evidence from fossils and their relations with the enclosing sediment. Emphasis on the paleoecological applications of faunal distributions, adaptive morphology, taphonomy, and biogenic sedimentary structures. Field trips. Prerequisites: GEO 201 and 221. (Spring)

281. Introduction to Geophysics.

Composition of the earth, radioactivity and age of the earth, gravity field and rotation, earthquakes and propagation of seismic waves, magnetic field, paleomagnetism, heat generation and heat flow, plate tectonics, and convection in the earth. Prerequisites: MTH 143, PHY 114, or equivalent. (Fall)

283. Structural Geology. Geometric analysis of deformed rock. Mechanical properties of rock. Theories of rock deformation. Prerequisites: GEO 101, 201, 224. (Fall)

285. Structure and Tectonics of Mountain Belts. Structural style and tectonic history of mountain belts, with special reference to Appalachians, Cordilleras, and Alps. Orogeny and its relationship to plate tectonics. Prerequisite: GEO 283 or equivalent. (Spring)

319. Geology and Public Policy. The use of various types of geologic prediction in dealing with geological hazards and environmental modification. For students in both the natural and social sciences. An SAS writing course. (Fall)

340. Environmental Decisions. Lecture and seminar analyzing decisions about some major classes of environmental changes as seen from the viewpoint of scientists and risk analysts. For seniors and graduate students; permission of the instructor is required. An SAS writing course. (Spring)

390. Supervised College Teaching. (Fall and Spring)

391. Independent Study in Geology. (Fall and Spring)

392. Special Topics Seminar. (Fall and Spring)

393. Senior Thesis. An individual research course for seniors who have completed the basic program of undergraduate courses required for a major. (Fall and Spring)

394. Internship in Geology. Experience in an applied setting supervised on site. Approved and overseen by a University instructor. Prerequisites: GEO 101, 201, and BIO 122. (Fall and Spring)

396. Tropical Marine Biology. An introduction to the biology of tropical marine invertebrates and fishes, illustrated by examples from the local waters of the Virgin Islands. Emphasis is placed on groups which are most important in the local reef ecosystem. Lectures on the taxonomy, structures, and function of marine organisms are supplemented by daily field trips and laboratory investigation of representative reef invertebrates, fishes, and plants. Prerequisites: GEO 101, 201, and BIO 122. (Fall)

397. Marine Geology. This course emphasizes the processes of reef development and sedimentation in shallow-water tropical areas. Lectures are supported by daily laboratory and field exercises. Emphasis is placed on recent and ancient geologic environments occurring on St. Croix. Prerequisites: GEO 101, 201, and BIO 122. (Fall)

398. Marine Ecology. Ecological studies of marine organisms and habitats surrounding St. Croix. Emphasis is placed on the illustration and application of ecological theory in field work on coral reefs and associated habitats. Students collect and analyze data and present oral and written reports. Prerequisites: GEO 101, 201, and BIO 122. (Fall)

399. Independent Research Project. The student prepares a formal research proposal with a literature review and detailed work plan. The proposal is implemented in an independent project, directed by a faculty member, which culminates in the preparation of a scientific paper. Emphasis is placed on critical experimental/observational design, data collection and analysis, and scientific writing. Prerequisites: GEO 101, 201, and BIO 122. (Fall)

HEALTH AND SOCIETY

This is an interdepartmental concentration program leading to a bachelor's degree. The concentration program is administered by the College Center for Interdisciplinary Studies (which is located in 206 Lattimore Hall) and is supervised by the Health and Society Committee.

COMMITTEE ON HEALTH AND SOCIETY

Dean Harper, Ph.D. (Columbia)
Professor of Sociology and of Psychiatry

Charles E. Phelps, Ph.D. (Chicago)
Professor of Political Science and of Economics; Chair of the Department of Community and Preventive Medicine; Chair of the Committee

Walter Hinchman Sangree, Ph.D. (Chicago)
Professor of Anthropology

Tyll van Geel, Ed.D. (Harvard), J.D. (Northwestern)
Professor of Education and of Political Science

Theodore M. Brown, Ph.D. (Princeton)
Associate Professor of History and of Community and Preventive Medicine

Bruce Jacobs, Ph.D. (Harvard)
Associate Professor of Political Science and Director of the Public Policy Analysis Program

Stephen J. Kunitz, Ph.D. (Yale)
Associate Professor of Community and Preventive Medicine

Deborah Ossip-Klein, Ph.D. (Pittsburgh)
Associate Professor of Psychology

Edward Wierenga, Ph.D. (Massachusetts)
Associate Professor of Religion

Health and society is an interdisciplinary area of study drawing upon a wide range of fields and intended for students considering careers in health care administration, health policy and planning, or the social services. Health and society concentrators planning careers in medicine should consult with a health professions advisor about premedical requirements.

The bachelor's degree with honors is awarded according to three criteria: (1) "B+" or better performance in the following honors courses taken for the Health and Society concentration: the methods course, its affiliated core course, and CAS 301, Senior Seminar in Health and Society, in which the thesis will be written; (2) completion of a senior thesis; and, (3) an oral defense of the thesis. Detailed information about the requirements is available in the College Center for Interdisciplinary Studies in 206 Lattimore Hall.

The bachelor's degree with distinction is awarded to students with a sufficiently high concentration grade-point average: 3.25 for distinction, 3.50 for high distinction, and 3.75 for highest distinction.

It is possible for students to earn the degree with both distinction and honors.

REQUIREMENTS FOR CONCENTRATION IN HEALTH AND SOCIETY

A total of 12 courses, distributed as follows:

Preconcentration Requirements (two courses)

- CAS 116. Introduction to Community Medicine
- STT 211. Applied Statistics for the Social Sciences I

A Methods Perspective

(one course from the following list)

- ECO 207. Intermediate Microeconomics
- EDA 450. Legal Research and Reasoning for Educators
- PHL 103. Contemporary Moral Problems
- PHL 252. Philosophy of Science
- PSC 201. Political Inquiry
- PSY 219. Research Methods in Psychology
- SOC 211. Design of Social Research

A student's program must include at least one other course in the same discipline as the methods perspective. This course must be from the core or electives list.

Health and Society Core Courses

(four from the following list)

- ANT 216. Medical Anthropology
- ECO 236. Health Policy
- EDA 253. Legal Issues in Medicine and Education
- HIS 279. Health, Medicine, and Social Reform
- HIS 280. Changing Concepts of Disease
- PHL 225. Ethical Decisions in Medicine
- PSC 245. Aging and Public Policy
- PSY 283. Behavioral Medicine.
- SOC 262. Medical Sociology
- CAS 392. Health Services Practicum
- CAS 394. London Internship in Medical Research*

Elective Courses

Four from an extensive list available in the Center office.

Senior Seminar

(one course)

- CAS/SOC 301. Senior Seminar in Health and Society

After preliminary discussion with a staff member in the College Center for Interdisciplinary Studies, intended health and society concentrators should work with an advisor chosen from among the members of the Committee in developing their proposed course of study. Depending upon the student's special interests and future plans, a proposal might concentrate, for example, on the conceptual foundation of modern medicine; the politics, economics, and management of health care; biomedical ethics; or specific problems such as the elderly in modern society.

*Please note: Either CAS 392 or CAS 394 may be counted toward the core requirement. If both are taken, one must be designated as an elective.

HISTORY

REQUIREMENTS FOR A MINOR IN HEALTH AND SOCIETY

The minor is intended for students who wish to apply the skills of their major concentration to the areas of medicine, health care administration, health policy and planning, or the social services. The minor will also be attractive to students who want to explore a secondary interest in the health field.

Five courses are required:

- CAS 116. Introduction to Community Medicine
- Four courses chosen from the following list:
 - ANT 216. Medical Anthropology
 - ECO 236. Health Policy
 - EDA 253. Legal Issues in Medicine and Education
 - HIS 279. Health, Medicine, and Social Reform
 - HIS 280. Changing Concepts of Health and Illness
 - PHL 225. Ethical Decisions in Medicine
 - PSC 245. Aging and Public Policy
 - PSY 283. Behavioral Medicine
 - SOC 262. Medical Sociology
 - CAS 392. Health Services Practicum

None of the courses included in the student's major may be counted toward the minor.

The minor is administered by the College Center for Interdisciplinary Studies, which is located in 206 Lattimore Hall, and is supervised by the Health and Society Committee. Students who need help planning their minor program should seek advice from members of the Committee (listed above). The minor form must be submitted to the Center office for approval. At that time the student's minor program will be checked against the concentration program for overlaps. Students will be notified of their acceptance by mail.

Further information is available from the staff in the College Center for Interdisciplinary Studies.

- Stanley L. Engerman, Ph.D. (Johns Hopkins) *Professor of Economics and of History*
- John A. Guy, Ph.D. (Cambridge) *Professor of History*
- William B. Hauser, Ph.D. (Yale) *Professor of History*
- Joseph E. Inikori, Ph.D. (University of Ibadan, Nigeria) *Professor of History and of African and African-American Studies*
- *Richard W. Kaeuper, Ph.D. (Princeton) *Professor of History*
- MacGregor Knox, Ph.D. (Yale) *Professor of History*
- Christopher Lasch, Ph.D. (Columbia) *Don Alonzo Watson Professor of History and Chair of the Department*
- William J. McGrath, Ph.D. (California, Berkeley) *Professor of History and Director of Undergraduate Studies*
- Brenda Meehan-Waters, Ph.D. (Rochester) *Professor of History*
- Dean A. Miller, Ph.D. (Rutgers) *Professor of History*
- John J. Waters, Jr., Ph.D. (Columbia) *Professor of History*
- Mary Young, Ph.D. (Cornell) *Professor of History*
- Theodore M. Brown, Ph.D. (Princeton) *Associate Professor of History and of Community and Preventive Medicine*
- Lynn D. Gordon, Ph.D. (Chicago) *Associate Professor of Education and of History*
- *Elias Mandala, Ph.D. (Minnesota) *Associate Professor of History*
- Jesse T. Moore, Ph.D. (Pennsylvania State) *Associate Professor of History*
- *Celia Applegate, Ph.D. (Stanford) *Assistant Professor of History*
- Daniel Borus, Ph.D. (Virginia) *Assistant Professor of History*
- Jeffrey Burds, Ph.D. (Yale) *Assistant Professor of History*
- Alice Conklin, Ph.D. (Princeton) *Assistant Professor of History*
- Larry E. Hudson, Ph.D. (Keele) *Assistant Professor of History*
- Mark Motley, Ph.D. (Princeton) *Assistant Professor of Education and of History*
- Stewart Weaver, Ph.D. (Stanford) *Assistant Professor of History*
- *Robert Westbrook, Ph.D. (Stanford) *Assistant Professor of History*
- Milton Berman, Ph.D. (Harvard) *Professor Emeritus of History and Senior Faculty Associate*
- Abraham Karp, M.H.L. (Jewish Theological Seminary) *Professor Emeritus of History and of Religion and Philip S. Bernstein Professor Emeritus of Jewish Studies*
- Perez Zagorin, Ph.D. (Harvard) *Wilson Professor Emeritus of History*

The Department of History uses 10 to 15 teaching assistants in large lecture courses as graders or section leaders.

The Department of History offers programs of study leading to the B.A. degree and to the B.A. degree with honors (and, on the graduate level, to the M.A. and Ph.D. degrees). The department also offers a minor in history. Nonmajors are welcome in all history courses and often become enthusiastic, successful students of history while pursuing other vocations. The history concentration is valuable not only for secondary and university teaching, but also for careers in law and politics.

The Department offers a wide range of courses in its undergraduate program: social, economic, cultural, intellectual, political, and psychological approaches to historical problems and periods. Most 100- and 200-level courses in the Department are accessible to students with a wide variety of backgrounds. In addition, the faculty offers 300-level seminars and courses designed for concentrators or other students interested in exploring more specialized historical problems. With approval, selected seniors may take 400-level graduate seminars.

*These faculty have applied for one or two semesters of leave in 1991-92.

The Department offers three geographical areas of concentration (Europe, the United States, and the Third World). The Department maintains advisors in all three areas.

REQUIREMENTS FOR CONCENTRATION IN HISTORY

Before admission to concentration in history, students must satisfactorily complete at least two history courses. Students may then count these two courses toward fulfillment of the history concentration requirement, which consists of a total of 12 courses (or 48 credit hours), including:

- Eight to 10 history courses (or 32 to 40 credit hours) including one primarily concerned with the period before 1789 and one with the period after 1789.
- Either the HIS 100–101 sequence (Foundations of Western Culture) or the HIS 102–103 sequence (Survey of Western Civilization). Normally this requirement will be satisfied in the freshman or sophomore year.
- Five history courses (or 20 credit hours) in the student's geographical area of concentration.
- Two to four courses in an allied field, of which at least two must be nonintroductory. Political science, English, foreign languages, literatures, and linguistics, philosophy, psychology, and sociology are the most common allied fields.
- The junior seminar (see page 108).

REQUIREMENTS FOR HONORS IN HISTORY

To graduate with honors in history, students must complete the concentration program described above and meet the following additional requirements:

- A departmental cumulative grade-point average of 3.2 or other demonstration of outstanding work in history.
- Satisfactory work in one 300-level history seminar in addition to the junior seminar.

- A distinctive essay of high quality, approximately 35 pages in length. The essay may be a seminar paper, further researched and suitably expanded, or it may be the product of HIS 393 (Senior Project). In addition to the student's advisor, a second reader will evaluate the essay.

REQUIREMENTS FOR A MINOR IN HISTORY

Six courses are required.

- Two of the following:
 - HIS 100. Foundations of Western Culture I
 - HIS 101. Foundations of Western Culture II
 - HIS 102. Survey of Western Civilization I
 - HIS 103. Survey of Western Civilization II
 - HIS 131. The History of the United States I
 - HIS 132. The History of the United States II
- Four additional courses beyond the introductory level

The minor must include at least one course from each of the department's areas of concentration: Europe, United States, and Non-Western. In addition, one of the six courses must be primarily concerned with the period before 1789 and one with the period after 1789.

OTHER DEPARTMENTAL REGULATIONS

- Transfer students must take at least four courses in the Department, thus meeting half the concentration requirements in residence.
- No more than two courses in an approved summer school may count toward concentration credit; advisor's approval is necessary.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991–92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

EUROPE GENERAL

100. Foundations of Western Culture I. This Freshman Venture explores selected themes within the Western tradition from Ancient Greece to the end of the Middle Ages. It considers the broadest range of historical forces: political, socioeconomic, intellectual; and in particular traces the origin and evolution of the state. (Fall)

101. Foundations of Western Culture II. The second term of the Freshman Venture considers the period from the late Middle Ages to the French Revolution. Particular emphasis is given the development of the scientific tradition as it emerged from the political and cultural context of early modern society. Prerequisite: HIS 100. (Spring)

102. Survey of Western Civilization I. The forging of European society from the fall of Rome to 1789. (Fall)

103. Survey of Western Civilization II. Europe's transition from traditional to modern society under the impact of the Industrial and French revolutions. (Spring)

ANCIENT WORLD TO RENAISSANCE

110. Greek History and Civilization. A study of the two "classical" civilizations, stressing comparisons of society, political power, religious experience, and cultural modes. Same as REL 140 and CLA 110. (Spring)

111. Byzantine Civilization. A study of the cultural foundations of Byzantium, its accomplishments in thought, art, and literature. (Fall)

208. Hellenistic and Imperial Civilization. A study of the changing aspects of the world from the early fourth century B.C. to the third century A.D.

209. High Medieval Europe. Europe from 1050–1300; economic, urban, and demographic growth; lords and peasants; spirituality, reform, and heresy; the emerging secular state; and “humanism” and “renaissance” in the High Middle Ages.

210. Kings, Knights, and Outlaws. An interdisciplinary investigation of society and literature of fourteenth century England, with emphasis on war and chivalry. Same as ENG 320.

220. British History to 1485. Political, social, economic, and religious themes in the construction of medieval England from Arthur through the Tudors.

258. Jews, Pagans, and Christians in the Hellenistic Age. Same as REL 258.

260. Advanced Mythology. This course analyzes myth and myth-making, especially from the perspectives of comparative religion, literary and textual criticism, depth psychology, and structural anthropology. Specific texts are examined in depth and in detail. Check with instructors/departments for prerequisites. Same as CLA 209 and REL 209.

261. The Northern Renaissance and Reformation. A study of religious, political, and cultural developments in northern Europe in the fifteenth and sixteenth centuries in relation to Renaissance humanism and the Protestant revolt against the Catholic Church. Prerequisite: HIS 100 or HIS 102.

272. Powerful People. Credit—4 hours. Kings, heroes, holy men, and others. A survey and analysis of authority and domination. Same as REL 272.

291. Cultural History of Ancient Greece. Credit—4 hours. Topics in the political, artistic, religious, and cultural history of ancient Greece during the Golden Age.

292. Kingship and Law in Medieval Europe. Credit—4 hours. Justice and public order as factors in the creation of medieval states in France and England, ca. 1000–1300. (Fall)

MODERN EUROPE

128. Russian Civilization. Study of Russian culture through an analysis of major themes and developments in Russian art, literature, music, and religion. Same as LIT 128.

129. History of Imperial Russia, 1689–1917. Survey of the major social, political, and economic developments of Imperial Russia in the eighteenth and nineteenth centuries.

200. Energy and the Environment, from the Death of Newton to the Birth of Atomic Physics. Analysis of the principal developments in the physical geological and biological sciences in the eighteenth, nineteenth, and early twentieth centuries, focusing on the growing understanding of energy and the environment. Major areas considered include the exploration of energy transformations within the maturing sciences of physics and chemistry, the coming of age of geology, physiology and evolutionary biology, the development of steam power in the Industrial Revolution and its connection with the emergence of thermodynamics, and the dawning of ecology and atomic physics. Reciprocal relationships between the several sciences, between science and technology, and between science and society will be given special attention. No prerequisites. Ventures students only. (Spring)

201. Scientific Revolution. The crucial transformations of the sciences in Western thought, 1500–1700. Consideration will be given to the social, political, economic, religious, and cultural aspects of the sciences, as well as to their changing philosophical and technical content.

204. France Since 1870. Credit—4 hours. The course examines France in an age of revolution and traces its transformation from absolutism to the threshold of democracy.

214. Old Regime France. A survey of France 1650–1789, combining themes from social, political, and cultural history.

215. European Cultural History, 1789–1848. The intellectual developments in Europe from 1789 to 1848, and the relationships among different fields

of activity, such as philosophy, art, religion, and politics. (Spring)

216. European Cultural History, 1848–1900. This course explores the beginning of the disintegration of European liberalism and the emergence of basic elements of twentieth-century culture. (Fall)

217. Twentieth-Century European Cultural History. Artistic, philosophical, and psychological movements are examined within the context of the period's political and social upheavals. (Spring)

218. The Holocaust. See REL 218.

221. Tudor England. A study of selected aspects of the political, religious, and sociocultural history of England from 1485 to 1603.

222. Stuart England. A study of the political, religious, and sociocultural history of England under the Stuarts, with special emphasis on the revolution of mid-century.

223. Revolutionary France, 1750–1871. Social and political analyses of France's three revolutions and the formation of a class society.

224. Europe from the French Revolution to the First World War. A survey of European society and politics in the age of revolution, nationalism, class struggle, and reform.

225. Germany from Frederick the Great to William II, 1740–1914. The rise of the Prussian power-state, Bismarck's “unification” of Germany through blood and iron, and Germany's grasp at world power to August 1914. (Fall)

226. Hitler's Germany, 1914–1945. Germany in World War I, the collapse of the Weimar Republic, National Socialism from beer hall to European hegemony, and the destruction of German unity. (Spring)

229. History of the U.S.S.R. The Bolshevik Revolution, with emphasis on the origins and development of economic, political, and cultural institutions from 1917 to the present.

230. Russian Religious Ideas. A history of Russian religious ideas and controversies from the tenth century to the present. Same as REL 230.

241. Economic Development of the North Atlantic Community. Britain since the seventeenth century; the connections between Britain and North America. Same as ECO 226.

248. United Italy, 1861–1985. Italian politics and society from Cavour through Mussolini to Christian Democracy.

250. Great Britain I: 1714–1851. Drawing on a variety of political, social, and literary material, this course explores the domestic history of the world's first modern nation.

251. England and Ireland Since 1815. Drawing on the same variety of materials as HIS 250, this course explores a society first at the height of its power and then in slow, colorful decline through the twentieth century.

253. The Soviet Union Through Film and Literature. A history of the Soviet Union from 1917 to the present through a critical analysis of Soviet literary, political, and cinematic sources.

257. Immigrant Jew in America. See REL 257.

263. The Enlightenment. Selected topics in the intellectual and cultural history of the eighteenth century, with emphasis on the French philosophers, especially Montesquieu, Voltaire, Diderot, and Rousseau.

269. Modern European Social History. Credit—4 hours. This course examines the transformation of European society from the mid-eighteenth century to World War II.

270. British Imperialism. A case study in the theory and practice of Empire from the eighteenth to the twentieth centuries.

282. Europe in the Twentieth Century. A survey of European society and politics in the age of democratic crisis, total war, and reconstruction.

295. War in the Industrial Age, 1861–1980. Credit—4 hours. The evolution of warfare from 1861 to the present under the impact of industrial, scientific, social, and political change.

298. Europe Since World War II. Traces the economic and political integration of Western Europe and the rise and fall of communism in Eastern Europe.

299. England and the Industrial Revolution. Credit—4 hours. Dwelling more on cultural than technological issues, this course explores contemporary reaction to the world's first industrial experience.

UNITED STATES

131. The History of the United States I. A general history of the United States from colonial times to the Civil War. (Fall)

132. The History of the United States II. A general history of the United States from the Civil War to the present. (Spring)

134. European Discoveries of America in Film. Analyses of the accounts of the Vikings, Columbus, Hakluyt, etc., and films based in part on these primary documents.

140. The Western Hero. A textual and visual analysis of the "knight" archetype, the medieval morality play villain, and the western hero as seen in various film classics.

141. Afro-American History to 1900. An introduction to the study of the black American. (Fall)

142. Black America Since 1900. A continuation of the study of the black American. (Spring)

145. United States Since 1945. Some observers believed that the year 1945 marked the great American century—both domestic and foreign peace would prevail. Such was not the case. This course offers an in-depth view of the hopes and even more fears as American society marched toward the decade of the 1980s.

147. Early American History and American History and American Studies: The Classical Period, 1611–1840. The colonial and early national searches and creations of the "American" as reflected in myths, politics, and literature. Open to A.P. American history freshmen and all upperclassmen. Linked to ENG 147.

148. Indians and Other Americans. Interactions between North American Indians and Euro-Americans from colonial times to the present, including the development of Pan-Indian movements.

149. American Characters. American history through biography, group biography, and autobiography.

203. Religion in American Life. A historical examination of the Protestant, Roman Catholic, and Jewish experience within the American context. Same as REL 203.

205. American Economic Growth. Analysis of the main features of economic growth since 1800; recent statistical studies of national product, industrial structure, and capital formation are evaluated. Same as ECO 227.

206. The Promise of American Life: A Tradition of Dispute. Credit—4 hours. Study of a tradition preeminent in the United States since the seventeenth century: debating the meaning and "promise" of America. Readings from significant participants in this tradition of dispute like John Winthrop, Benjamin Franklin, Thomas Jefferson, Alexis de Tocqueville, R. W. Emerson, Abraham Lincoln, Tom Watson, W. E. B. Du Bois, Eugene Debs, Herbert Croly, Woodrow Wilson, John Dos Passos, Martin Luther King, Tom Hayden, and Ronald Reagan.

207. Economics of Afro-American Slavery. The profitability and economic viability of the slave system and the effect of slavery on distribution of income as well as on the level and rate of growth of Southern per capita income. Prerequisite: ECO 101 or permission of the instructor. Same as ECO 228.

231. American Colonial History. A study of the English discovery, settlement, and development of America, 1580–1763.

232. The Revolutionary Era, 1763–1800. From imperial reform to rebellion, confederation, and federalism.

233. Democratic America, 1800–1850. Jefferson, Jackson, party formation, popular culture, and sectionalism.

235. Industrial America, 1877–1914. Formation of industrial capitalism and the response of populists and progressives.

236. Recent America, 1914–1970. The First World War, the Great Depression, New Deal politics, and the super-power role of the United States at home and abroad. (Spring)



239. Catholicism in American Life. See REL 239.

243. American Social History I. The development of American society and culture from the seventeenth century to the Civil War. (Fall)

244. American Social History II. The development of American society and culture from the Civil War to the present. (Spring)

245. Cultural History of the U.S., 1830–1890. Victorian culture in America and its critics. Antebellum reform, debate over slavery, Darwinism, the crises of religious belief, and proprietary capitalism.

246. Cultural History of the U.S., 1890–Present. The “disenchantment of the world,” the rationalization of life, and the failed promise of science; Krutch’s *Modern Temper*, Lippmann’s *Preface to Morals*, Russell’s *Marriage and Morals*, etc.

271. Utopias and the American Communal Tradition. Study of Renaissance and other utopian texts, their usage, and their transformation in American culture.

274. American Radicalism, 1880–1980. Radical politics and social theory in modern U.S.: populism, socialism, communism, black nationalism, the New Left, feminism.

281. Social History of Twentieth-Century America. The triumph, crisis, and restructuring of industrial capitalism; social change and social movements in twentieth-century America.

285. America and the “Good War.” The impact of World War II on the society and culture of the United States, particularly the effect of the traumatic events of the war—the Holocaust, Japanese internment, the dropping of the atomic bomb—on the American moral imagination.

287. History of the American South, 1792–1896. The South as it developed as a distinct cotton region. The structure of Southern society is analyzed in light of Gavin Wright’s contention that cotton gave the South a social unity that

it would not otherwise have had. The course looks at the many points in Southern history and assesses their impact on the several social groups which constituted Southern society.

288. History of the American South, 1896–1945. This course looks at the political and social relations which developed in the New South and examines the forces which gave the South its distinctiveness during this post-Civil War period. Explores the impact of events and processes such as industrialization, migration, World War I, and the Great Depression.

294. Protest Movements in Twentieth-Century America. Credit—4 hours. An examination of movements in twentieth-century America which had as their objective to exercise a degree of power over their destiny.

299. Artisans, Peasants, and the Crowd in the Early Modern World. Credit—4 hours. A search for the "roots" of pre-industrial British and American common-peoples using folklore, quantification, and the "new social history."

THIRD WORLD

AFRICA

202. The Third World. The origins of colonization and "underdevelopment" in the rise of European capitalism.

265. Africa and the West to 1885. Stresses major themes and processes which contributed to the internal development of sub-Saharan African societies from 1500 to 1885. No prerequisites. (Spring)

266. Colonial and Contemporary Africa. The course explores the impact of capitalism on African socio-economic institutions during and after the era of formal colonialism. No prerequisites. (Fall)

297. Southern Africa: A History of Apartheid. Credit—4 hours. The interactions and conflicts between black Africans and Europeans from the time of permanent white settlements in Southern Africa to the present.

ASIA

105. The Asian Search for Self. See REL 105.

106. From Confucius to Zen. See REL 106.

177. Traditional Japanese Culture. Explorations in the cultural and institutional history of Japan from premodern to modern times. (Fall)

178. Traditional Chinese Civilization. Same as LIT 178 and REL 144.

276. Japan and Pearl Harbor. Japanese national security, Western imperialism and racism, and the economic, social, diplomatic, and political roots of the Pacific War.

277. Modern Japan. Japan's passage into modernity, industrialization, imperialism; war and the reconstruction of a new society since 1945. (Spring)

286. Film Images of War in Asia. Wartime and postwar U.S. and Japanese films with patriotic, racist, and humanistic themes, supplemented by novels, criticism, and history readings.

296. Women in East Asia: Japan, China, and Korea. A history of women in the family, women and work, women in society in three East Asian cultures.

MIDDLE EAST

107. History of Islam. See REL 107.

121. A History of Judaism. See REL 103.

219. Judaism and Christianity. See REL 236.

237. Jewish Legal Tradition. A history of the development of Jewish law from biblical days to the state of Israel. Same as REL 237.

249. Roots of the Middle East Crisis. Examines the political, socio-economic, religious and other elements combining to produce the modern Middle East; from the late antique world to the rise of Arab nationalism. Same as REL 275.

264. Modern Jewish Thought. Same as REL 264.

278. Islam and the Third World. See REL 278.

LATIN AMERICA

242. Economics and Societies of Latin America. See AAS 252.

INTERDISCIPLINARY AND GENERAL COURSES

275. World Politics Since 1941. The principal actors, forces, and currents in world politics from Hitler's failure to take Moscow and the attack on Pearl Harbor to the present.

290. The Origin of World Politics, 1890–1945. Credit—4 hours. International conflict from the opening up of the Far East in the 1890s to Hitler's destruction of European independence in 1941–45.

293. Strategy. The development of Western strategic thought from the Napoleonic wars to the present.

WOMEN AND THE FAMILY

247. The History of the Family. Traces the rise of the modern family in Western Europe and the United States from the seventeenth to the twentieth century.

254. History of Feminism. A survey of feminist ideas and political movements in the United States and Europe.

255. The Rise of Modern Woman. The social, economic, and cultural roles of women in the development of modern eighteenth- and nineteenth-century society. Same as WST 201.

279. Health, Medicine, and Social Reform. Pursuit of the theme of public health and medical reform in leading writers, from different positions along the political spectrum, committed to the social and economic reorganization of modern society.

280. Changing Concepts of Disease. Historical account of the way disease has been conceived in the Western tradition. Emphasizes the scientific, epidemiological, philosophic, social, cultural, and professional forces that have shaped the development of this conception.

289. Women in the United States History. Social history of women from colonial America to the present. Explores difference and change in women's work, family, and political lives. Same as WST 289.

NOTE: There are also several 300-level seminars on women and the family.

THE JUNIOR SEMINAR

All majors are required to take the junior seminar during the spring term of their junior year. The seminar consists of several distinct courses, each with its own subject matter and meeting separately, but united by a common theme and by a series of common lectures. All of the seminars in any given year are devoted to one theme. These themes include such topics as revolution, cities, secularization, and decadence.

In general, the junior seminar addresses — in the context of concrete empirical study of particular periods and particular countries — the nature of historical scholarship, the relation of history to other disciplines, and the current state of the art. How are arguments about historical interpretation carried on? What is the difference between argument and proof? How does one decide among rival interpretations? What are the main concepts that guide social and historical analysis? Does historical scholarship need to become more theoretical? Has recent borrowing from the social sciences been beneficial or detrimental?

The junior seminar, then, is not a course in historiography or historical method but a broad-ranging course that explores central concepts in a comparative setting.

JUNIOR SEMINARS

303. The Junior Seminar: The City in History. Credit—4 hours. Study of the historical development of major European, Asian, and American cities and the manner in which they have reflected and shaped particular cultures: (1) New York, (2) Tokyo, (3) London, (4) Los Angeles, (5) Vienna. Required course for juniors majoring in history.

SPECIAL SEMINAR PROGRAM

The Department strongly urges every concentrator to take at least one 300-level (8-credit) seminar in his or her area of concentration. These special seminars, composed of a research scholar and about 10 carefully selected students, are intended as the culmination of the history concentrator's studies. They enable the student to engage in research under close and expert supervision, to participate in the investigation of important historical questions, and to present his or her research in an extensive essay.

308. Historiography. The main theoretical and critical approaches to British and European historiography since the late nineteenth century.

309. Imperial Christianities: Byzantium and Orthodoxy in Historical Context. Deals with the theological underpinning of the Byzantine/Orthodox Church, but also concentrates on the interpenetration of Orthodoxy with an imperial state, on the growing contrast with Western forms such as the Papal monarchy, on the importance of the Byzantine/Orthodox "mission," and on mutual influences from and on non-Greek eastern Christian churches and, finally, Islam. Same as REL 309.

310. The Expansion of Europe, 1400–1800. This course assesses the impact of expansion upon Europe and the non-European world, examining selected examples from the early modern period, e.g., Venice, Spain, England.

311. Byzantine Culture and Civilization. An introduction to the techniques of research in the Byzantine area for the nonspecialist and the prospective specialist. Same as CLA 311.

312. Topics in Medieval History. Selected problems in the political, social, and intellectual history of the Middle Ages.

313. Topics in Early Modern European History. Renaissance humanism, the "new politics," the rise of modern science, and the transformation of early modern European culture.

315. Historians and the German Problem. How historians (from Treitschke to the *Historikerstreit*) have analyzed Germany's unique place in the West; political contexts of historical debates on Germany's past.

316. Problems in Modern German Social and Political History. Critical issues in the development of a modern class society and in the shaping of political parties and institutions, from the disintegration of the Holy Roman Empire to the fall of the Weimar Republic.

317. Cultural History and Its Critics. Critical study of trends and problems in cultural history, focusing on central tensions within the field and external challenges from anthropology and literary theory.

318. Topics in Russian History.

319. Nineteenth-Century European Cultural History. Selected topics bearing on the relationship of politics, literature, philosophy, and music during the nineteenth century.

320. Topics in Modern British Culture and Society. A critical introduction to recent research in nineteenth- and twentieth-century British history. Focus on art, industry, politics, and religion.

321. Topics in Early Modern British History. Topics in the political, religious, legal, and cultural history of England, Wales, Ireland, and Scotland.

322. Topics in Early Modern Political Thought. Topics in the history of political thought from the fifteenth to the eighteenth centuries.

323. Twentieth-Century European Cultural History. Study of literary, political, psychological, and artistic innovations which established the foundations of twentieth-century culture.

324. The French Revolution. A study of major problems in the origins, growth, and spread of the Revolution.

325. The Age of Imperialism. Euro-American conquest of the world in the nineteenth and twentieth centuries. Relationship between imperialism and capitalism. Impact of imperial domination in non-European societies.

326. Germany, 1890–1945. Selected topics in German political history, with special emphasis on National Socialism and its antecedents.

327. Russian Serfdom in Historical Perspective. Study of the origins and development of Russian serfdom; comparison with European serfdom and American slavery; social, economic, and psychological impact on the peasantry and on the revolutionary movement.

328. The Russian Revolution.

1915–1920; contemporary accounts, monographic literature, and theories of revolution.

329. Concept and Development of the Eighteenth-Century Police State.

Theoretical and historical foundations of the interventionist state. Changing concepts of sovereignty, rulership, and regulation in Russia, Prussia, Austria, and France.

330. Topics in British Labor History.

Introduction to old and new interpretation of the social, cultural, and political experience of the British working class. Includes some comparative emphasis on European and American labor history.

331. Colonial Communities. An interdisciplinary examination of English and American communal structures from the sixteenth to the eighteenth century, with particular analysis of opportunities for experimentation offered by colonization.

332. Topics in American History. A study of selected problems in immigration, religion, politics, and economics in early America.

333. Jacksonian America. Economic development, changes in social structure, institutions, and ideologies in the Jacksonian era.

334. Plantation Society in the Americas, Sixteenth and Seventeenth Centuries. An investigation of the development of plantation societies in the United States, Latin America, and the Caribbean in an attempt to compare and contrast the resulting effects of the differing influences brought by Europeans to the New World.



336. France Since the Revolution. The major problems and themes in French history from 1815 to 1945.

340. The Progressive Movement. Progressivism in the United States (ca. 1890–1930) was an attempt to reform not only politics but society and culture as well. This course considers, among other topics, feminism, social science, scientific management, pragmatism, and the social gospel.

341. Powerful People. A transdisciplinary examination of monarchic and imperial rulers; heroes and nobles; saints, magicians, and holy men; and “dark” or “reversed” figures (such as sorcerers, outlaws, and anti-heroes). Same as REL 341.

342. Afro-American History. The experiences of blacks in the African diaspora: emigration, manifestations of African cultural survivals or orientations, and evolution of themes of negritude.

344. American Social Thought. Selected topics in American social thought, treating the work of intellectuals in its social, political, and cultural context.

345. History of the Family. Sociological and psychological theories that have influenced historians; examples of recent historical writing on the family in western Europe and the United States.

346. Rise of Modern Management. This course examines the Second Industrial Revolution in the United States beginning around 1900.

347. History of Feminism. A survey of feminist ideas and political movements in the United States and Europe. Same as WST 347.

348. U.S. Indian Relations. Attitudes and presuppositions underlying the formulation of government policies with Indians. Conditions and impact of policies on processes of acculturation.

349. Plantation Society in the Americas, Eighteenth and Nineteenth Centuries. Course examines the differing forces which contributed to and characterized the development of slave societies in the New World. Through a close look at the Southern states, the Caribbean, and Brazil an attempt is made to assess the impact of slavery on modern society. Same as AAS 349.

352. Evolution and Revolution in Science. A study of both the historical and philosophical aspects of a few selected major scientific changes. Same as PHL 352.

354. State and Revolution in Southern Africa. An exploration of revolutionary thought and practice and their relationship to anti-colonial struggles in the politically diverse but economically integrated southern African subcontinent.

355. Topics in the History of Women. The focus of this course changes from year to year to include both classic and new interpretations of such topics as feminism, women and work, women and revolution, women and social theory. Same as WST 355.

356. The Black Family in Slavery and Freedom. This course traces the development of black family life through slavery and into freedom. The impact of factors such as economics, politics, and religion on the development of the black slave family is given special attention.

357. Women and Socialism. An analysis of women and socialism: thorough study of the fundamental theoretical writings; analysis of the lives of major European and American women socialists; and study of changing Soviet legislation and attitudes toward women and the family from 1917 to the present.

359. Old Regime France and the French Revolution. This seminar considers the major interpretive problems in the historiography of the Old Regime and the French Revolution, including: the relationship between demography, economy, and social structure; religion and the Enlightenment; absolutism and the growth of political opposition; and popular culture in eighteenth-century France.

360. Fascism. Analysis of the fascist movements and regimes, and of the numerous interpretations of the fascist phenomenon.

361. Diplomacy and War in Europe, 1890–1945. The two German wars, the failure of the West in the interwar period, and the dwarfing of Europe.

362. Social History of Twentieth-Century America. The triumph, crisis, and restructuring of industrial capitalism; social change and social movements.

363. The Enlightenment. An intensive consideration of selected problems in the social, political, educational, and religious thought in eighteenth-century France and other Western European countries.

366. Scientists and the Politics of Extremity. Study of scientists during periods of extreme political turbulence and of their reactions to their political environment.

368. Topics in the History of Medicine. Intensive readings, discussion, and research at the graduate level in topics in the history of medicine and public health.

369. Topics in the History of Science. Intensive readings, discussion, and research at the graduate level in topics in the history of science.

371. Evolution of the World Economic Order Since the Sixteenth Century.

Deals with the economic relations between the developed and less developed parts of the world since the sixteenth century. Attention will be given to the impact of slavery and the slave trade upon Africa, Europe, and the Americas, and to the role of the overseas trade in European and American development and its impact on the rest of the world. Same as AAS 371 and ECO 371.

376. Women and History in Africa. Selected themes in the history of women in Africa, particularly issues related to women's incorporation into the capitalist world-economy. No prerequisites.

377. Studies in Modern Japan. Evolution of Japan as a modern state, with special emphasis on those forces that contributed to Japan's successful response to the West.

378. Tokugawa Japan, 1560–1850. Political, social, economic, intellectual, and demographic history of early modern Japan. Emphasis on critical analysis.

380. Black Leaders and Protest Movements of the Twentieth Century. An in-depth examination of the men and women, the organizations, and the ideologies that have guided black protest activities during the twentieth century.

381. Topics in Nineteenth-Century American Cultural History. This course considers the decline of Calvinism, the rise of humanitarianism, and various critics of the new spirit of "improvement."

382. Topics in Twentieth-Century American Cultural History. Research seminar on selected topics in modern American cultural history.

384. The Food Crisis in Africa. Study of the meanings and origins of the crisis, with a focus on its relationship to transformations in gender, class, and systems of production and distribution in the age of imperialism.

385. The Atlantic Slave Trade and Africa, 1650–1850. The main thrust of the course shows the extent to which the Atlantic slave trade retarded the development of capitalism in Africa between 1650 and 1850, and so creating the conditions for the imposition of European colonial domination on the continent from the late nineteenth century. Same as AAS 375 and ECO 385.

OTHER PROGRAMS

300. Study Abroad. The Department participates in programs of study abroad. Complete details of these programs may be obtained from the Academic Advising Office in Lattimore Hall and/or the department advisor.

391. Independent Study. Credit—4 hours. Designed for junior and senior students who wish to pursue an independent reading program with a professor; it may also be used for readings in a 300-level seminar in which the student does *not* write the required essay and as such does not meet the 300-level seminar requirement, but it may be used as a distribution requirement within its area.

393. Senior Project. Credit—4 hours. May be an independent course with a faculty sponsor or may be taken in a 300-level seminar in which the student elects to write the essay but not to do all the required readings; as such it does not meet the 300-level seminar requirement, but it may be used as a distribution requirement within its area.

394. Internship in History. Experience in an applied setting supervised on site. Approved and overseen by a University instructor.

396. Washington Semester. Credit—8 hours. This course is mostly used by joint history-political science concentrators who are interning in Washington for one semester. This program is administered by the Department of Political Science.

INTEGRATED SCIENCES

The integrated sciences program allows students to design a concentration that provides broad training in the natural sciences, rather than focused study in a particular scientific specialty. The integrated sciences concentration is designed for students preparing for careers that require a background in the sciences plus additional training in another area such as education, English, management, or political science. For example, a student interested in teaching science at the secondary school level might combine the integrated sciences concentration with the secondary teacher education program (see page 197). Similarly, a combination of integrated sciences and a minor in English might be useful for a student interested in a career in scientific writing. Positions in sales or management in a high-technology company might be well served by linking integrated sciences with a Certificate in Management Studies (see page 115). Other useful combinations are limited only by the ingenuity of the student, in consultation with the appropriate academic advisors.

For careers such as those mentioned above, the broad training in the natural sciences provided by the integrated sciences program may be more useful than the more specialized training obtained by concentrating in a specific natural science department (such as biology or chemistry). However, integrated sciences is not recommended for students preparing for advanced degrees in the natural sciences leading to careers in scientific research and higher education. These students are advised to concentrate in the relevant natural science department.

The Committee on Integrated Sciences supervises the program leading to a B.A. degree, administered through the College Center for Interdisciplinary Studies (page 113). For additional information and advice about integrated sciences, students should consult the Center, which is located in 206 Lattimore Hall. Concentrations in integrated sciences are

highly individualized and should be designed by the student in close coordination with the Center, and the additional departments or programs involved.

A degree may be awarded with a double concentration in integrated sciences and another natural science, provided that the advanced-level work in integrated sciences is not the same as that for the other concentration.

The bachelor's degree with distinction is awarded to students with a sufficiently high concentration grade-point average: 3.25 for distinction, 3.50 for high distinction, and 3.75 for highest distinction.

COMMITTEE ON INTEGRATED SCIENCES

- Carlton E. Brett, Ph.D. (Michigan)
Professor of Geology
Govind Shrikrishna Mudholkar, Ph.D.
(North Carolina) *Professor of Statistics and of Biostatistics*
Sanford L. Segal, Ph.D. (Colorado)
Professor of Mathematics
John Jaenike, Ph.D. (Princeton)
Associate Professor of Biology and Chair of the Committee

CONSULTANTS TO THE COMMITTEE

- Dana H. Ballard, Ph.D. (California, Irvine) *Professor of Computer Science*
Robert S. Knox, Ph.D. (Rochester)
Professor of Physics
John S. Muentzer, Ph.D. (Stanford)
Professor of Chemistry
Jerome S. Schwartzbaum, Ph.D. (Stanford) *Professor of Psychology*

CONCENTRATION IN INTEGRATED SCIENCES

General Prerequisites

MTH 161 and 162 or the equivalent, as well as demonstrated proficiency in computing, must be completed satisfactorily before the student can be accepted as a concentrator.

The computer science prerequisite may be satisfied with the successful completion of one of the following:

1. Any course offered by the Department of Computer Science,
2. EE 171.

A student may ask for an oral examination in place of successful completion of one of the above.

Concentration Requirements

A "C" average is required in previously completed courses used toward the concentration, and a "C" average must be maintained for all courses used in the concentration.

The concentration consists of at least:

1. Three basic-level courses, one from each of the three following categories: the biological sciences, mathematical sciences, and physical sciences.
2. Six advanced-level courses must be completed, comprising three each from two of the natural science departments listed below. The two departments chosen for the advanced-level courses can be any combination except the following:
 - a. A combination of statistics, mathematics, or computer science since these combinations are offered through the mathematics and statistics departments as separate degrees.
 - b. Neuroscience in combination with either biology or psychology.
3. Two courses in the history of science, the philosophy of science, or scientific methodology.

Students wishing to take advanced-level course work from a department that is not currently listed in the integrated sciences program may petition to have the Committee consider an alternative program. If the Committee approves the petition, the student must then obtain the approval of a faculty advisor in the department involved. Once an acceptable program of course work has been developed and the approval of the appropriate faculty advisor is obtained, the student will be considered for admission to the concentration.

Students should note that some basic-level and advanced-level courses have prerequisites that cannot be used to satisfy the requirements of the integrated sciences concentration.

Basic-Level Courses

The basic-level courses must be taken in at least three different departments, chosen from the list below. All three of the science categories must be represented.

CATEGORY I, BIOLOGICAL SCIENCES

Biology 111, 121, 150
Neuroscience 201
Psychology 131, 141, 151

CATEGORY II, MATHEMATICAL SCIENCES

Computer Science 181, 220
Mathematics 163, 164
Statistics 165, 211, 212

CATEGORY III, PHYSICAL SCIENCES

Chemistry 103, 105
Geology 101, 201
Physics and Astronomy AST 111, 142,
PHY 113, 121, 123

Advanced-Level Courses

1. Biology: Three additional courses in the biological sciences chosen from those offered in the Program in Biology and Medicine, at least one of which must be a laboratory course.
2. Neuroscience: Any three courses beyond NSC 201.
3. Psychology: Any three additional natural science courses in psychology, one of which must be a laboratory course. Two of the advanced-level courses must be at the 200 level.
4. Computer Science: Any three 200-level courses with the exception of any course used to satisfy the basic-level requirement.

5. Mathematics: Integrated sciences students taking advanced-level courses in mathematics must take both basic-level courses (MTH 163 and 164) and MTH 235 (linear algebra) as an advanced-level course. The other two required advanced-level courses may be any 200- or 300-level courses, except for MTH 300.

6. Statistics: STT 201, and either STT 216 or 226, and one advanced-level course.

7. Chemistry: If CHM 103 is taken as a basic-level course, students must take 104, 203, 204, and one additional course. If CHM 105 is taken as a basic-level course, students must take 106, 205 and either 207 or 209, 206, and one additional course.

8. Geology: Any three of the following: GEO 221, 224, 235, 241, 248, 281, 283.

9. Physics and Astronomy: Any three 200-level courses in physics or astronomy.

History of Science, Philosophy of Science, and Scientific Methodology Courses

Two courses chosen from but not limited to those listed may be taken to fulfill this requirement: HIS 201, MTH 300, PHL 210, PHL 214, PHL 215, PHL 217, PHL 252, PHL 254, PHL 258. Courses other than those listed may be used to satisfy this requirement with prior written approval of the Committee on Integrated Sciences. Students who plan to supplement their concentration in integrated sciences with either the management studies certificate or the secondary school teacher education program may be able to substitute some of this course work for part of this requirement, pending the approval of the Committee.

INTERDEPARTMENTAL DEGREE PROGRAMS

Students whose educational interests do not fall within one of the existing departmental concentrations have opportunities for special degree programs through the College Center for Interdisciplinary Studies (p. 113). These include individualized interdepartmental concentrations and formalized concentrations such as cognitive science (p. 67), health and society (p. 101), and integrated sciences (p. 111). In addition, the College Center for Interdisciplinary Studies administers certificate programs in actuarial studies (p. 40), Asian studies (p. 49), international relations (p. 114), management studies (p. 115), Russian studies (p. 154), and a minor in health and society (p. 101).

INTERDISCIPLINARY STUDIES

The College Center for Interdisciplinary Studies enables students to pursue educational goals that lie outside traditional disciplines and departments. Through its faculty-student Committee on Individualized Interdepartmental Concentrations, it supervises specially constructed programs leading to the B.A. degree. These include programs tailored to the specific needs of the individual student. In recent years these individualized concentrations have included such diverse areas as American studies, environmental studies, and paleoanthropology.

In addition, the Center coordinates interdisciplinary certificate programs in actuarial studies (p. 40), Asian studies (p. 49), international relations (p. 114), management studies (p. 115), and Russian studies (p. 154), and, through its Committee on Interdisciplinary Programs, reviews formalized interdepartmental concentrations in cognitive science (p. 67), film studies (p. 79), health and society (p. 101), integrated sciences (p. 111), and women's studies (p. 160). Together, these formalized, semi-formalized, and individualized programs offer students a variety of ways to use the resources of the University for their own needs and interests.

CENTER STAFF

Brenda Meehan-Waters *Director; Senior Associate Dean for Undergraduate Studies, College of Arts and Science; Professor of History*
 Debra W. Graham *Counselor and Coordinator*
 Deborah L. Howe *Counselor and Coordinator; Certificate in Management Studies*
 Dena Campbell *Secretary*
 Margaret M. Schepp *Secretary*

COMMITTEE ON INDIVIDUALIZED INTERDEPARTMENTAL CONCENTRATIONS

Carlton Brett, Ph.D. (Michigan)
Professor of Geology and Chair of the Committee
 Jerome S. Kaye, Ph.D. (Columbia)
Professor of Biology
 William J. McGrath, Ph.D. (California, Berkeley) *Professor of History*
 *Brenda Meehan-Waters, Ph.D. (Rochester) *Senior Associate Dean for Undergraduate Studies, College of Arts and Science; Professor of History*
 Michael K. Tanenhaus, Ph.D. (Columbia)
Professor of Psychology

PROGRAMS

The *Certificate Programs*—actuarial studies, Asian studies, international relations, management studies, and Russian studies—give recognition for specialization in connection with a departmental concentration.

The *Concentration Programs*—cognitive science, health and society, integrated sciences, interdepartmental studies lead to bachelor's degrees awarded by the College of Arts and Science.

An *interdepartmental M.A. or M.S.* may also be arranged with the cooperation of the related departments.

Students who are interested in any of these programs are urged to discuss their plans with an advisor in the College Center for Interdisciplinary Studies, which is located in 206 Lattimore Hall.

A student seeking an individualized interdepartmental concentration should begin his or her planning no later than the second semester of the sophomore year. After discussion with two faculty members who agree to serve as advisors, the student prepares a proposal which contains the following information: (1) a statement indicating the reasons for the particular concentration and how it relates to the student's educational and career goals, (2) a statement explaining why these goals cannot be met within an existing departmental concentration,

(3) a listing of those courses that will make up the concentration (at least 10 in number), and (4) the names of two faculty members who have agreed to be advisors. Help in preparing the proposal is available in the College Center for Interdisciplinary Studies.

For example, one student who was considering either law or graduate school designed a concentration in American studies which included history courses in nineteenth- and twentieth-century America, courses in American literature and American politics from corresponding periods, together with supplementary courses in art and international studies.

Once a student's proposal is complete, it is handed in to 206 Lattimore Hall and subsequently is submitted for action to the Committee on Individualized Interdepartmental Concentrations. In judging the proposal, the Committee considers the student's academic goals and attempts to judge the coherence and thoughtfulness of the proposed program.

The bachelor's degree with honors is awarded according to three criteria: (1) successful completion of 12 credits of honors coursework: two 4-credit independent study courses in the senior year, one devoted to honors research in the fall, and another devoted to thesis writing in the spring; and one 4-credit advanced-level course or seminar; (2) completion of a senior thesis; and (3) an oral defense of the thesis. Detailed information about the requirements is available in the College Center for Interdisciplinary Studies in 206 Lattimore Hall.

The bachelor's degree with distinction is awarded to students with a sufficiently high concentration grade-point average: 3.25 for distinction, 3.50 for high distinction, and 3.75 for highest distinction.

It is possible for students to earn the degree with both distinction and honors.

NOTE: Proposals for concentrators must be submitted by mid-April of the junior year or before the end of the third semester preceding graduation.

*Ex officio member of the committee.

INTERNATIONAL RELATIONS

COMMITTEE ON INTERNATIONAL RELATIONS

Charles M. Carlton, Ph.D. (Michigan)
Professor of French and of Romance Linguistics

William B. Hauser, Ph.D. (Yale)
Professor of History

John E. Mueller, Ph.D. (California, Los Angeles)
Professor of Political Science and Chair of the Committee

Robert D. Pahre, Ph.D. (California, Los Angeles)
Assistant Professor of Political Science

The International Relations Certificate Program provides students with an opportunity to develop an interdisciplinary knowledge of international relations. The certificate is designed to supplement a disciplinary concentration taken by students in the social sciences or humanities. Those interested in the program must satisfy the requirements in their major field and in addition, submit a program that includes at least the following:

- Two courses in economics, two courses in history, and two courses in political science from among those listed under the heading, Primary Courses.
- Four courses from either the Primary Courses or Secondary Courses list, or four substitute courses approved by the student's International Relations Program faculty advisor, of which up to two may be foreign language courses beyond 105.

In addition:

- No primary course may be taken satisfactory-fail and no more than one secondary course may be taken satisfactory-fail.
- Students must earn an overall grade-point average of at least 2.0 in courses submitted for the program.

The International Relations Certificate Program is administered through the College Center for Interdisciplinary Studies and students who plan to enroll in the program should pick up an application in the Center, which is located in 206 Lattimore Hall. The completed application, with approval indicated by the signature of the faculty advisor, should be returned to the Center no later than the first semester of the senior year.

Upon graduation, students successfully completing the International Relations Certificate Program will receive a certificate in international relations.

Please note that some courses are offered only in alternate years. Information about current offerings is available in Lattimore 206, and definitive course listings are distributed prior to registration.

PRIMARY COURSES

ECONOMICS

- ECO 108. Principles of Economics.
ECO 207. Intermediate Micro-economics.
ECO 269. International Economics.
ECO 270. International Finance.

HISTORY

- HIS 195. Japan and Pearl Harbor.
HIS 197. Roots of the Middle East Crisis.
HIS 202. The Third World.
HIS 224. Europe from the French Revolution to World War I.
HIS 226. Hitler's Germany, 1914-1945.
HIS 229. History of the U.S.S.R.
HIS 236. Recent America, 1914-1970.
HIS 241. Economic Development of the North Atlantic Community.

- HIS 242. Economics and Societies of Latin America.
HIS 251. Britain and Ireland Since 1815.
HIS 266. Colonial and Contemporary Africa.
HIS 275. World Politics Since 1941.
HIS 276. Japan and Pearl Harbor.
HIS 277. Modern Japan.
HIS 278. Islam and the Third World.
HIS 285. America and the Good War.
HIS 295. War in the Industrial Age, 1861-1980.
HIS 316. Topics in German Social and Political History.
HIS 325. The Age of Imperialism.
HIS 326. Germany, 1890-1945.
HIS 354. State and Revolution in Southern Africa.
HIS 360. Fascism.
HIS 361. Diplomacy and War in Europe, 1890-1945.
HIS 365. Nationalism in Twentieth-Century Africa.
HIS 371. Evolution of the World Economic Order Since the Sixteenth Century.
HIS 384. The Food Crisis in Africa.

POLITICAL SCIENCE

- PSC 270. International Politics.
PSC 272. Theories of International Relations.
PSC 274. International Political Economy.
PSC 275. National Security Policy.
PSC 277. Just and Unjust Wars.
PSC 278. The War in Vietnam.

SECONDARY COURSES

A list of Secondary Courses is available in the College Center for Interdisciplinary Studies, 206 Lattimore Hall.

MANAGEMENT STUDIES

The College of Arts and Science, in consultation with the William E. Simon Graduate School of Business Administration, offers a Certificate in Management Studies, administered through the College Center for Interdisciplinary Studies and supervised by a faculty committee. Students who wish to enroll in the program should pick up an application in the Center, which is located in 206 Lattimore Hall. Ordinarily, students should apply by March 1 of their junior year.

COMMITTEE ON MANAGEMENT STUDIES

K. Ruben Gabriel, Ph.D. (Hebrew University) *Professor of Statistics and of Biostatistics*

Ronald Hansen, Ph.D. (Chicago) *Associate Dean of Academic Affairs, William E. Simon Graduate School of Business Administration*

Brenda Meehan-Waters, Ph.D. (Rochester) *Professor of History, Senior Associate Dean for Undergraduate Studies, College of Arts and Science*

Alan Stockman, Ph.D. (Chicago) *Professor of Economics and Chair of the Committee*

Ladd Wheeler, Ph.D. (Minnesota) *Professor of Psychology*

Linda W. Powell, Ph.D. (Rochester) *Associate Professor of Political Science*

Robert Fowler, Ph.D. (Washington) *Assistant Professor of Computer Science*

Kenneth McLaughlin, Ph.D. (Chicago) *Assistant Professor of Economics*

REQUIREMENTS FOR A CERTIFICATE IN MANAGEMENT STUDIES

For certification, students must complete the six management courses with a GPA of 2.5. No course may be taken pass/fail; ordinarily, no transfer credit without pre-approval for specific courses is allowed, although students may petition for transfer credit just as they may for the substitution of specific courses in their chosen track.

Six courses are required:

1. STT 211 or 165 (prerequisite for STT 165; MTH 141) or another appropriate statistics course
2. CSC 108, CSC 110, CSC 181, or EE 171
3. ECO 207. Intermediate Microeconomics (as preparation for this course students may be advised to take ECO 108)
4. ACC 201. Principles of Accounting
5. Two courses from one of the following tracks:

a. Production:

- OMG 231. Operations Management
- PSY 353. Human Factors
- MTH-STT 207. Linear Programming and the Theory of Games
- MTH 209. Introduction to Optimization Theory

Of the two courses required for this track, one must be from the Simon School offerings.

This track emphasizes production analysis and leads to careers in production planning, quality control, inventory management, and other jobs involving managing the production of goods and services.

b. Marketing:

- MKT 203. Principles of Marketing
- MKT 213. Marketing Projects and Cases
- ECO 251. Industrial Organization: Theory and Evidence
- STT 221. Sampling Techniques

This track emphasizes the distribution and sale of goods and services and leads to careers in sales, marketing research, consumer relations, and others having to do with marketing goods and services.

c. Public Sector Analysis:

- LAW 205. Business Law
- ECO 234. Regulation of Economic Activity
- ECO 237. Domestic Public Policy
- ECO 245. Aging and Public Policy
- ECO 261. State and Local Public Finance
- ECO 263. Public Finance and Fiscal Policy

Qualified undergraduates with the approval of the Committee's Simon School advisor may substitute BPP 440, Public Economics, for any course in the track. ECO 238, Economics of Energy, is recommended for students desiring additional course work.

This track leads to jobs involving the natural resources, government regulations, and relations between various agencies.

d. Personnel Management:

- BSI 241. Fundamentals of Personnel Administration
- ECO 223. Labor Markets
- PSC 235. Organizational Theory and Behavior
- PSY 262. Human Motivation and Emotion
- PSY 264. Psychology of Business and Industry

Leading to careers such as personnel relations, benefits counseling, public relations, and staff recruiting, this track offers a flexible introduction to the many positions in personnel offices.

e. Accounting/Finance:

- ACC 221. Cost Accounting
- FIN 205. Financial Management
- ECO 211. Money, Credit, and Banking
- ECO 216. Financial Markets: Concepts and Institutions
- ECO 217. Financial Markets: Theory and Evidence
- ECO 248. Risk and Insurance

Of the two courses required for this track, one must be from the Simon School offerings.

NOTE TO ECONOMICS MAJORS: FIN 205 cannot be used as an elective in your ECO concentration if ECO 216 or 217 have been taken for the major.

MATHEMATICS

This track leads to careers with banks, investment firms, benefits offices, and other places that analyze and record business transactions. Students may wish to supplement their work with other courses in financial theory or public economics. ECO 263 and 265 are recommended for additional course work.

f. Information Systems:

- CIS 215. Foundations of Management Systems (required)
- CIS 225. Data Management
- CSC 220. Data Structures
- MTH 220. Discrete Mathematics
- EE 203. Computer Programming Systems

This track prepares students to make sound business decisions regarding the use of computer technology. This understanding is achieved through a survey of computing topics including hardware and software, programming, systems analysis, and information management with emphasis on practical applications in the business environment.

Students also have the option of completing any two-track courses for a Certificate in Management Studies with no specific track designation.

Upon graduation, students successfully completing the management studies program will receive a certificate in their departmental diploma ceremony.

Frederick R. Cohen, Ph.D. (Chicago)
Professor of Mathematics

Norman Larrabee Alling, Ph.D. (Columbia) *Professor of Mathematics*

Samuel Gitler, Ph.D. (Princeton)
Professor of Mathematics and Chair of the Department

John Robb Harper, Ph.D. (Chicago)
Professor of Mathematics

Richard Bengt Lavine, Ph.D. (M.I.T.)
Professor of Mathematics

Saul Lubkin, Ph.D. (Harvard)
Professor of Mathematics

Richard Mandelbaum, Ph.D. (Princeton)
Professor of Mathematics

John Moore, Ph.D. (Brown)
Adjunct Professor of Mathematics

Leopoldo Nachbin, Ph.D. (Rio de Janeiro) *George Eastman Professor of Mathematics*

Joseph Neisendorfer, Ph.D. (Princeton)
Professor of Mathematics

Arnold Pizer, Ph.D. (Yale)
Professor of Mathematics and Associate Chair of the Department

David Donald Prill, Ph.D. (Princeton)
Professor of Mathematics

Ralph Alexis Raimi, Ph.D. (Michigan)
Professor of Mathematics

Douglas C. Ravenel, Ph.D. (Brandeis)
Professor of Mathematics

Sanford Leonard Segal, Ph.D. (Colorado)
Professor of Mathematics

Norman Stein, Ph.D. (Cornell)
Professor of Mathematics

Charles Edward Watts, Ph.D. (California, Berkeley) *Professor of Mathematics*

Michael Cranston, Ph.D. (Minnesota)
Associate Professor of Mathematics

Michael E. Gage, Ph.D. (Stanford)
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Steven Mark Gonek, Ph.D. (Michigan)
Associate Professor of Mathematics

Allan Greenleaf, Ph.D. (Princeton)
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Jeffrey Hoffstein, Ph.D. (M.I.T.)
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Naomi Jochnowitz, Ph.D. (Harvard)
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Carl Mueller, Ph.D. (California, Berkeley) *Associate Professor of Mathematics*

Adrian Nachman, Ph.D. (Princeton)
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*Nickolas Backscheider, Ph.D. (Purdue)
Assistant Professor of Mathematics

Carol Bezuidenhout, Ph.D. (Minnesota)
Assistant Professor of Mathematics

Martin Guest, Ph.D. (Oxford)
Assistant Professor of Mathematics

Yi Li, Ph.D. (Minnesota)
Assistant Professor of Mathematics

Benjamin Lichtin, Ph.D. (Ohio State)
Assistant Professor of Mathematics

Norman Gustav Gunderson, Ph.D. (Cornell) *Professor Emeritus of Mathematics and of Education*

Johannes Henricus Bernardus Kemperman, Ph.D. (Amsterdam)
Fayerweather Professor Emeritus of Mathematics

Arthur Harold Stone, Ph.D. (Princeton)
Professor Emeritus of Mathematics

Dorothy Maharam Stone, Ph.D. (Bryn Mawr) *Professor Emeritus of Mathematics*

Teaching assistants are used to supervise recitation and review sections of freshman and sophomore courses.

NOTE: Approximately 15 percent of the faculty may be on leave in a given academic year.

The Department of Mathematics offers the B.A., B.S., M.A., M.S., and Ph.D. degrees.

Mathematics today is one of the most pervasive modes of thought—indeed a striking intellectual phenomenon of the past several decades is the utilization of mathematics in fields far removed from the traditional ones of the physical sciences and engineering. Some of this mathematics is “new,” invented by mathematicians and others for the purpose of mathematical study of a new field, as, for example, mathematical game theory and economics; some of it depends on new technology, as with computerized taxonomy or mathematical simulation of biological systems; some of it is “old” mathematics, finding new uses, such as the mathematical study of epidemics and birth-and-death

*Part-time.

processes. Mathematics has even found applications in fields as seemingly remote as political science and anthropology. In turn, each new area of application is an additional stimulus to mathematics itself. The offerings of the Department of Mathematics are intended to reflect this diversity.

Students planning to concentrate in almost any of the University's liberal arts programs, in addition to those which require some college mathematics, will find one or more courses or sequence offerings in the Department of Mathematics a valuable complement to their field of interest. Students are urged to consult the departmental advisors of both mathematics and their own intended area of concentration about courses in mathematics which may be useful for their educational and career goals, and to begin the necessary or recommended courses as early as possible.

COURSE INFORMATION

There are three freshman-sophomore sequences in mathematical analysis:

- Students in the physical and engineering sciences normally choose the sequence MTH 161, 162, 163, 164. MTH 161 is offered every fall and MTH 162, 163, and 164 are offered every semester.
- The sequence MTH 141, 142, 143, 163, 164 is intended for students who require a less fast-paced calculus sequence than MTH 161, 162. The three courses MTH 141, 142, 143 contain all of the material of MTH 161, 162 and prepare students for MTH 163 and 164. These courses are offered each semester.

The first of these sequences may be entered with advanced standing and credit by students who do sufficiently well on a College Entrance Examination Board advanced placement examination. MTH 163 and 164 may be taken in either order. Usually MTH 164 (Multi-dimensional Calculus) is taken first since its subject matter is more closely related to MTH 162. However, some engineering majors require MTH 163 (Differential Equations) to be completed by the



end of the fall semester of the sophomore year.

- The sequence 171, 172, 173, 174 is an honors calculus sequence for talented students interested in mathematics. The sequence emphasizes the theoretical understanding of calculus in addition to teaching technical skills. Five credits will be granted for each course satisfactorily completed instead of the usual four credits. Mathematics concentrators who complete all four semesters will, on the approval of their advisor, be excused from the requirement to take MTH 200 and MTH 235.

Care is taken to ensure correct placement in the appropriate mathematics sequence during freshman orientation. Placement is based upon high-school background and national and University placement tests. In addition, once classes have begun, students may choose, or the instructors may advise, transfer to a more suitable sequence when considered appropriate.

MTH 130 is an introductory course especially recommended for students intending to pursue concentrations in the humanities.

CONCENTRATION PROGRAMS

In addition to a B.A. concentration in mathematics and a B.S. concentration in applied mathematics, the Department offers a program in secondary mathematics education, and two undergraduate concentration programs in computer sciences. There also is a joint concentration program in mathematics and statistics, details of which are given under statistics.

THE B.A. IN MATHEMATICS

The B.A. concentration requires, in the 10-course group known as "the major," six to eight mathematics courses numbered 200 or higher, of which MTH 200, 235, 236, and 265 are specified. Of these, MTH 200 must be completed by the end of the first semester of concentration; that is, by the end of the first semester of the junior year in virtually all cases. It is recommended that students intending to concentrate in mathematics complete MTH 200 and 235 by the end of their sophomore year. In addition, a fourth course, in analysis or applied mathematics, must be chosen from MTH 201, 263, 266, 280, 281, 282, or 288. The other one to three mathematics courses are electives, according to the interests of the student, and the balance of the 10 nonelementary courses constituting the major must be chosen from a department-approved allied field. Since the "allied field" requirement in a mathematics concentration is minimal, students are urged to consult departmental advisors concerning suitable course work, even in elective fields of study which seem at first glance to be quite distant from mathematics.

The entire proposed major is usually worked out with departmental advice during the spring of the sophomore year. It may be revised and should be reviewed yearly with a departmental advisor.

Sample Programs and Advice

Students intending graduate work in mathematics should consider MTH 237, 266, and suitable 400-level graduate courses as electives. Students who plan to use mathematics in a physical science or engineering are urged to consider MTH 201, 266, 281, and 282 as electives. Students intending graduate work in economics, business administration, or operational mathematics, or work in a field such as systems analysis, are urged to consider MTH 201, 202, and 207. Students particularly interested in computer science should elect MTH 288 and EE 200, noting that either CSC 181 or EE 171 is an elementary prerequisite to

later work in computer science; consideration should particularly be given to MTH 280, 286, and other cross-listed courses as electives.

The 10 courses which constitute one of the concentrations in mathematics do not exhaust the student's time in the junior and senior years. Prospective graduate students in mathematics, for example, would do well to learn to read a foreign language (French, German, or Russian). Other mathematical careers involve considerable preparation in (among others) areas such as physics, biology, engineering, and economics.

Below are some typical examples of concentration programs. These are intended as suggestive, not prescriptive.

1. Pure Mathematics with interest in physical science: MTH 200, 235, 236, 265, 266, 281, 282. Allied field: physics or chemistry.
2. Applied Mathematics, operational: MTH 200, 201, 202, 207, 235, 236, 238, 265. Allied field: economics.
3. Applied Mathematics, biology: MTH 200, 201, 205, 235, 236, 263, 265. Allied field: biology.
4. Pure Mathematics, intending graduate study: MTH 200, 201, 235, 236, 237, 265, 266, 281, 282. Allied field: optional.
5. Applied Mathematics, physics or chemistry: MTH 200, 235, 236, 265, 280, 281, 282, 283, 284. Allied field: physics or chemistry.

Secondary Education

The secondary education concentration is designed to prepare teachers of secondary school mathematics. It includes the Teacher Education Sequence in secondary school mathematics offered in the Graduate School of Education and Human Development and eight (rather than 10) courses numbered 200 or higher in mathematics and a department-approved allied field. Six or more of the eight must be in mathematics, including MTH 200, 235, 236, and 265. Electives may be chosen at will, but prospective teachers are advised to elect, where possible, courses in logic, geometry, theory of numbers, and computer science.

A typical program might be as follows: MTH 200, 201, 216, 230, 235, 236, 253, 265. Allied field: statistics; also, the Teacher Education Sequence in the Graduate School of Education and Human Development.

THE B.A. IN COMPUTER SCIENCES: MATHEMATICS

1. Basic courses:

- CSC 181. Introduction to Computer Science
- MTH 161, 162, 163, 164. (Any equivalent sequence may be substituted.)

2. Mathematics core: MTH 200, 235, 236, 265.

3. Six additional courses at the 200-level or above of which CSC 220 is required.

Three of these additional courses must be chosen from courses cross-listed in mathematics and computer science. The others are to be selected from courses in mathematics and computer science, or from other approved offerings. Modifications in consultation with the student's advisor are possible.

THE B.S. IN COMPUTER SCIENCES: APPLIED MATHEMATICS

Students entering this program are expected either to have the equivalent of a year of calculus (at least at the level of MTH 161-162) or of a semester of calculus and one of computing (at the level of CSC 181). Students not having these prerequisites are urged to consider the B.A. in computer sciences: mathematics (just described) which forms an adequate background for either graduate school in computer science or employment. Students planning immediate employment should consider taking at least one of the mathematical modeling courses MTH 218, MTH 219, in their program.

The B.S. program involves core courses in mathematics and computer sciences and electives.

1. Core Courses (computer sciences):

- CSC 181. Introduction to Computer Science *or* EE 171. Introduction to Computer Engineering (or equivalent)
- EE 200. Computer Architecture

One of:

- CSC 206. Non-Numerical Computing
- CSC 220. Data Structures

Core Courses (mathematics):

- MTH 161, 162, 163, 164. (Any equivalent sequence may be substituted.)
- MTH/STT 201. Introduction to Probability
- MTH 218. Introduction to Mathematical Models in Social and Life Sciences A *or* MTH 219. Introduction to Mathematical Models in Social and Life Sciences B
- MTH 235. Linear Algebra
- MTH 263. Ordinary Differential Equations *or* MTH 236. Introduction to Algebra I
- MTH 265. Functions of a Real Variable I
- MTH 281. Introduction to Fourier Series, Orthogonal Polynomials, and Boundary Value Problems
- MTH 282. Introduction to Complex Variables with Applications

(MTH 173-174 may be taken instead of MTH 163-164; in this case MTH 235 is waived.)

These core requirements may be modified in consultation with the student's advisor. Students are also strongly advised to take the extra-credit computer labs offered by the mathematics department.

2. Elective courses: Students should take at least six (preferably seven) of the following courses not previously taken:

- EE 201. Computer Organization
- CSC 220. Data Structures
- CSC 240. Introduction to Artificial Intelligence
- MTH/CSC 238. Combinatorial Mathematics
- MTH/CSC 248. Theory of Graphics
- MTH/CSC 280. Introduction to Numerical Analysis
- MTH/CSC 286. Introduction to the Theory of Computation
- MTH/CSC 288. Design and Analysis of Computer Algorithms
- MTH 220. Discrete Mathematics
- MTH 236. Introduction to Algebra I

- MTH 263. Ordinary Differential Equations

Again, modifications in consultation with the student's advisor are possible.

THE B.S. IN APPLIED MATHEMATICS

Freshman and Sophomore Years

1. Mathematics Core:

MTH 161–164 or 171–174: A four-semester calculus sequence

MTH 218 or MTH 219: An introduction to mathematical models

MTH 163-A: Computer lab in calculus and differential equations is strongly recommended.

2. Related Technical Fields:

Four courses including at least one of the following sequences: PHY 121, 122, 123 (or equivalent), or EE 200–201: Computer Systems. To satisfy the remainder of this requirement, students will normally choose, in consultation with their advisor, from among selected lower-level undergraduate courses in mathematics-related departments.* All students enrolled in this program will be required to demonstrate proficiency in a high-level computer language (e.g., FORTRAN or Pascal): CSC 181 is strongly recommended and would count as one of the four courses required in this category.

Junior and Senior Years

1. Mathematics Core:

- MTH 201. Introduction to Probability
- MTH 235. Linear Algebra (Waived if 171–174 are completed.)
- MTH 263. Ordinary Differential Equations
- MTH 265. Functions of a Real Variable
- MTH 281. Fourier Analysis and Partial Differential Equations
- MTH 282. Introduction to Complex Variables with Applications
- MTH/CSC 280. Numerical Analysis Strongly recommended

2. Related Technical Fields:

Three courses at the nonintroductory level. Students will normally choose, in consultation with their advisor, from among selected upper-level undergraduate courses in mathematics-related departments.*

In addition, these requirements can be satisfied by appropriate graduate courses.

The student's advisor will work with each student to set up individual programs of study following specific tracks (e.g., biomathematics, computing, engineering, mathematical economics, mathematical physics, statistics and operational mathematics). Among their electives, students are required to take at least four courses in either mathematics or related technical fields including at least one course in computing.

MINORS

The Department offers a minor in probabilistic mathematics. The minor consists of five courses beyond MTH 161–162 or equivalent:

1. At least one of:
 - MTH 163. Ordinary Differential Equations I
 - MTH 164. Multidimensional Analysis
2. MTH/STT 201. Introduction to Probability
3. At least three courses from among:
 - MTH/STT 202. Introduction to Stochastic Processes
 - MTH/STT 203. Introduction to Mathematical Statistics
 - MTH/STT 207. Linear Programming and the Theory of Games
 - MTH 218. Introduction to Mathematical Models in Social and Life Sciences A
 - MTH 219. Introduction to Mathematical Models in Social and Life Sciences B

The group of three will be chosen by the student after a consultation with a member of the undergraduate advisory committee.

Examples

1. A student interested in mathematical modeling might take one of 163, 164 and further 201, 202, 218, and 219.
2. A student with primary interest in probability might take 164, 201, 202, 203, and 207.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991–92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

130. Excursions in Mathematics. The nature of mathematics and its application. Emphasis on concepts and understanding rather than acquisition of techniques. Intended for prospective concentrators in the humanities.

140. Pre-Calculus. Credit—2 hours. For students who lack the algebra and trigonometry skills needed to perform successfully in beginning calculus courses. Successful completion of the course will be measured by a series of tests. Failed tests must be repeated until passed. Help sessions and practice sessions will be scheduled regularly throughout the course. Students arrange class times with instructor. Not available for audit. (Fall)

141–143. Calculus I–III. A three-semester sequence identical in content with the two-semester sequence MTH 161, 162 described below. (Fall and Spring)

161. Analysis I. Analysis of the elementary real functions: algebraic, trigonometric, exponentials and their inverses and composites. Their graphs, derivatives, and integrals. Mean value theorem, maxima and minima, curve plotting. The fundamental theorem of calculus, with geometric and physical applications. (Fall)

161A. Computer Lab I. A computer lab designed to complement the standard department offering MTH 161. The lab is self-contained and may also be taken by someone not concurrently taking

*These departments include biology, chemical engineering, chemistry, computer science, economics, electrical engineering, mechanical engineering, physics, and statistics. (A detailed list of appropriate courses is available on request.)



MTH 161. Topics selected from: numerical representation; round-off and truncation error; loss of significant digits by cancellation; limits and convergence; evaluation of functions; conditioning and stability; curve plotting; numerical differentiation; roots of equations; maxima and minima of functions; numerical integration; interpolation techniques. No prior knowledge of programming is required. However, a student not previously exposed to computers is advised to take the Computer Center mini-course, Introduction to Computing I (six classes), simultaneously. (Fall)

162. Analysis II. Techniques of integration. Improper integrals, l'Hopital's rules. Infinite series, Taylor's series in one variable. Plane curves, parametric equations, vectors in two and three dimensions, lines and planes, vector-valued functions, velocity and acceleration, arc length, curvature. Partial differentiation, directional derivatives, extrema in several variables. Prerequisite: MTH 161 or equivalent. (Fall and Spring)

162A. Computer Lab II. A computer lab designed to both complement and supplement the standard department offering MTH 162. Course aims: 1) to use microcomputers to understand some of the standard calculus concepts such as parametric equations, polar coordinates and plane curves and their tangents better by using microcomputer graphics; 2) to use computers in numerical integration, interpolation, and curve fitting (e.g., spline and least squares) techniques; 3) to understand the nature and application of error estimates associated with numerical and computer techniques. Especially recommended for science and engineering majors.

No prior knowledge of programming is required. However, a student not previously exposed to computers is advised to take the Computer Center mini-course, Introduction to Computing I (six classes), simultaneously. MTH 161A is *not* a prerequisite. (Spring)

NOTE: Either MTH 164 or MTH 163 can be taken after MTH 162 or MTH 143. The usual procedure would be to take MTH 164 followed by MTH 163 but see Course Information above.

163. Ordinary Differential Equations I. Elementary methods, linear equations, and systems with constant coefficients, solutions in series, special functions, phase plane analysis and stability, Laplace transform, extremal problems. Prerequisite: MTH 143, 162, or 172. (Fall and Spring)

163A. Computer Lab III. A computer course designed to both complement and supplement the differential equations course, MTH 163. This course uses microcomputers to achieve a better understanding of the qualitative behavior of solutions of differential equations. Particular emphasis is placed on solution of real problems from engineering or physics. Two-dimensional systems of equations and their phase-plane pictures are introduced. Numerical techniques and error estimates. Especially recommended for science and engineering majors. No prior knowledge of programming is required. However, a student not previously exposed to computers is advised to take the Computer Center mini-course, Introduction to Computing I (six classes), simultaneously. Neither MTH 163 nor other computer labs are prerequisites. (Spring)

164. Multidimensional Analysis.

Differentiation and linear approximation, extrema, Taylor series. Line, surface, and volume integrals; coordinate changes, Jacobians. Divergence theorem, Stokes' theorem. Determinants and matrices in N-dimensional vector spaces. Prerequisite: MTH 143, 152, 162, or 172. (Fall and Spring)

171-174. Analysis Ia-IVa. Credit—5 hours for each course in the sequence. An honors sequence covering the material of MTH 161, 162, 163, and 164 in greater depth from the standpoint of both theory and applications. Consent of Department required.

190. The Mathematical Experience. Designed to offer some picture of what mathematics is, why anyone does it, and how it is done, for students with no professional need for mathematics. No technical background is necessary. The course tries to place mathematics in a cultural and intellectual setting by examining samples of mathematics, by studying the lives of mathematicians, and reading the writings of mathematicians and others on mathematics.

200. Transition to Advanced Mathematics. Introduces some of the basic techniques and methods of proof used in mathematics and computer science. Methods of logical reasoning, mathematical induction, relations, functions, and more. The course concludes with an application of the techniques learned to either group theory or real analysis. (Fall and Spring)

201. Introduction to Probability. Probability spaces; combinatorial problems; random variables and expectations; discrete and continuous distributions; generating functions; independence and dependence; binomial, normal, and Poisson laws; laws of large numbers. Prerequisite: MTH 162 or equivalent; MTH 164 recommended. Same as STT 201. (Fall and Spring)

202. Introduction to Stochastic Processes. Theory and applications of random processes, including Markov chains, Poisson processes, birth-and-death processes, random walks. Prerequisite: MTH 201. Same as STT 202. (Spring)

203. Introduction to Mathematical Statistics. Principles of statistical decision theory, point and interval estimation, tests of hypotheses, multivariate normal distribution, linear hypotheses, selected topics. Prerequisite: MTH 201. Same as STT 203. (Spring)

207. Linear Programming and the Theory of Games. The basic properties of convex sets. Linear programming. Duality. Principal theorems. Finite games. Some infinite games. Prerequisites: MTH 164 or equivalent and at least one of: MTH 235, 265, or 174. Same as STT 207.

216. Mathematical Logic I. Propositional calculus, functional calculus of first and higher order, the decision problem, consistency, completeness. Same as CSC 216.

218. Introduction to Mathematical Models in Social and Life Sciences A. Both MTH 218 and MTH 219 are aimed at building problem-solving ability in students through the development of mathematical models for certain real-life situations in the social and biological sciences. MTH 218 concentrates on axiomatic models and those involving autonomous systems of differential equations. Topics are selected from biology and political science, including voting theory and Arrow's Theorem. Independent of MTH 219. Prerequisite MTH 162 (MTH 163 is recommended).

219. Introduction to Mathematical Models in Social and Life Sciences B. Both MTH 218 and MTH 219 are aimed at building problem-solving ability in students through the development of mathematical models for certain real-life situations in the social and biological sciences. MTH 219 concentrates on probabilistic models, and includes all necessary elementary probability theory. Linear programming and utility theory are also discussed. Topics are mostly selected from biology and economics. Independent of MTH 219. Prerequisite: MTH 162.

230. Theory of Numbers. Divisibility, primes, congruences, quadratic residues and quadratic reciprocity, primitive roots, elementary prime number theory,

233. Number Theory and Cryptology. Divisibility, primes, congruences, pseudoprimes. Classical, public-key, and knapsack ciphers. Other topics in number theory and applications in computer sciences as time permits. Same as CSC 233.

235. Linear Algebra. Finite-dimensional vector spaces over \mathbf{R} and \mathbf{C} axiomatically and with coordinate calculations. Forms, linear transformations, matrices, eigenspaces. Prerequisite: MTH 163. This course may be taken concurrently with MTH 164. (Fall and Spring)

236. Introduction to Algebra I. An introduction to basic algebraic structures, groups, rings, fields, with applications to specific examples. Prerequisite: MTH 235, taken previously or concurrently, is recommended. (Fall and Spring)

237. Introduction to Algebra II. Continuation of MTH 236. (Spring)

238. Combinatorial Mathematics. Permutations and combinations; enumeration through recursions and generating functions; Polya's theory of counting; finite geometries and block designs; counting in graphs. Same as CSC 238.

239. Introduction to Algebraic Number Theory. Gaussian integers and sums of two squares, quadratic fields and binary quadratic forms, arithmetic of quadratic fields, including factorization of ideals, class numbers, and fundamental units. Prerequisite: either MTH 230 or 236.

243. Introduction to Topology. Classification of surfaces, knot theory, the fundamental group. Prerequisites: MTH 236 and 265.

247. Theory of Sets. Sets, relations, mappings; equivalence, order; cardinals, ordinals, transfinite arithmetic; axiom of choice and equivalents.

248. Theory of Graphs. Paths, circuits, trees. Bipartite graphs, matching problems. Unicursal graphs, Hamiltonian circuits, factors. Independent paths and sets. Matrix representations. Planar graphs. Coloring problems. Prerequisite: MTH 235 recommended. Same as CSC 248.

250. Introduction to Geometry. Foundations of geometry, isometry, similarity, inversions; introduction to affine, projective, and various non-Euclidean geometries. (Fall)

253. Projective Geometry. Projective and affine planes, theorems of Desargues, Pappus, Pascal. Cross ratio, collineations, coordinates, conics, duality. Prerequisites: MTH 164 or 174. MTH 235 recommended. (Spring)

255. Differential Geometry I. Torsion, curvature, the differential geometry of curves and surfaces in 3-space. Prerequisite: MTH 164 or 174. (Fall)

256. Differential Geometry II. Riemannian geometry. Prerequisite: MTH 255. (Spring)

263. Ordinary Differential Equations. A second course in ordinary differential equations in the real domain. Prerequisite: MTH 163 or equivalent and MTH 235, or consent of the instructor.

265. Functions of a Real Variable I. Real number system, uniform continuity, mean value theorems, bounded variation, Riemann-Stieltjes integral, sequences of functions. Prerequisites: MTH 163 and 164, or 174, or equivalent. (Fall and Spring)

266. Functions of a Real Variable II. Differentials; implicit functions, functional dependence; transformations of multiple integrals; arc length, surface area; differential forms, vector analysis. Prerequisite: MTH 265. (Spring)

275. Introduction to Functional Analysis. Banach spaces. Spaces of continuous linear mappings. Spaces of continuous multilinear mappings. Differential calculus in Banach spaces. Prerequisites: MTH 235, 265.

280. Introduction to Numerical Analysis. The numerical solution to mathematical problems by computer. Linear systems, approximation, integration, and differential equations. Floating point arithmetic and consequent pitfalls of computation. Prerequisite: MTH 162 or equivalent. Same as STT 280 and CSC 280. (Spring)

281. Introduction to Fourier Series, Orthogonal Polynomials, and Boundary Value Problems. Fourier series and convergence theorems. Orthogonal polynomials. Applications to some partial differential equations. Fourier transforms. Prerequisites: MTH 163 and 164 or 174. Equivalent to ME 201. (Fall)

282. Introduction to Complex Variables with Applications. Complex differentiation and integration, analytic functions, singularities, residues, poles, series expansions, conformal mapping, with some applications. This course is independent of MTH 281. Prerequisite: MTH 164 or 174. Equivalent to ME 202. (Spring)

286. Introduction to the Theory of Computation. Introduction to automata theory, formal languages, computability, and computational complexity. Prerequisite: MTH 162 or permission of the instructor. Same as CSC 286. (Offered in alternate years with MTH 288.) (Fall)

288. Introduction to Design and Analysis of Computer Algorithms. Introduction to general data structures and programming techniques for the design of time- and space-efficient algorithms. Prerequisites: CSC 220, MTH 162, or permission of the instructor. Same as CSC 288. (Offered in alternate years with MTH 286.) (Spring)

300. History of Mathematics. The nature and style of mathematics in ancient Babylonia, Egypt, and Greece; medieval and Renaissance Europe; seventeenth-century Europe; and some aspects of the development of abstraction and rigor in analysis and set theory since 1700. Some of the actual methods and problems of the eras studied are part of the material of the course.

305. Music and Mathematics. A seminar course exploring the relations between the two arts. The topics may be chosen from combinatorics, group theory, serialism, atonalism, mathematical acoustics, computer composition, etc. Prerequisite: consent of the instructor.

333. Surreal Numbers. A seminar on numbers (in the new treatment of John Conway) designed to expose students to the creative aspect of mathematics and to help develop the ability to do independent work in mathematics.

391. Independent Study in Mathematics. Special work arranged individually.

Graduate-level courses (400 and 500 level) are open to qualified undergraduates with permission of the instructor. Among these are:

436. Algebra I. Rings and modules, group theory. Galois theory. Prerequisite: MTH 237. (Fall)

437. Algebra II. Multilinear algebra, quadratic forms, simple and semi-simple rings and modules. Prerequisite: MTH 436. (Spring)

440. General Topology I. Continuity. Compactness, connectedness, metrizability. Product spaces. Prerequisite: MTH 265. (Fall)

443. Algebraic Topology I. The combinatorial structure of complexes and the homology of polyhedra. Applications of algebraic techniques in topology to classification of surfaces, fixed point theory, and analysis. Prerequisites: MTH 436 and 440. (Spring)

453. Differentiable Manifolds. An introduction to the theory of differentiable manifolds. Manifolds and submanifolds, tangent spaces and bundles, vector and sphere bundles, vector fields, differential forms, tensors, and homogeneous spaces. Prerequisite: MTH 266 or equivalent.

463. Partial Differential Equations. An introduction to partial differential equations. First order, elliptic, parabolic, and hyperbolic equations. Cauchy-Kowalevski theorem, maximum principle, Dirichlet problem, heat kernel, etc.

467. Theory of Analytic Functions I. Cauchy theorems, Taylor and Laurent series, residues, conformal mapping, analytic continuation, product theorems. Prerequisite: MTH 265 or equivalent. (Fall)

471. Measure and Integration. Lebesgue measure on the line. Measure spaces. Integration. Convergence theorems. The Radon-Nikodym theorem. Differentiation. Fubini's theorem. The function spaces L_p and C . Prerequisite: MTH 265 or equivalent. (Spring)

472. Functional Analysis I. Banach spaces. Dual spaces. Riesz theorem. Hilbert space. Fourier series. Projective and unitary operators. Spectral analysis of completely continuous self-adjoint operators. Applications. Prerequisite: MTH 471. (Fall)

A more detailed description of other graduate-level courses may be found in the *Official Bulletin: Graduate Studies*.

MUSIC

Kim H. Kowalke, Ph.D. (Yale)

Professor of Music, College of Arts and Science and Eastman School of Music and Chair of Department

Ellen Koskoff, Ph.D. (Pittsburgh)

Associate Professor of Musicology, Eastman School of Music

Daniel G. Harrison, Ph.D. (Yale)

Assistant Professor of Music, College of Arts and Science, and of Music Theory, Eastman School of Music

Massimo M. Ossi, Ph.D. (Harvard)

Assistant Professor of Music, College of Arts and Science and of Musicology, Eastman School of Music

David Schildkret, D.M. (Indiana)

Assistant Professor of Music and Coordinator of Choral Activities, College of Arts and Science; Assistant Professor of Conducting and Ensembles, Eastman School of Music

*Carl J. Atkins, D.M.A. (Eastman

School of Music) Assistant Professor of Music, College of Arts and Science; Conductor, Symphonic Wind Ensemble

*Darryl One, M.M. (Indiana)

Conductor of Orchestral Ensembles and National Endowment for the Arts/Affiliate Artist Resident Conductor of the Rochester Philharmonic Orchestra

*Alvin Parris, B.A. (Eastman School of

Music) Director of the Gospel Choir
Additional faculty members, *Eastman School of Music*

The music program uses four to six teaching assistants from the Eastman School of Music as lecturers or musician-ship instructors.

Students from all disciplines may participate in the pleasures and rigors of musical study and performance to acquire a deeper understanding of the many ways music (and related arts) reflects values of various cultures, influences lives, and enriches human existence. The music program of the College of Arts and Science offers courses of study leading to the B.A. degree with a concentration in music and a minor in music. A wide variety of nontechnical courses address

nonconcentrators who wish to study music on an introductory, interdisciplinary, or aesthetic basis. Degree programs, course offerings, and performance opportunities in music are diverse and invite choice and flexibility. Courses offered at the Eastman School of Music, normally open to any student presenting the proper prerequisites, augment the range and depth of musical experiences and courses available to students in the College of Arts and Science. (For information concerning the bachelor of music degree and courses offered at the Eastman School, consult the School's official bulletin. Credit for ESM courses will be awarded according to the system used at the Eastman School.)

MUSICAL ENSEMBLES AT THE RIVER CAMPUS

Currently more than 300 students participate in nine musical ensembles that present approximately 40 concerts each year. Instrumental organizations include the University Symphony Orchestra, the Symphonic Wind Ensemble, the University Chamber Orchestra, the Jazz Ensemble, and the Chamber Music program. Choral activities comprise the University Glee Club, the University Chamber Singers, the Gospel Choir, and two pop singing groups—the Yellowjackets (12 men) and Vocal Point (12 women).

In addition, there are a number of special musical events, including musical theater productions on a regular basis, and off-campus concerts and tours.

Students in any college of the University are eligible to audition for membership in musical ensembles on the River Campus. Undergraduate students may elect to enroll in musical ensembles for credit; grades are awarded as CR (credit) and NCR (noncredit). Each ensemble carries credit, but a student may earn only 1 credit per semester for participation in musical groups. Music ensembles may be repeated for credit; a maximum of 8 credit hours for music concentrators and 4 credit hours for all other students may be counted as electives toward the bachelor's degree.

PRIVATE INSTRUMENTAL AND VOCAL INSTRUCTION

Credit Lessons

Each year approximately 200 River Campus students, including music concentrators and nonconcentrators, take private instrumental or vocal lessons for credit at the Eastman School. Anyone at an intermediate level of proficiency on an instrument or in voice is encouraged to apply to take credit lessons. Students registering for lessons for the first time must audition during the first three days of the semester. Students previously enrolled and making satisfactory progress in applied music need not audition again if they wish to continue lessons, but they must have their registrations approved by the Associate Director for Academic Affairs of the Eastman School. Applications for applied music instruction are available from the secretary of the music program.

Most students meet with their instructors once a week for 30 minutes, and receive 2 credits for lessons. Students who qualify for one-hour lessons may be awarded additional credit. The addition of private lessons to a normal 16-credit-hour semester is not considered an overload, and there is no fee or additional tuition charge. No more than 8 credit hours of applied instruction for non-music concentrators and 16 credit hours for music concentrators may be counted toward the B.A. degree.

Noncredit Lessons

A limited number of students may take lessons without credit by enrolling directly with the Community Education Division of the Eastman School. The cost of this instruction is not included in regular college tuition; students are billed directly by the Eastman School. College credit will not be awarded for these lessons nor will such lessons appear on the student's permanent record at the University. However, the Community Education Division awards grades for all study, and a transcript of such study is available through the Community Education Division Office at the Eastman School of Music.

Practice Facilities

Practice facilities in the Spurrier Building on the River Campus are open to all members of the University community. Keys are available at the Information Desk in Wilson Commons.

THE B.A. WITH A CONCENTRATION IN MUSIC

The College of Arts and Science, in cooperation with the Eastman School of Music, offers the bachelor of arts degree with a concentration in music. This degree program in music addresses students who can meet both the intellectual and musical challenges of a rigorous program that emphasizes the broad experience of a liberally educated person. The concentration comprises a balanced program of academic courses, private instruction, and ensemble experience that fosters understanding of musical languages, historical developments, and compositional styles while encouraging excellence in performance. The core curriculum in music theory and history provides the common foundation for advanced study of specialized subfields in music (musicology, theory, conducting, management, performance, composition, music education, etc.) both as emphases in the final years of undergraduate education and at the graduate or professional level.

Although the concentration in music is a demanding one, students often also explore, beyond the introductory level, one or more nonmusic disciplines. Some students pursue a double major. Such flexibility allows, for example, students to combine prelaw or premedicine preparation with a concentration or minor in music.

Students who concentrate in music in the B.A. program at the University of Rochester usually demonstrate significant prior musical experience. Applicants to the College of Arts and Science who are considering a concentration in music are encouraged to audition (in person or by tape) as part of the admission process so that musical achievement can be considered in the admission

decision and the student can be advised of placement in private instruction at the Eastman School. Students are admitted to the music concentration by the music faculty after a review, usually in the sophomore year, of their academic records and musical progress. Music concentrators are encouraged to satisfy their foreign language requirement in either German or French. Students must have satisfied the piano proficiency requirement or be enrolled in an appropriate piano class before they can be admitted to the concentration.

REQUIREMENTS FOR THE MUSIC CONCENTRATION

A concentration in music (52 credits) will include these minimum requirements:

1. Music theory and musicianship (16 credits): MUR 111, 112, 211, 212.
2. Music history (16 credits): MUR 221, 222, 223, 224.
3. Ensemble (4 credits) at least two of which must be in a River Campus ensemble. A maximum of 8 credits may be counted toward the B.A. degree.
4. Private instruction (8 credits—minimum four semesters). Students receiving an audition rating equal to or higher than performance majors in the B.M. program at the Eastman School may be assigned a primary studio instructor at the discretion of the Associate Director for Academic Affairs at Eastman. All other students will be assigned secondary instructors.
5. Piano proficiency (0–4 credits). Students must demonstrate keyboard facility prior to graduation by successfully completing PA 102 or being exempted on the basis of comparable proficiency. Auditions are held during the first week of classes in the fall term.
6. Music electives (8 credits). May be chosen from any MUR or ESM course numbered 200 or higher, except ESM Music History 421–426. No ensemble or applied music (private instruction) credits may be included. (See the *Official Bulletin: Eastman School of Music* for its course offerings and credit hours.)

In accordance with University policy, no more than 80 credit hours may be taken in music. Although the requirements for the concentration in music can be met in three years, any student who is considering a music concentration is urged to begin the music theory sequence in the fall semester of the freshman year. Students with limited background in music who do not qualify for Theory I should enroll in MUR 101, Elements of Music, during the freshman year.

THE MINOR IN MUSIC

Seven courses (28 credit hours) are required, including:

- MUR 111, 112; 134
- 4 credits in ensemble or applied music
- 12 credit hours in music courses numbered MUR 120 or ESM 200 or above, excluding ensembles and applied music

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991–92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

100. Music in Performance. A course for listeners. Surveys the masterworks of music; sometimes limited to a group of composers or a historical period. Live performances (including programs of chamber music, opera, orchestral, and choral works) accompany the weekly lectures. No prerequisites.

101. Elements of Music. A nonthreatening theory course for the student with limited or no previous musical experience. Notation, intervals, chords, and other basic concepts of tonal harmony, with application to the study of a wide range of styles including popular idioms. Little emphasis on ear training and keyboard work. No prerequisites. (Fall and Spring)



102. Masterpieces of Western Music. A course for the nonconcentrator, designed to increase the understanding and enjoyment of music for performers and listeners. The course focuses on listening skills and a brief historical survey of musical styles without reliance upon technical language or the ability to read music. No prerequisites. (Spring)

111. Theory and Musicianship I. The first course in a four-term sequence in music theory and musicianship required for the concentrator. The vocabulary and syntax of tonal harmony and counterpoint, with musicianship lab in sight-singing, dictation, keyboard harmony, and other skills. Prerequisite: Knowledge of treble and bass clefs, scales, keys, triads, intervals, as demonstrated by a qualifying score on placement test administered during orientation periods. (Fall)

112. Theory and Musicianship II. Continuation. Prerequisite: MUR 111. (Spring)

121. World Music Traditions. This course explores some of the world's major musical traditions, including those of India, Indonesia, China, Eastern Europe, sub-Saharan Africa, and the Americas. Students become familiar with the social, economic, and religious systems surrounding musical practices, as well as with the building blocks of the world's music from various pitch and improvisational systems to those of time, form, and texture. No prerequisites.

122. History of Jazz. A survey of the history of jazz from pre-1900 origins to the present. No prerequisites. (Spring)

123. History of Afro-American Music. A social and historical survey of the music made primarily by and for blacks in America. Traces the development from the origins in Africa to its present state in American culture. No prerequisites. (Spring)

125. American Musical Theater. A historical survey of the repertoire of American musical theater within its social, dramatic, and musical contexts from 1900 to the present. (Fall)

134. Musical Style and Genre. A one-semester intensive survey of major musical styles and genres, intended for those with considerable previous musical experience. Required for the minor in music. Prerequisite: MUR 101 or 111 or permission of instructor. (Spring)

135. Musical Theater in Production. Full-scale production of musical theater. Depending on the level of involvement and responsibilities, the course may be taken for 2 or 4 credits, subject to approval of the instructor. Cast members who take the course for credit will be expected to attend dance classes, acting workshops, and coaching sessions. Technical and management participants will work under supervision on various backstage aspects of production. (Spring)

141-9. Topics in Music. Specific subjects will be announced in the *Schedule of Courses*. Previous topics have included Beethoven's symphonies, Mozart's operas, Renaissance Court Music, Music and the Visual Arts, Bach and Handel, Music and Film, Opera. Intended for the nonconcentrator. Prerequisite: MUR 101, 102, or 111.

151. Symphonic Wind Ensemble.

152. Jazz Ensemble. (Fall and Spring)

153. University Symphony Orchestra.

154. University Chamber Orchestra.

155. Chamber Ensembles.

156. University Glee Club.

158. University Chamber Singers.

159. Gospel Choir.

211. Theory and Musicianship III. Continuation. Prerequisite: MUR 112. (Fall)

212. Theory and Musicianship IV. Continuation. Prerequisite: MUR 211. (Spring)

221. Music History I. A historical survey of music from the Middle Ages to the Renaissance, with an introduction to listening skills, methodology, music reference tools, and writing about music. Prerequisite: MUR 112. (Fall)

222. Music History II. A historical survey of music from ca. 1560 to ca. 1770, with an emphasis on stylistic analysis and cultural contexts. Prerequisites: MUR 211, 221. (Spring)

223. Music History III. A historical survey of music from ca. 1770 to ca. 1880, with an emphasis on structural analysis, compositional procedure, and relationships to literature and visual art. Prerequisite: MUR 212, 222. (Fall)

224. Musical History IV. A historical survey of music from 1880 to the present. Prerequisite: MUR 212, 223. (Spring)

232. Beginning Composition. Principles of musical composition and exercises in the writing of small forms. Prerequisite: MUR 112.

233. Musical Theater Workshop. Intensive practical experience with scene-and-song work from the repertoire of popular musical theater genres. Prerequisite: one year of voice instruction, ENG 129, or permission of instructor. (Fall)

241-9. Topics in Music History. Intensive study of limited repertoire with emphasis on analysis and critical writing by the student. Specific subjects to be announced. Prerequisites: MUR 212, 224.

251. Senior Seminar. Required of all students preparing senior projects in music. (Spring)

252. Independent Study in Music. (Fall and Spring)

NAVAL SCIENCE

- Ralph K. Martin, Captain, USN, M.A.
(Wisconsin) *Professor of Naval Science and Chair of the Department*
- D. Anthony Quinn, Commander, USN, M.S. (Naval Postgraduate School)
Associate Professor of Naval Science
- Carol S. Clark, Lieutenant, USN, M.B.A. (Western Florida)
Assistant Professor of Naval Science
- Joseph H. Gates, Lieutenant, USN, B.S. (Fitchburg State)
Assistant Professor of Naval Science
- Thomas W. O'Keefe, Lieutenant, USN, B.S. (Virginia)
Assistant Professor of Naval Science
- Ernest W. Sax, Lieutenant, USN, B.S. (U.S. Naval Academy)
Assistant Professor of Naval Science
- Daniel L. Weed, Lieutenant, USN, B.S. (Rochester)
Assistant Professor of Naval Science

The Department of Naval Science does not use teaching assistants in its instructional program.

Naval science studies are designed to prepare students seeking commissions in the U.S. Navy or U.S. Marine Corps through the NROTC Program. The University has had an NROTC unit on campus since 1946. The NROTC Program is open to both male and female students. Any student may enroll in courses offered by the Department of Naval Science.

Students participate in the NROTC Program in one of three options:

1. NROTC SCHOLARSHIP PROGRAM students are selected by national competition. Applications may be obtained from the Department of Naval Science and must be mailed by early November for enrollment in the following fall semester. Students are subsidized by the Navy for tuition, fees, textbooks, and uniforms, and they receive a subsistence

allowance of \$100 per month during the academic year. Scholarship students may withdraw from the program at their own request without obligation at any time prior to the beginning of the sophomore year. Thereafter, the student is obligated to accept a commission as Ensign, USN, or Second Lieutenant, USMC, upon graduation and to serve on active duty for a minimum of four years.

2. NROTC COLLEGE PROGRAM is available to all freshmen and sophomores and is specifically designed to provide an opportunity for students to earn a commission. Students are welcome to apply for the program by contacting any member of the Department of Naval Science for details. College Program students receive uniforms and a subsistence allowance of \$100 per month during the junior and senior years. College Program students are eligible to enter the national scholarship competition and, if successful, become Scholarship students. College Program students incur a service obligation upon beginning their junior year. They must agree to accept a commission as Ensign, USNR, or Second Lieutenant, USMCR, upon graduation and to serve thereafter on active duty for three years.

3. TWO-YEAR COLLEGE PROGRAM students may apply for the program by submitting their applications to the Professor of Naval Science. Sophomores who have two years of study remaining (including two summers) prior to receiving a baccalaureate or higher degree are eligible to apply. Students selected for the Two-Year Program attend the Naval Science Institute for about six weeks during July and August at the Naval Education and Training Center, Newport, Rhode Island. Tuition, room, board, travel expenses, and modest subsistence are provided. The student is then eligible to join the NROTC College Program in the fall, assuming the same obligations as other College Program students.

ELIGIBILITY FOR NROTC PROGRAMS

In general, students must be U.S. citizens between 17 and 21 years of age and be physically qualified in accordance with standards prescribed for Navy midshipmen. More detailed information can be obtained from the Department of Naval Science office.

SUMMER TRAINING CRUISES

Students in the NROTC Program participate in summer cruises of approximately six weeks' duration as part of their training to become officers in the Navy or Marine Corps. Cruises are aboard naval ships, submarines, aircraft squadrons, and shore bases throughout the world. Four-year Scholarship students attend three such summer cruises. College Program students attend one such cruise, between the junior and senior years. Two-year Scholarship students attend one cruise. While on cruise, NROTC students receive room, board, travel expenses, and compensation equivalent to one-half ensign's pay.

NAVAL SCIENCE STUDENTS

Any student in the University may take naval science courses. Credits for courses taken in the Department of Naval Science are determined by the college in which the student is pursuing his or her concentration. Students who are thinking about applying to an NROTC program are encouraged to enroll in a naval science course.

NROTC COURSE REQUIREMENTS

The following is the recommended sequence of naval science courses for midshipmen. Deviations from the recommended sequence are permitted; however, they must be approved by the Professor of Naval Science.

First Year

- NS 93. Introduction to Naval Science
- NS 94. Ship Systems I

Second Year

- NS 249. Ship Systems II
- NS 250. Sea Power and Maritime Affairs

Third Year

- NS 221. Navigation I
- NS 98. Navigation II

Fourth Year

- PSY 264. Psychology in Business and Industry
- PSY 265. Leadership and Management II

Various other courses, contained in a core curriculum, are prescribed for midshipmen depending upon their category/service. Details may be obtained from the Department of Naval Science.

OTHER ACADEMIC REQUIREMENTS

Midshipmen are encouraged to pursue courses of study leading to degrees in engineering, physics, mathematics, and chemistry, but may also follow any program which leads to a baccalaureate degree. Marine Option midshipmen will take Amphibious Operations (NS 99), Evolution of Strategic Concepts (NS 251), and two electives, approved by the Professor of Naval Science, during their junior and senior years, instead of the sequence listed previously.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.



93. Introduction to Naval Science.

No credit. Introduction to the Navy, including customs, traditions, seamanship, officer responsibilities, and naval careers. (Fall)

94. Ships Systems I. No credit. Introduction to shipboard engineering, including other topics to prepare midshipmen for their first summer training cruise. (Spring)

98. Navigation II. No credit. The rules designed to prevent collisions at sea and techniques for determining the relative motion between ships. (Spring)

99. Amphibious Operations. No credit. The organization, techniques, and strategies employed by the U.S. Navy and Marine Corps in the conduct of an amphibious operation. (Fall)

221. Navigation I. Credit—4 hours. Theory and techniques of the art of navigation, including dead reckoning, piloting, and electronic and celestial navigation. (Fall)

249. Ships Systems II. Credit—

4 hours. Analysis of ship systems and working environments; system selection, system control, computational procedures, data transmission and control. (Fall)

250. Sea Power and Maritime Affairs. Credit—4 hours. A survey of all aspects of maritime affairs and the effects of sea power on national development. A discussion of historical events. (Spring)

251. Evolution of Strategic Concepts. Credit—4 hours. A study of the development of strategic concepts by various world powers, with emphasis on naval strategies. (Fall)

PHILOSOPHY

Richard Feldman, Ph.D. (Massachusetts)
Professor of Philosophy

*Robert Lawrence Holmes, Ph.D.
(Michigan) *Professor of Philosophy*

*Henry E. Kyburg, Jr., Ph.D. (Columbia)
*Burbank Professor of Philosophy and
Professor of Computer Science*

Dennis O'Brien, Ph.D. (Chicago)
Professor of Philosophy

F. Jeffrey Pelletier, Ph.D. (California,
Los Angeles) *Professor of Philo-
sophy, Luce Professor of Cognitive
Science, and Professor of Computer
Science*

Earl Conee, Ph.D. (Massachusetts)
Associate Professor of Philosophy

Ralf Meerbote, Ph.D. (Harvard)
*Associate Professor of Philosophy and
Chair of the Department*

Deborah Modrak, Ph.D. (Chicago)
Associate Professor of Philosophy

David Braun, Ph.D. (California,
Los Angeles) *Assistant Professor
of Philosophy*

Randall Curren, Ph.D. (Oxford)
*Assistant Professor of Education and
of Philosophy*

Lewis White Beck, Ph.D. (Duke)
*Burbank Professor Emeritus of Moral
and Intellectual Philosophy*

Rolf A. Eberle, Ph.D. (California, Los
Angeles) *Professor Emeritus of
Philosophy*

Harmon R. Holcomb, B.D. (Colgate
Rochester Divinity School)
*Professor Emeritus of Philosophy
and of Religion*

Alfred Harrison Jones, Ph.D. (Cornell)
Professor Emeritus of Philosophy

Colin Murray Turbayne, Ph.D.
(Pennsylvania) *Professor Emeritus
of Philosophy*

*The Department of Philosophy uses
approximately 10 teaching assistants in
large lecture courses as graders or section
leaders.*

The Department of Philosophy offers programs leading to the B.A. degree, as well as to the M.A. and the Ph.D. degrees.

A wide variety of points of view and interests is represented by the faculty of the Department of Philosophy. The specific problems discussed in undergraduate courses are the traditional ones of the theory of knowledge, metaphysics, ethics, social philosophy, philosophy of science, etc. The techniques brought to bear on these problems are primarily historical or analytical and logical. The program stresses Western philosophy, ancient and modern, and gives particular emphasis to recent and contemporary Anglo-American philosophy. The breadth of offerings provides an excellent foundation not only for graduate work in philosophy, but also for careers in biology, English, history, mathematics, law, and medicine. Double concentrations are encouraged.

Students who wish to do graduate work in philosophy may, with permission of the instructor and approval of the undergraduate advisor, take graduate seminars (see *Official Bulletin: Graduate Studies*).

The bachelor's degree with distinction is offered on recommendation of the Department and is based primarily on the grade-point average in philosophy. Performance in undergraduate seminars and in independent study is sometimes considered.

The Department recognizes three special concentrations in philosophy. One, the philosophy concentration with emphasis on law and ethics, is designed primarily for students, including prelaw students, who are interested in a systematic treatment of social justice. The second concentration emphasizes history, and is designed for students with both scholarly and philosophical interests in the history of philosophy. The third is the philosophy concentration with emphasis on logic and the philosophy of science. It is designed primarily for students interested in one or more of the sciences who wish to pursue in depth the study of logic and the philosophy of science.

Students may minor in philosophy by following one of the four plans described below. There is a general minor in philosophy as well as specialized minors in philosophy of science, ethics, and history of philosophy. There is considerable flexibility in devising minors, and students are required to formulate their programs in close consultation with the undergraduate advisor.

Philosophy offers an honors program for exceptional students, who show promise of being able to do individual research and to complete successfully an honors thesis. Students who wish to apply for the honors program should consult with the Director of the Honors Program during their sophomore year or at the outset of their junior year.

To graduate with honors a student must satisfy the following requirements:

1. Four credit hours of an Honors Tutorial (PHL 392). In an Honors Tutorial a student does preliminary reading in preparation for writing an Honors Thesis. PHL 392 is typically taken as two 2-credit courses during the junior year (students studying abroad during a semester of the junior year may condense this into one semester of tutorial for 4 credit hours).
2. Four credit hours of Honors Thesis (PHL 393). In order to receive honors a student must submit a thesis by April 1, and defend the thesis orally by the final day of classes.
3. Four credit hours of a graduate seminar in philosophy, or in an undergraduate seminar approved for honors credit. The seminar may be taken during the junior or senior year.

After a student has completed an Honors Thesis, the thesis is reviewed by a three-person faculty committee, including the Director of the Honors Program, the student's advisor, and one other faculty member. If the committee approves the thesis, an oral exam will be conducted.

Philosophy can be considered relevant to almost any program or concentration in the University. Within the humanities,

*This faculty member has applied for one or two semesters of leave in 1991-92.

philosophy has had as long and as influential a career as literature; many of the problems it addresses are problems which have aroused the interest and concern of many of the most powerful thinkers in the Western tradition. Below are listed groups of courses that might be of particular relevance to students concentrating in the indicated disciplines:

Anthropology

PHL 102, 105, 201, 202, 211, 253
Biology, Chemistry, Geology, Microbiology, Physics and Astronomy
PHL 202, 210, 252

Computer Science, Mathematics

PHL 210, 211, 214, 218, 252

Economics

PHL 102, 210, 220, 223, 253

English, Art and Art History,

Foreign Languages, Literatures, and Linguistics

PHL 141, 201, 202, 203, 211

History

PHL 201 through 209

Naval Science

PHL 102, 108, 210, 223, 252

Political Science

PHL 102, 203, 210, 220, 223, 253

Psychology

PHL 101, 211, 244, 253, 254

Religion

PHL 101, 201, 202, 242, 246

Sociology

PHL 102, 103, 202, 203, 223, 253

Statistics

PHL 210, 252, 253.

REQUIREMENTS FOR CONCENTRATION IN PHILOSOPHY

A total of 10 courses:

- PHL 201, 202, 210.
- Five or more additional courses in philosophy. These courses must include
 - (a) one course in ethics from among PHL 102, 103, 220, and 230;
 - (b) one course from among PHL 214, 217, 218, 242, 243, 244, 247, 248, 252, 254, and 258;
 - (c) one 200-level course (other than PHL 201, 202, and 210) of the student's choice.
- Two advanced courses, approved by the Department advisor, in an allied field.



PHILOSOPHY CONCENTRATION WITH EMPHASIS ON LAW AND ETHICS

A total of 11 courses:

- PHL 201, 202, 210.
- One course in reasoning from among PHL 105, 106, 214, 217, 243.
- One course from among PHL 214, 217, 218, 242, 243, 244, 247, 248, 252, 254, 258.
- Four courses on ethics or law from among PHL 102, 103, 220, 223, 225, 226, 230.
- Two advanced courses in an allied field, subject to the approval of the undergraduate advisor.

PHILOSOPHY CONCENTRATION WITH EMPHASIS ON HISTORY

A total of 11 courses:

- PHL 201, 202, 210.
- One course in ethics from among PHL 102, 103, 220, 225, 230.
- One course from among PHL 214, 217, 218, 242, 243, 244, 247, 248, 252, 254, 258.
- Four courses in the history of philosophy from among PHL 245, 246, 261, 266, 267, 315, 319, 320, 323, 370.
- Two advanced courses in an allied field, subject to the approval of the undergraduate advisor.

PHILOSOPHY CONCENTRATION WITH EMPHASIS ON LOGIC AND THE PHILOSOPHY OF SCIENCE

A total of 10 courses:

- PHL 201, 202, 210.
- One course in ethics from among PHL 102, 103, 220, 230.
- Four courses in logic or the philosophy of science from among PHL 105, 106,

211, 214, 215, 216, 217, 218, 243, 252, 253, 254, 352. The student *must* take either 215 or 252.

- Two advanced courses in an allied field, subject to the approval of the undergraduate advisor.

Ordinarily, a student who concentrates in both philosophy and some other discipline will take the advanced courses listed above that are recommended to students in that other discipline.

Qualified concentrators in philosophy may be approved by the Department for the Study Abroad program.

MINORS IN PHILOSOPHY

Each minor requires five courses chosen in consultation with the undergraduate advisor.

Plan A

PHILOSOPHY OF SCIENCE

PHL 210, 252, and three other courses in philosophy of science. Courses include 105, 106, 218, 243, 253, 254, 352, 391.

Plan B

ETHICS

PHL 102 and four other courses in ethics and related areas. Courses include 103, 220, 223, 225, 226, 228, 230, 391.

Plan C

HISTORY OF PHILOSOPHY

PHL 201 and 202 and three other courses in the history of philosophy. Courses include 245, 246, 261, 266, 267, 315, 319, 320, 323, 370.

Plan D

PHILOSOPHY

Students may devise in consultation with the undergraduate advisor their own five-course minor in philosophy.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.



INTRODUCTORY COURSES

101. Introduction to Philosophy. A study of fundamental philosophical problems and approaches to their solution. (Fall, Spring)

102. Ethics. A critical examination of leading theories of right and wrong, and good and evil. (Fall, Spring)

103. Contemporary Moral Problems. The application of ethical theory to moral problems, such as punishment, abortion, and racism. (Spring)

105. Reason and Argument. A study of reason and argument on both scientific and nonscientific topics. How to evaluate reasoning as it is found in editorials, speeches, and essays. How to understand and evaluate the reasoning found in reports on scientific research. (Spring)

106. Rational Decisions. An introduction to formal decision theory with special emphasis on the philosophical foundations.

108. Philosophy of War. An examination of the concepts of war, legal and moral aspects of just war theory, pacifism, and the problem of war and moral responsibility.

111. Philosophy of Religion. Same as REL 111. (Fall)

112. Rationality and Religious Belief. Same as REL 112.

141. Aesthetics. Critical examination of some of the major problems in aesthetics and consideration of the historical routes along which they have evolved. Same as AH 269.

171. Philosophical Foundations of Feminism. The investigation of some of the philosophical issues raised by contemporary feminism, such as questions about justice, human nature, and human freedom. Same as WST 295. (Spring)

HISTORICAL COURSES

201. History of Ancient Philosophy. Lecture survey of the development of Western philosophy from the prephilosophical beginnings through Aristotle. (Fall)

202. History of Modern Philosophy. A study of important philosophers from the seventeenth to the eighteenth century, and of their position in the cultural history of the West. (Spring)

203. Aristotle's Philosophy. Study of various works of Aristotle's philosophy.

266. Rationalism. A study of the three great philosophical figures of the rationalist period, namely, Descartes, Leibniz, and Spinoza, with emphasis on the last. Topics include the nature of substance, of space and time, and of knowledge and mind. Prerequisite: PHL 202.

267. British Empiricism. A study of three great figures of early British philosophy: Locke, Hume, and Reid. Topics include theories of knowledge, consciousness, space, and perception. Prerequisite: PHL 202. (Spring)

LOGIC AND RELATED COURSES

210. Introductory Logic. Precise methods for formalizing arguments, demonstrating their validity, and proving theorems in first-order symbolic logic. Same as COG 210. (Fall, Spring)

211. Logic and Language. Logical analysis, consequences, and semantics in natural languages: presupposition, possibility, tenses, ambiguity, vagueness, etc.

214. Logical Methods in Philosophy. Philosophical logic: modal, tense, many-valued logic, logical linguistics, mereology, etc. Prerequisite: PHL 210. (Spring)

215. Intermediate Logic. Formal axiomatic treatment of alternative systems of theory or higher order logic. Prerequisite: PHL 210 or permission of instructor.

216. Mathematical Logic. Same as MTH 216, CSC 216. Prerequisite: PHL 210 or permission of the instructor. (Fall)

217. Uncertain Inference. The exploration of various measures of uncertainty proposed in both philosophy and computer science. Prerequisite: PHL 210 or equivalent. Same as CSC 217.

218. The Philosophy of Mathematics. A study of the nature of mathematics from a philosophical point of view. Prerequisite: PHL 210 or permission of the instructor.

ETHICS AND RELATED COURSES

220. Recent Ethical Theory. An examination of the main twentieth-century ethical and meta-ethical theories. Readings from Moore, Ross, Stevenson, Hare, et al. Prerequisite: PHL 102 or permission of the instructor.

223. Social and Political Philosophy. An inquiry into the nature of human society, role of the state, and relation of moral to legal obligation. Prerequisite: PHL 102 or permission of the instructor.

225. Ethical Decisions in Medicine. Same as REL 225. (Spring)

226. Philosophy of Law. The nature of law and legal practice in relation to ethics. Prerequisite: one previous course in philosophy. (Fall)

230. History of Ethics. An examination of the major writers on ethics in Western thought, including Plato, Aristotle, Aurelius, Augustine, Hume, Kant, Mill, and Nietzsche. Prerequisite: one previous course in philosophy.

TRADITIONAL PHILOSOPHICAL DISCIPLINES

243. Theory of Knowledge. A study of the nature and extent of human knowledge. What is knowledge? Can skepticism be refuted? Under what conditions are beliefs justified or rational? Can anyone know what is right and wrong? Prerequisite: one previous course in philosophy. (Fall)

244. Philosophy of Mind. A discussion of problems connected with the nature of mind, e.g., the mind/body problem and the problem of personal identity. Prerequisite: one previous course in philosophy.

245. Selected Topics in Ancient Philosophy. Prerequisite: PHL 201 or permission of instructor. (Fall)

246. Augustine, Anselm, and Aquinas. Same as REL 224.

247. Philosophy of Language. A study of philosophical questions about language and the general nature of language. Prerequisite: one previous course in philosophy. (Fall)

248. Free Will. An examination of philosophical problems concerning free will, moral responsibility, and causal determinism. Prerequisite: one previous course in philosophy.

PHILOSOPHY OF SCIENCE

252. Philosophy of Science. An examination of scientific theories, nature of causal and statistical explanation. Prerequisite: PHL 210 or permission of instructor. (Spring)

254. Philosophy of Psychology. A study of philosophical topics relating to psychology. What is a mind and can it be scientifically studied? Behaviorism. Justifying psychological theories. Freedom and determinism. The ethics of psychological research. Prerequisite: one previous course in philosophy or permission of instructor. Same as COG 254. (Spring)

258. Science and Reason. A relatively formal assessment of the role of both inductive and deductive argument in science. Primarily for philosophy majors and majors in the sciences. Prerequisite: PHL 210 or permission of the instructor.

272. Existentialism. A 2-credit one-half term course. An introduction to existentialism philosophy through the works of Dostoevsky, Kierkegaard, Heidegger, and Sartre.

SEMINARS

308. Morality and War. An examination of the question whether war can be morally justified, with special attention to the just war theory, the killing of innocents, and nuclear deterrence. Prerequisite: one previous course in philosophy. (Spring)

315. Plato's Republic. Credit — 2 hours. An in-depth examination of the structure of the overall argument in Plato's *Republic* with special attention to Plato's views on morality and knowledge. (One-half term course)

323. Topics in Nineteenth-Century German Philosophy. Topics in post-Kantian German idealism. Prerequisites include at least one of the following: PHL 266, 267, 530, 531, or consent of instructor.

342. Metaphysics. This course focuses on the topic of identity through change, with considerable attention to the case of persons. Prerequisite: one previous course in philosophy.

360. Selected Topics in the Philosophy of Religion. An examination of recent work in the philosophy of religion. Prerequisite: one previous course in philosophy.

391. Independent Study in Philosophy. The reading of philosophical literature under guidance, for seniors majoring in philosophy. (Fall, Spring)

PHYSICS AND ASTRONOMY

*Arie Bodek, Ph.D. (M.I.T.)
Professor of Physics

*Theodore Castner, Ph.D. (Illinois)
Professor of Physics

Douglas Cline, Ph.D. (Manchester)
Professor of Physics and Director of the Nuclear Structure Research Laboratory

David H. Douglass, Jr., Ph.D. (M.I.T.)
Professor of Physics

Joseph H. Eberly, Ph.D. (Stanford)
Professor of Physics and of Optics

Thomas Ferbel, Ph.D. (Yale)
Professor of Physics

J. Bruce French, Ph.D. (M.I.T.)
Andrew Carnegie Professor of Physics

Harry E. Gove, Ph.D. (M.I.T.)
Professor of Physics

Carl Richard Hagen, Ph.D. (M.I.T.)
Professor of Physics

H. Lawrence Helfer, Ph.D. (Chicago)
Professor of Astronomy

John R. Huizenga, Ph.D. (Illinois)
Tracy H. Harris Professor of Chemistry and of Physics

Robert S. Knox, Ph.D. (Rochester)
Professor of Physics

Daniel S. Koltun, Ph.D. (Princeton)
Professor of Physics

Frederick Lobkowicz, Ph.D. (Edg. Tech. Hochschule Zurich)
Professor of Physics

Leonard Mandel, Ph.D. (London)
Professor of Physics

Adrian C. Melissinos, Ph.D. (M.I.T.)
Professor of Physics

*Susumu Okubo, Ph.D. (Rochester)
Professor of Physics

Stephen L. Olsen, Ph.D. (Wisconsin)
Professor of Physics

Judith L. Pipher, Ph.D. (Cornell)
Professor of Astronomy and Director of the C. E. Kenneth Mees Observatory

Malcolm P. Savedoff, Ph.D. (Princeton)
Professor of Astronomy

Albert Simon, Ph.D. (Rochester)
Professor of Mechanical Engineering and of Physics

Paul Slattery, Ph.D. (Yale)
Professor of Physics and Chair of the Department

*These faculty have applied for one or two semesters of leave in 1991-92.

- John H. Thomas, Ph.D. (Purdue)
Professor of Mechanical and Aerospace Sciences and of Astronomy and University Dean of Graduate Studies
- Edward H. Thorndike, Ph.D. (Harvard)
Professor of Physics
- Hugh M. Van Horn, Ph.D. (Cornell)
Professor of Physics and of Astronomy
- *Emil Wolf, Ph.D. (Bristol), D.Sc. (Edinburgh) *Professor of Physics and of Optics; Wilson Professor of Optical Physics*
- Ashok Das, Ph.D. (SUNY, Stony Brook)
Associate Professor of Physics
- *William J. Forrest, Ph.D. (California, San Diego) *Associate Professor of Astronomy*
- Yonathan Shapir, Ph.D. (Tel Aviv)
Associate Professor of Physics
- Yongli Gao, Ph.D. (Purdue)
Assistant Professor of Physics
- Stuart B. Gazes, Ph.D. (M.I.T.)
Assistant Professor of Physics
- *Sarada G. Rajeev, Ph.D. (Syracuse)
Assistant Professor of Physics
- Stephen L. Teitel, Ph.D. (Cornell)
Assistant Professor of Physics
- Dan M. Watson, Ph.D. (California, Berkeley) *Assistant Professor of Physics*
- Frank Wolfs, Ph.D. (Chicago)
Assistant Professor of Physics
- Ralph H. Colby, Ph.D. (Northwestern)
Adjunct Assistant Professor of Physics
- Michael Rubenstein, Ph.D. (Harvard)
Adjunct Assistant Professor of Physics
- David Meisel, Ph.D. (Ohio State)
Associate Director, C. E. Kenneth Mees Observatory
- Harry W. Fulbright, Ph.D. (Washington)
Professor Emeritus of Physics
- Edward H. Jacobsen, Ph.D. (M.I.T.)
Professor Emeritus of Physics and Senior Faculty Associate
- Stewart L. Sharpless, Ph.D. (Chicago)
Professor Emeritus of Astronomy and Senior Faculty Associate
- Robert L. Sproull, Ph.D. (Cornell)
Professor Emeritus of Physics

Approximately 25 graduate teaching fellows and several carefully selected undergraduates assist the faculty in the presentation of the teaching program.

*These faculty have applied for one or two semesters of leave in 1991-92.

The Department of Physics and Astronomy provides a spectrum of opportunities for undergraduates ranging from introductory courses for the nonscientist to a minor in physics or astronomy and complete degree programs leading to the B.A. and B.S. in physics or in physics and astronomy. Its programs at the master's and doctoral levels provide numerous advanced courses to the undergraduate seeking an in-depth education.

In accordance with general College policy, students are not formally accepted as concentrators until the end of their sophomore year. However, freshmen or sophomores wishing to major in physics or in physics and astronomy should make this known at the Department's Office of Undergraduate Studies, whereupon they will be assigned a departmental advisor.

The Department awards several prizes in recognition of special achievement. The Honors Physics Prize is presented annually to the student with the best record in PHY 142 and 143. The Stoddard Prize is awarded for the best senior thesis. The Fulbright Prize is awarded for the best performance in Advanced Laboratory. The John F. Flagg Award is given annually to the graduating senior who has compiled the best academic record during his or her undergraduate program. A fuller description of the requirements for these prizes may be obtained at the Office of Undergraduate Studies, 210 Bausch & Lomb Hall.

GENERAL COURSE INFORMATION

Of particular interest to students not concentrating in the natural sciences are PHY 100, AST 102, and AST 104, each a broad survey of selected topics in their field, requiring no special background. Students with a deep interest in science and music will find PHY 103 highly appropriate. For those desiring a working knowledge of basic physics, PHY 113-114 and 121-123 are appropriate, both requiring a background in high school science and mathematics. AST 111 and 142, a comprehensive survey of astronomy, require the same background. The sequence 121-142-143 is recommended

for all students with very strong interest and abilities in physics and is most appropriate for those wishing to major in the Department. A student who does well in the sequence 121-122-123 is also prepared to be a major in one of the Department's degree programs.

It is possible for students to enter the physics sequences with advanced standing, based on scores on an Advanced Placement Test, or the equivalent, and an interview.

CONCENTRATION IN PHYSICS

The B.S. degree in physics is intensive and provides strong preparation for any graduate school in physics or a closely related science. The B.A. program is appropriate for students desiring a broader academic experience. It also provides flexibility in planning, as might be required, for example, in a joint degree with another department.

GENERAL REQUIREMENTS

Preparation for concentration in physics is similar in most respects for the B.A. and B.S. degrees:

- An introductory physics sequence; PHY 121-122-123 or PHY 121-142-143 with corresponding laboratory courses PHY 182 and 183. The second sequence covers the same material as the first, but at a deeper physical and mathematical level. Students are encouraged to take PHY 142-143 as early as possible.
- Four terms of mathematics; MTH 161, 162, 163, 164 or equivalents.
- In the B.S. program only, two introductory courses in the natural sciences other than physics and mathematics (Group III). At least one of these is to be completed before applying for the concentration, although students are encouraged to take both within the first two years.

The B.A. and B.S. programs of study should be planned by the student in consultation with the departmental advisor by the end of the sophomore year and are subject to departmental approval.

B.A. PROGRAM (PHYSICS)**Requirements beyond the first two years:**

- Four 200-level physics courses—PHY 217, 235, and 238 and one chosen from among the following: PHY 218, 227, 243, 247.
- One of the following: another 200-level physics course; PHY 391 or 393; any 200-level astronomy course.
- Two additional courses which can be 200-level physics or astronomy courses, 200-level mathematics courses, or other science or engineering courses (not necessarily at the 200 level).

B.S. PROGRAM (PHYSICS)**Requirements beyond the first two years:**

- PHY 217, 218, 227, 235, 238, 247 (or their close equivalents); PHY 243; one other 200-level physics course (one of the 250-series courses is recommended).
- Two advanced courses in mathematics (MTH 281 or ME 201 is required; MTH 282 or ME 202 is recommended).
- Computer literacy. This requirement can be satisfied either by receiving a passing grade in an introductory computing course; by satisfactorily completing a computer problem approved by the Director of Undergraduate Studies, possibly one from a previous class; or by having a faculty member familiar with the student's work recommend that the Director of Undergraduate Studies certify computer literacy on the basis of computing experience accumulated in work with a research project.

A synopsis of a typical B.S. program follows:

First Year

| | |
|------------------------|----------------------------------|
| PHY 121 or elective | PHY 121, PHY 137, or elective |
| MTH 161 | MTH 162 |
| English requirement | Group II course |
| Group II course | Elective |

Second Year

| | |
|--------------------------------|--------------------|
| PHY 122 or 142 | PHY 123 or 143 |
| PHY 182 (1 credit) | PHY 183 (1 credit) |
| MTH 163 | MTH 164 |
| Foreign language (Group I)* | Group II |
| Group III | Elective |

Third Year

| | |
|----------|----------|
| PHY 217 | PHY 218 |
| PHY 235 | PHY 238 |
| MTH 281 | MTH 282 |
| Elective | Elective |

Fourth Year

| | |
|----------|---------------------|
| PHY 243 | PHY 227 |
| PHY 247 | One course from |
| Elective | among PHY 244, |
| Elective | 251, 253, 393, etc. |
| | Elective |
| | Elective |

REQUIREMENTS FOR A MINOR IN PHYSICS

- An introductory sequence: typically PHY 121, 122 (or 142), and 123 (or 143).
- Any three of the following courses: 217, 218, 227, 235, 238, 243, 247, 25X. Course 25X may be any one of the 250 series.

For admission to the minor, a student must have attained an average of at least 2.0 in the introductory sequence and at least 2.0 in all introductory mathematics courses taken.

The selection of advanced courses is to be approved by the Director of Undergraduate Studies in Physics, who will be concerned with the general coherence of the program, the student's plans to take necessary mathematical prerequisites, and mutual reinforcements between the minor and the student's major studies.

REQUIREMENTS FOR A MINOR IN ASTRONOMY

- An introductory physics sequence: typically PHY 121, 122 (or 142), and 123 (or 143).

- One of three descriptive astronomy courses: AST 102, 104, or 111; AST 111 is preferred.
- The introductory astrophysics course: AST 142.
- Any two 200-level astronomy courses. (Four of these are offered on a two-year cycle. These courses usually require concurrent or prerequisite registration in 200-level mathematics and physics courses.)

For admission to the minor, a student must have attained an average of at least 2.0 in the introductory 100-level astronomy courses and normally at least 2.0 in the introductory physics and mathematics courses taken.

Concentrators in physics may elect a minor in astronomy.

CONCENTRATION IN PHYSICS AND ASTRONOMY

The programs leading to the B.A. and B.S. degrees in physics and astronomy are generally similar to the corresponding programs in physics. Students planning to pursue graduate study should elect the B.S. program; they are encouraged to take advantage of opportunities for reading or research provided by AST 391 and 393 in the senior year. The program as described below may be modified to fulfill the students' legitimate academic goals. Approval from the astronomy advisor is required for all degree programs. The 200-level astronomy courses are offered in a two-year cycle.

GENERAL REQUIREMENTS (PHYSICS AND ASTRONOMY)

Requirements for the first two years are the same as those for the B.A. and B.S. in physics, except that AST 111, 142, 171, 172 are normally taken in place of the introductory Group II courses in the first year.

All astronomy majors are urged to take the laboratory courses AST 171, 172.

*Most students can complete their foreign language requirements with one term of college work. Students who need more than one course must take the additional work in place of electives.

Background knowledge equivalent to that contained in AST 111 and 142 and associated laboratories is necessary for the degree. AST 142 is recommended, but not required.

B.A. PROGRAM (PHYSICS AND ASTRONOMY)

Requirements beyond the first two years:

- Two of the following: AST 203, 232, 241, 242, including at least one of AST 241, 242.
- Three additional semesters of 200-level physics or astronomy courses.
- Two additional technical courses, which can be 200-level physics courses, 200-level mathematics courses, or other science or engineering courses (not necessarily at the 200 level).
- The above choices must be approved as a coherent program by the undergraduate astronomy advisor.

B.S. PROGRAM

Requirements beyond the first two years:

- Three of the following: AST 203, 232, 241, 242, including at least one of AST 241, 242.
- Six courses in physics at the 200 level or beyond: PHY 217, 227, 235, 238, 247 are recommended.
- Two courses in advanced mathematics: MTH 281, 282 or ME 201, 202 are recommended.
- One advanced course in natural sciences (Group III) related to astrophysics (e.g., GEO 281).
- All course choices must be approved by the undergraduate astronomy advisor.

A synopsis of a typical B.S. program follows:

First Year

| | |
|------------------------|----------------------------------|
| PHY 121 or elective | PHY 121, PHY 137, or elective |
| MTH 161 | MTH 162 |
| AST 111 | Group II |
| English requirement | Elective |

Second Year

| | |
|--------------------------------|--------------------|
| PHY 122 or 142 | PHY 123 or 143 |
| PHY 182 (1 credit) | PHY 183 (1 credit) |
| MTH 163 | MTH 164 |
| Foreign language (Group I)* | AST 142 |
| Group III | Elective |

Third Year

| | |
|----------------------|------------------------------------|
| PHY 217 | Physics elective, e.g., PHY 218 |
| PHY 235 | PHY 238 |
| MTH 281 or ME 201 | MTH 282 or ME 202 |
| AST 232 | AST 241 |
| Elective | Elective |

Fourth Year

| | |
|----------|--------------------|
| PHY 227 | Group III elective |
| PHY 247 | AST 242 |
| Elective | Elective |
| Elective | Elective |
| | Elective |

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

PHYSICS

100. The Nature of the Physical World. To acquaint students outside the sciences with some current ideas on the nature of the physical world. No prerequisites. (Fall and Spring)

103. Physics of Music. A study of the physical basis of musical phenomena. Theories of musical instruments, room acoustics, and special topics selected by the class and instructor. Two lectures and one lab per week. Half of labs devoted to individual student projects, often involving analysis of student instruments or of room acoustics. Course is open to any student with a strong interest in science and music. PHY 103 will satisfy a Group III (natural sciences) requirement. Prerequisite: consent of instructors.

113. General Physics I. Part of a two-semester sequence, suitable for students in the life sciences. Mechanics, thermodynamics, optics. Laboratory included and required. Calculus used sparingly and introduced as needed. Prerequisites: MTH 161 or 141 (may be taken concurrently). (Fall)

114. General Physics II. Electricity and magnetism, atomic and nuclear physics, electronics. Laboratory included and required. Prerequisite: PHY 113; MTH 162 or 142 desirable. (Spring)

121. Mechanics. First course for all students intending to major in physics, other physical sciences, and engineering. Newton's laws of motion, conservation of energy and momentum, gravitation, thermodynamics. Laboratory included and required. Special recitation sections for honors-sequence preparation. Prerequisites: prior introductory knowledge of calculus; MTH 141 or 161 or the equivalent (161 may be taken concurrently). (Fall and Spring)

122. Electricity and Magnetism. Second in a three-semester sequence. Electricity and magnetism, from Coulomb's Law through the integral form of Maxwell's equations. Prerequisites: PHY 121; MTH 162 or the equivalent (may be taken concurrently). (Fall)

123. Modern Physics. Third of the three-semester sequence. Electromagnetic waves, interference and diffraction, historical development of modern physics, relativity, introduction to quantum mechanics and applications thereof. Prerequisites: PHY 122 or 142; MTH 163 or the equivalent (may be taken concurrently). (Spring)

137. Elements of Quantum Mechanics. Introduction to the principles of quantum theory at the same mathematical level as classical mechanics, PHY 121. One-dimensional wave mechanics, non-commuting observables, uncertainty, state vectors for spins, photons, elementary measurement theory, and reality vs. locality. Prerequisites: performance at or above the "B-" level in PHY 121 or by petition; MTH 161 or the equivalent. Open to freshmen and to others by permission of the instructor.

*Most students can complete their foreign language requirements with one term of college work. Students who need more than one course must take the additional work in place of electives.

142. Electricity and Magnetism. Topics same as those of PHY 122 but at greater depth. Recommended for prospective departmental concentrators and other science and engineering students with strong physics and mathematics aptitudes. Prerequisites: performance at or above the "B-" level in PHY 121 or by petition; MTH 162 or the equivalent (may be taken concurrently).

143. Modern Physics. Topics same as those of PHY 123 but at greater depth. Recommended for prospective departmental concentrators and other science and engineering students with strong physics and mathematics aptitudes. Prerequisites: PHY 142 or performance at or above the "B-" level in PHY 122; MTH 163 or the equivalent (may be taken concurrently). Students not meeting the physics prerequisite may petition for placement.

151. Physics/Mathematics Workshop I. Credit—1 hour. A special mathematics-physics recitation-style course available to students simultaneously registered in mechanics and calculus. Emphasis is placed on application of specific mathematical methods to specific physics problems with reference to subject material in PHY 121 and MTH 162. Prerequisites: enrollment in PHY 121 and MTH 162, MTH 161 or equivalent, and consent of the instructor. (Fall and Spring)

182. Electricity and Magnetism Laboratory. Credit—1 hour. Experiments on DC and AC circuits, magnetism. Prerequisite: PHY 122 or 142 (may be taken concurrently). (Fall and Spring)

183. Modern Physics Laboratory. Credit—1 hour. Experiments on electronic charge, light, microwaves, scattering. Prerequisite: PHY 123 or 143 (may be taken concurrently). (Spring)

217. Intermediate Electricity and Magnetism I. Fields, potentials, multipoles, dielectrics, induction. Maxwell's equations. Prerequisites: PHY 122 or 142; advanced calculus taken concurrently. (Fall)

218. Intermediate Electricity and Magnetism II. Electromagnetic waves, reflection and refraction, waveguides and resonant cavities, radiation, dispersion, electrodynamics. Prerequisites:

PHY 217; advanced calculus taken concurrently. (Spring)

227. Thermodynamics and Introduction to Statistical Mechanics. A survey of thermodynamics, from both the classical and the statistical points of view. (Spring)

235. Classical Mechanics. Potential theory. Lagrangian dynamics, central forces, coordinate transformations, rigid-body motion. Prerequisite: advanced calculus (may be taken concurrently). (Fall)

236. Advanced Classical Mechanics. Special relativity, scattering theory, Hamiltonian dynamics, small oscillations, continuous media. Prerequisite: PHY 235. (Spring)

238. Quantum Theory I. Origins of quantum theory, Schrödinger's equation, approximation methods, many-particle systems and spin. Prerequisites: PHY 235, MTH 281. (Spring)

243. Advanced Laboratory I. Approximately six classic experiments in atomic, nuclear, and condensed matter physics. Lectures on statistics, detector theory, electronic functional assemblies, scattering theory. Prerequisites: PHY 217 and 238 (may be taken concurrently). (Fall)

244. Advanced Laboratory II. A continuation of PHY 243, which is a prerequisite.

247. Quantum Theory II. Formal quantum mechanics, symmetries and angular momentum, electromagnetic effects, scattering, relativistic quantum theory. Prerequisite: PHY 238. (Fall)

250. Advanced Laboratory Projects. Similar in level to PHY 243 and 244, but based on extended experimental projects by students as individuals or in small groups. Prerequisite: PHY 243.

251. Introduction to Solid State Physics. Periodic potentials, free electron gas, phase transitions, elementary excitations, and imperfections. Prerequisite: PHY 238.

254. Nuclear and Particle Physics. Nuclei, nuclear forces, conservation laws. Elementary particles, their interactions, and static properties. Prerequisite: PHY 238.

255. Physics in Modern Technology. Microelectronics and applications to computers, modern communications systems, energy demand and generation. Prerequisite: PHY 121–123 or equivalent.

258. Energy and Environment. A broad survey of the energy-environment field, for science and engineering concentrators. Prerequisites: three semesters of physics, two semesters of math.

261. Physical Optics I. See OPT 261.

262. Physical Optics II. See OPT 262.

383. Special Topics in Physics. Selected topics offered when justified by sufficient interest.

391. Independent Study. Normally open to seniors concentrating in physics.

393. Senior Project. Completion of an independent research project under the direction of a faculty member.

ASTRONOMY

102. Topics in Modern Astronomy. To acquaint the nonphysical science concentrator with developments of interest in modern astronomy. Primarily concerned with studies of the stars, material between the stars, and cosmology. Not a substitute for AST 111–142. (Fall)

104. Topics in Space Sciences. Designed to acquaint the nonphysical science concentrator with aspects of the historical and modern study of the solar system, including results from space probe studies. (Spring)

111. Elementary Astronomy I. A survey of observational astronomy intended for physical science majors. Typical topics include: celestial mechanics and planetary structure, properties of stars, stellar evolution, galactic structure, galaxies, cosmology. The course is open to freshmen. (Fall)

142. Elementary Astrophysics. Designed for sophomore science majors. Makes use of first-year physics and calculus. The emphasis is on understanding the physics involved in astrophysical phenomena. Covers the sun, nuclear energy sources, stars, nebulae, galaxies. Prerequisites: PHY 121; PHY 122 (may be concurrent) or 142; MTH 161, 162; AST 111 recommended. (Spring)

POLITICAL SCIENCE

171. Elementary Astronomy Laboratory I. Credit—1 hour. Typical exercises involve use of star charts, photographs, and celestial coordinate systems and analysis of data dealing with lunar craters, orbit determinations, stellar magnitudes, and application of micro-computers to astronomical problems. Should be taken in conjunction with AST 111. (Fall)

172. Elementary Astronomy Laboratory II. Credit—1 hour. Continuation of AST 171 with emphasis on solar spectroscopy, stellar distance determinations, star clusters, interstellar medium. Micro-computer applications. Should be taken in conjunction with AST 142. (Spring)

203. Astronomical Techniques. A survey course designed to acquaint the student with techniques of observational astronomy. Topics covered include statistical techniques, computerized image processing, introduction to FORTH, and electronic instrumentation. Prerequisites: one year of undergraduate astronomy and one year of introductory physics or permission of the instructor. (Fall)

232. Dynamics and Statistics of Star Systems. The motions of stars are studied and are used to discover and interpret the dynamic properties of our galaxy. Familiarity with PHY 235 and AST 142 is advised. (Fall)

241. Astrophysics I. Stellar atmospheres and the interstellar medium. Topics in radio and cosmic ray astronomy. Prerequisite: PHY 238. (Spring)

242. Astrophysics II. Evolutionary processes in the planets, stars, and universe. Mainly evolution of stars. Prerequisites: PHY 227 and 238. (Spring)

383. Special Topics in Astronomy. Selected topics offered when justified by sufficient interest.

391. Independent Study. Normally open to seniors concentrating in physics and astronomy.

393. Senior Project. Completion of an independent research project under the direction of a faculty member.

- *William T. Bluhm, Ph.D. (Chicago)
Professor of Political Science
- Bruce J. Bueno de Mesquita, Ph.D. (Michigan) *Professor of Political Science*
- Richard F. Fenno, Jr., Ph.D. (Harvard)
William Kenan Professor of Political Science and Distinguished Professor of Arts and Science
- Eric A. Hanushek, Ph.D. (M.I.T.)
Professor of Economics and of Political Science
- *John E. Mueller, Ph.D. (California, Los Angeles) *Professor of Political Science and of Film Studies and Chair of the Department*
- Richard G. Niemi, Ph.D. (Michigan)
Professor of Political Science
- Samuel C. Nolutshungu, Ph.D. (Manchester) *Professor of Political Science and African Politics*
- Charles E. Phelps, Ph.D. (Chicago)
Professor of Political Science, of Economics, and of Community and Preventive Medicine
- G. Bingham Powell, Jr., Ph.D. (Stanford) *Professor of Political Science*
- S. Peter Regenstreif, Ph.D. (Cornell)
Professor of Political Science and of Canadian Studies
- William H. Riker, Ph.D. (Harvard)
Joseph C. Wilson Professor of Political Science
- Tyll van Geel, Ed.D. (Harvard)
Professor of Education and of Political Science
- David L. Weimer, Ph.D. (California, Berkeley) *Professor of Political Science and of Public Policy*
- *David Austen-Smith, Ph.D. (Cambridge) *Associate Professor of Political Science*
- Jeffrey S. Banks, Ph.D. (California Institute of Technology) *Associate Professor of Political Science and of Economics*
- Larry Bartels, Ph.D. (California, Berkeley) *Associate Professor of Political Science*
- Randall Calvert, Ph.D. (California Institute of Technology) *Associate Professor of Political Science*

- Bruce Jacobs, Ph.D. (Harvard)
Associate Professor of Political Science and of Public Policy; Director of the Public Policy Analysis Program
- Lynda W. Powell, Ph.D. (Rochester)
Associate Professor of Political Science
- Harold W. Stanley, Ph.D. (Yale)
Associate Professor of Political Science
- *Melanie Manion, Ph.D. (Michigan)
Assistant Professor of Political Science
- Robert D. Pahre, Ph.D. (California, Los Angeles) *Assistant Professor of Political Science*
- *Lawrence S. Rothenberg, Ph.D. (Stanford) *Assistant Professor of Political Science and of Public Policy*
- Edward J. Bird, M.S. (Wisconsin)
Instructor in Political Science and in Public Policy
- Walter Broadnax, Ph.D. (Syracuse)
Adjunct Professor of Political Science and Public Policy
- William H. Bristol, J.D. (Vanderbilt)
Adjunct Associate Professor of Political Science
- Nan Johnson, M.A. (Rochester)
Adjunct Associate Professor of Political Science
- Glenn Gordon Wiltsey, Ph.D. (Chicago)
Professor Emeritus of Political Science

The Department uses six to eight teaching assistants in PSC 101 and 102 to assist in grading and conducting recitation sessions.

The Department of Political Science offers programs leading to the B.A. degree, the B.A. degree with honors, and, at the graduate level, the M.A., M.S. (public policy), and Ph.D. degrees.

The Department is regularly ranked in the top handful of political science departments in the country. In its ranks are two former presidents of the American Political Science Association, two members of the National Academy of Sciences, and six Guggenheim fellows. The American Political Science Association's Woodrow Wilson Foundation Prize for the year's best book in the field has been won three times in the last dozen years by Rochester political scientists.

*These faculty have applied for one or two semesters of leave in 1991-92.

Social science, as a whole, offers generalizations about human behavior, motives, interactions, goals, etc. It differs thus from those approaches that interpret unique events. In order to teach students how to generalize, the program in political science offers instruction about theory and testing theory against details observed in the political world. This contrasts with instruction in political science in many other universities where there is little instruction on how to generalize. The generalizations are designed to explain the principles that underlie the reality of politics.

Political science, as one of several social sciences, is concerned with a particular kind of social interaction and human goals, namely, the conflict involved in attempting to enforce certain moral and material values. Since this interaction, which is often called the pursuit of power or the attempt to win, usually takes place in the setting of governmental institutions, the program of the Department offers instruction about political conflict in a variety of settings: local and national political systems and the international world.

The ultimate purpose of this program is, like the purpose of all science, to help students understand more profoundly some features of the natural world. In this sense it is simply one among many liberal studies. But it also has a professional application, in the sense that the portion of nature studied is of particular interest to those planning a career in law, government, and business management. To this end, the Department offers a 3-2 program in public policy analysis, in which a student can earn both a bachelor's degree in his or her undergraduate major and a master's degree in policy analysis in five years. Students may also wish to take advantage of the option to participate in the Model UN at Harvard. Furthermore, the Department sponsors a number of internship opportunities with the local district attorney and public defender, the state legislature, the U.S. House of Representatives, and the British House of Commons.



CONCENTRATION REQUIREMENTS IN POLITICAL SCIENCE

PSC 101 and 102 are recommended, but not required, for concentration. One of these courses may be counted toward the elective part of the concentration, but neither may be used to satisfy the distribution requirement (a.-d. below).

A total of 11 courses is required:

1. Eight courses in political science of which at least seven must be beyond 190. Of the seven advanced courses, four must be distributed as follows:

- a. One course in techniques of analysis. PSC 200 or 201 is recommended, but this requirement may also be satisfied by STT 165, 203, or 211 or ECO 231. Students should attempt to fulfill this requirement before the end of the first semester of their junior year.
- b. One course in either American politics or public policy (Group B or C).
- c. One course in either comparative politics or international relations (Group D or E).
- d. One course in political theory (Group F).

PSC 272 and 372 can be used *either* for c. or d. PSC 341 can be used *either* for b. or d. No single course may be used to satisfy two of the distribution requirements.

Summer school courses taught by graduate students may be used to satisfy the elective, but not the distribution requirements (a.-d.). No course, other than statistics courses, transferred from other schools, may be used to satisfy the distribution requirement.

Students with AP credit in politics courses may use such courses in lieu of PSC 101 or 102 if they received a score of 4 or 5.

2. Three courses beyond the introductory level in an allied field. Acceptable fields include anthropology, computer science, economics, history, philosophy, psychology, and statistics. Faculty advisors inform students about what particular courses are acceptable for allied field credits in various departments. All allied field courses typically are taken in the same department, but an allied field that is composed of a mixture of courses from different departments can sometimes be substituted with the permission of the departmental advisor.

REQUIREMENTS FOR A MINOR IN POLITICAL SCIENCE

Five courses are required:

- PSC 200, Applied Data Analysis, or PSC 201, Political Inquiry (ECO 231, STT 165, 203, or 211 *may not* be used to fulfill this requirement.)
- One course in formal theory/political philosophy (Group F) **or** PSC 272
- PSC 101, European Political Systems **or** another course in international relations (Group E) **or** comparative politics (Group D)
- PSC 102, The American Political System, **or** another course in American politics (Group B) **or** public policy (Group C)
- One additional 200-level course

At least four of the five courses in the minor must be above the 190 level.

THE 3-2 PROGRAM IN PUBLIC POLICY ANALYSIS

Many individuals are motivated to study the social sciences by the possibility of eventually pursuing careers related to some phase of the development, implementation, or evaluation of public policy. The Public Policy Analysis Program is an interdisciplinary program designed to develop the mixture of skills required by individuals who wish to enter this field. The training combines the analytical methods of economics and political science, statistical techniques, knowledge of particular substantive areas, and practical experience. Graduates take jobs in both government (at all levels) and the private sector where their skills are in demand.

The program, which leads to an M.S. (public policy) degree, normally requires two years to complete. However, a limited number of undergraduates also may take the program as a 3-2 option. Students interested in this program should consult the Public Policy Analysis Program description on page 148. Applications and further information can be obtained in 334 Harkness Hall.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

- 101. European Political Systems.** A comparative study of the political process of selected European states, including Great Britain, France, and the Soviet Union. (Fall)
- 102. The American Political System.** An analysis of the process of political conflict, bargaining, coalition formation, and institutions in the U.S. (Spring)
- 300. Senior Seminar.** Prepare for and write a research paper based on a topic chosen by the student and approved by the instructor. Open to seniors, with permission of the instructor. (Spring)
- 391. Independent Study.** Work beyond the regular course offerings is done by arrangement with the Department.
- 393. Senior Honors Project.** See Honors Program description on page 139. (Fall and Spring)
- 394. Internships.** Combined work-study in the public defender's or district attorney's office. Public policy internships with the City of Rochester are also available for qualified students.
- 396. Washington Semester Program.** One semester's work in Washington, D.C., as a member of the staff of a U.S. Senator or Representative.
- 397. European Political Internship.** Generally available for one semester in London working for a member of Parliament or in another political placement. For students with appropriate language preparation, internships may be available in Brussels, Bonn, Madrid, and Paris.

GROUP A: TECHNIQUES OF ANALYSIS

- 200. Applied Data Analysis.** Introduces use of the computer in substantive political science applications. (Fall)

- 201. Political Inquiry.** Introduction to the philosophy of science and scientific approaches to politics; applications in critical analysis and original research. (Spring)

- 403. Mathematical Modeling.** An introduction to mathematical applications in political science. Same as PPA 403. (Fall)

- 404. Introduction to Statistical Methods.** Statistical methods for political science. Same as PPA 404. (Fall)

- 405. Multivariate Statistical Methods.** Additional instruction in statistical methods, with special emphasis on the theory and application of multiple regression analysis as it applies to politics. Same as PPA 405. (Spring)

- 406. Design and Analysis of Survey Studies.** Rationale and methods for survey studies of political behavior. Planning stage, collection, processing, and analysis of data. Same as PPA 406. (Fall*)

- 460. Benefit-Cost Analysis.** Studies modern methods of cost-benefit and cost effectiveness analysis. Same as PPA 460. (Fall*)

GROUP B: AMERICAN POLITICS

- 209. Interest Groups in America.** Introduction to issues that concern political scientists and economists about interest groups in American politics. Foci include history and formation of organizations, relationship between associations and formal political institutions, and policy-specific case studies. (Spring)

- 210. Political Parties, Elections, and Interest Groups.** An analysis of political parties; electoral behavior; party organization, leadership, and strategy. (Fall)

- 211. Public Opinion, Voting, and Elections.** Discussion and analysis of public opinion and voting behavior. (Spring)

- 215. The Legislative Process.** An analysis of decision making in legislative bodies. Major emphasis on the U.S. Congress. (Spring)

*PSC 406 is taught Sept.-Oct. and PSC 460 from Oct.-Dec. Each course is 2 credit hours.

217. Politics and Mass Media. The interaction of politics and mass media, focusing on techniques of opinion manipulation, campaigning, and the use of polls. (Spring)

219. The Constitution: Then and Now. A study of the events and ideas involved in the writing of the U.S. Constitution and a consideration of the present form of the Constitution in operation. (Fall)

222. The Presidency. A study of recent presidential campaigns and presidential leadership in both foreign and domestic policy. (Fall)

223. Constitutional Politics. A study of judicial decision making, with emphasis on civil rights and liberties. (Spring)

227. Modern Southern Politics. Analyzes recent changes and the resistance to change in Southern politics, particularly civil rights gains and political development. (Fall)

246. Women in Politics. Examines the participation of women in American political life. Same as WST 211. (Fall)

247. Women and the Law. Examines sex discriminatory aspects of statutory, judicial, and administrative rules of law. Same as WST 247. (Spring)

GROUP C: PUBLIC POLICY

235. Organizational Theory and Behavior. An analysis of individual and collective behavior in public and private organizations. Various explanations of bureaucratic decision making and performance are considered. (Spring)

237. Domestic Social Policy. The content, rationale, assumptions, and development of selected domestic policies. The use of social science theories and findings in policy formation and evaluation. Same as PPA 437. (Fall)

239. Family Policy in the U.S. General framework for analyzing family policy and its history in the United States as well as specific policy areas such as child care, foster care, and adolescent pregnancy. Same as PPA 439. (Fall)

240. Criminal Procedures and Constitutional Principles. An examination of statutory and constitutional criminal procedure issues. (Spring)

245. Aging and Public Policy. Covers policies in such areas as social security, public assistance, health care, and social services for the elderly. Same as PPA 445. (Spring)

GROUP D: COMPARATIVE POLITICS

250. Problems in Comparative Politics. An examination of topics in comparative political analysis. Major emphasis is on aspects of division and conflict in Western Europe. (Fall)

252. Politics in Canada. An analysis of the Canadian political system. Comparisons with British and U.S. systems are stressed. (Fall)

253. Contemporary British Politics. An examination of the political process in Britain, emphasizing comparisons with the U.S. and other Western countries. (Spring)

262. Political Change in Communism. A comparative study of politics in selected states, including the Soviet Union and the People's Republic of China. (Fall)

263. Black Intellectuals and the Crisis of the Twentieth Century. Considers major political thinkers in the United States, Africa, and Caribbean, by placing their work in historical context. Same as AAS 205. (Fall)

264. Comparative Political Corruption. An examination of the causes and consequences of political corruption in different institutions and political systems. (Spring)

266. State and Society in Africa. Examines critical issues in Africa, political and economic trends, with particular emphasis on the relationship between states and societies. (Spring)

267. Politics in China. An introduction to the political process in the People's Republic of China, with a brief survey of its political history. (Fall)

GROUP E: INTERNATIONAL RELATIONS

270. International Politics. An examination of foreign policy and world politics, especially for the period since World War II. (Fall)

272. Theories of International Relations. A survey of approaches to theory building in international relations, with some emphasis on attempts to explain war and its causes. (Fall)

274. International Political Economy. Presents an overview of the international political economy and the role of nation states within it. (Spring)

275. National Security Policy. An examination of the problems of war and peace in the nuclear era. (Fall)

277. Just and Unjust Wars. The course considers the just war tradition in political thought and the relevance of this tradition to modern war, both conventional and nuclear. (Spring)

376. Cooperation and Conflict in International Relations. Examines theoretical conditions that promote cooperation or conflict between states. Identifies strategies that promote cooperative solutions to international disputes and evaluates those strategies in terms of their historical effectiveness. (Spring)

377. Perspectives on War and Peace. Examination of the literature and research on war and peace issues with particular stress on the ways attitudes toward war and peace have changed history. (Spring)

378. The War in Vietnam. A seminar on political and military aspects of the war in Vietnam from its beginnings in the mid-1950s until its end in the mid-1970s. It is strongly recommended that PSC 270 or equivalent be taken first. Prerequisite: permission of the instructor. (Spring)

GROUP F: POLITICAL THEORY

280. The Greek and Roman Political Classics. A detailed comparative study of Thucydides, Plato, and Aristotle. Comparisons with modern political theories. (Fall)

281. The Modern Political Classics: The Philosophy of Freedom. Systematic political theories from Hobbes to Nietzsche. (Spring)

282. Political Economy of Governmental Behavior. An introduction to some recent developments in explaining and evaluating government behavior. Same as ECO 282. (Fall)

285. Strategy in Politics. An examination of recent descriptive theories of political behavior (including theories derived from the theory of games, social choice theory, and economic models) in order to arrive at a general theory of political strategy. (Spring)

289. Scope of Political Science. A philosophical analysis of the logic of theory construction in political science. (Fall)

SEMINARS IN POLITICAL SCIENCE

Qualified students are urged to consider taking a 300-level seminar during the junior or senior year. These seminars carry eight hours of credit since they require more than the usual amount of work. Enrollment requires permission of the instructor. Classes are a mixture of graduate and undergraduate students and typically number about 10.

Students are urged to make plans well in advance, since not all seminars are offered every year. These seminars carry 4–8 hours of credit. Enrollment and course credit require permission of the instructor.

300. Senior Seminar.

305. Advanced Statistical Methods.

310. Political Parties and Elections.

311. Public Opinion and Electoral Behavior.

312. Organizations and Politics.

313. Public Opinion and Public Policy.

314. Congress as an Institution.

315. Legislative Behavior.

316. American Politics.

341. Ethics and Public Policy.

350. Problems in Comparative Politics.

351. Western European Politics.

358. Topics in Comparative Communism.

372. International Relations Theory.

376. Cooperation and Conflict in International Relations.

377. Perspectives on War and Peace.

378. The War in Vietnam.

384. Game Theory.

386. Positive Political Theory.

THE HONORS PROGRAM

Students wishing to graduate with honors in political science must fulfill the normal requirements of the undergraduate concentration, have a cumulative average of 3.0 in political science courses, and must in addition:

- a. Complete a 300-level seminar in an area related to the subject of the honors project, preferably in the junior year.
- b. Enroll in a year-long course sequence entitled PSC 393, Senior Honors Project.
- c. Within the context of this course, do research for and write an honors paper describing the results of the research, which may take the form of data analysis, library research, or an experiment or survey.
- d. Present the paper for review by a committee of two members of the department. The final draft of the honors paper must be presented no later than the last day of classes of the spring semester.

The instructor with whom the candidate works on the honors project will assign course grades for the two semesters of the project. The two courses may be counted by the student as electives in fulfilling the requirements for an undergraduate concentration in political science. But the award of honors will be separately determined by the department review committee. The department encourages prospective honors students to apply for the honors program during the spring semester of the junior year by consulting and gaining the consent of a department faculty member willing to direct the honors work.

NOTE: Students wishing to do a semester-long research project rather than a full honors project should consider taking PSC 300, Senior Seminar.

PSYCHOLOGY

Robert Ader, Ph.D. (Cornell) *Professor of Psychiatry and of Psychology*

Richard Aslin, Ph.D. (Minnesota) *Professor of Psychology and in the Center for Visual Science*

Thomas G. Bever, Ph.D. (M.I.T.) *Professor of Psychology and of Linguistics*

Robert Chapman, Ph.D. (Brown) *Professor of Psychology and in the Center for Visual Science*

Dante Cicchetti, Ph.D. (Minnesota) *Professor of Psychology and of Psychiatry*

Paul Coleman, Ph.D. (Rochester) *Professor of Neurobiology and Anatomy and of Psychology*

Emory L. Cowen, Ph.D. (Syracuse) *Professor of Psychology, of Psychiatry, and of Education and Human Development*

Philip W. Davidson, Ph.D. (George Washington) *Professor of Pediatrics and of Psychology*

Edward L. Deci, Ph.D. (Carnegie Mellon) *Professor of Psychology*

Robert W. Doty, Ph.D. (Chicago) *Professor of Physiology and of Psychology*

*Barbara Ilardi, Ph.D. (Stanford) *Professor of Sociology in Psychology*

James R. Ison, Ph.D. (Michigan) *Professor of Psychology and of Toxicology and in the Center for Visual Science*

Carol Kellogg, Ph.D. (Rochester) *Professor of Psychology and Associate Professor of Pharmacology*

*Rafael Klorman, Ph.D. (Wisconsin) *Professor of Psychology*

Victor G. Laties, Ph.D. (Rochester) *Professor of Biophysics, of Pharmacology, and of Psychology*

Peter Lennie, Ph.D. (Cambridge) *Professor of Psychology and in the Center for Visual Science*

Walter Makous, Ph.D. (Brown) *Professor of Psychology, in the Center for Visual Science, and of Ophthalmology*

Dale W. McAdam, Ph.D. (Iowa) *Professor of Psychology*

*These faculty have requested one or two semesters of leave during 1991–92.

- Elissa Newport, Ph.D. (Pennsylvania)
Professor of Psychology
- Harry Reis, Ph.D. (New York)
Professor of Psychology and Associate Professor of Education and Human Development
- *Richard Ryan, Ph.D. (Rochester)
Professor of Psychology
- Jerome S. Schwartzbaum, Ph.D. (Stanford)
Professor of Psychology
- Michael K. Tanenhaus, Ph.D. (Columbia)
Professor of Psychology
- Bernard Weiss, Ph.D. (Rochester)
Professor of Biophysics and of Psychology
- Ladd Wheeler, Ph.D. (Minnesota)
Professor of Psychology
- David Williams, Ph.D. (California, San Diego)
Professor of Psychology, in the Center for Visual Science, and of Optics
- Melvin Zax, Ph.D. (Tennessee)
Professor of Psychology
- Miron Zuckerman, Ph.D. (Harvard)
Professor of Psychology
- Craig Barclay, Ph.D. (Illinois, Urbana-Champaign)
Associate Professor of Education and Human Development and of Psychology
- James Connell, Ph.D. (Denver)
Associate Professor of Education and Human Development and of Psychology
- Lucia French, Ph.D. (Illinois)
Associate Professor of Education and Human Development and of Psychology
- Mary Hayhoe, Ph.D. (California, San Diego)
Associate Professor of Psychology
- Deborah Ossip-Klein, Ph.D. (Pittsburgh)
Associate Professor of Psychology
- Tatiana Pasternak, Ph.D. (Copenhagen)
Associate Professor of Neurobiology and Anatomy, of Psychology, and in the Center for Visual Science
- Allan J. Schwartz, Ph.D. (Rochester)
Associate Professor of Psychiatry and of Psychology; Psychologist, University Health Service
- Ellen Skinner, Ph.D. (Pennsylvania State)
Associate Professor of Education and Human Development and of Psychology
- Judith Smetana, Ph.D. (California, Santa Cruz)
Associate Professor of Education and Human Development and of Psychology
- Sharon Carver, Ph.D. (Carnegie Mellon)
Assistant Professor of Education and Human Development and of Psychology
- Cristine Chandler, Ph.D. (Denver)
Assistant Professor of Education and Human Development and of Psychology
- Robert Cole, Ph.D. (Cornell)
Assistant Professor of Psychiatry and of Psychology
- Robert C. Emerson, Ph.D. (Pennsylvania)
*Senior Scientist in Ophthalmology and in the Center for Visual Science and Assistant Professor of Psychology***
- *Kyunghee Koh, Ph.D. (Michigan)
Assistant Professor of Psychology
- Ernest J. Nordeen, Ph.D. (California, Irvine)
Assistant Professor of Psychology and of Neurobiology and Anatomy
- Kathy W. Nordeen, Ph.D. (California, Irvine)
Assistant Professor of Psychology and of Neurobiology and Anatomy
- Kenneth E. Clark, Ph.D. (Ohio State)
Dean Emeritus of the College of Arts and Science and Professor Emeritus of Psychology
- Vincent Nowlis, Ph.D. (Yale)
Professor Emeritus of Psychology
- S. D. S. Spragg, Ph.D. (Yale)
Professor Emeritus of Psychology
- Garth Thomas, Ph.D. (Harvard)
Professor Emeritus of Psychology, and of Neurology

The Department uses teaching assistants as discussion group leaders in large courses.

The Department of Psychology offers programs of study leading to B.A. and Ph.D. degrees.

Instruction is offered throughout the broad spectrum of behavior-related science. Its content covers technical, theoretical, and empirical presentations of psychology as a natural science and as a social science. Application of these various aspects of the discipline to health and to the helping professions is a common theme. Student experiences may range from large lecture courses to individual laboratory and practicum situations. Individual programs may be tailored to provide excellent background for postgraduate work in psychology, medicine, education, social work, law, and other related social and natural sciences.

Students planning to pursue graduate studies in psychology are advised to seek a broad foundation in such closely related disciplines (e.g., biology, chemistry, mathematics, philosophy, sociology, education) as may be appropriate to their individual goals and interests. Further, they are strongly advised to enroll in laboratory courses and individually supervised research work.

In addition to standard course offerings, students may pursue their interests through individual reading and research arrangements with faculty and internships. Course credit may be obtained for these activities. While most special offerings are aimed at students intending to do graduate work in psychology or related disciplines, other interested students are not excluded.

An undergraduate student may register for graduate-level courses with the permission of the advisor and the course instructor.

GENERAL COURSE INFORMATION

Successful completion of the introductory survey course in psychology is a prerequisite to all other courses in psychology and to acceptance in the concentration program. This requirement may also be met by passing an exemption exam.

*These faculty have requested one or two semesters of leave during 1991-92.

**Part-time.

Laboratory courses and practica are designed primarily, but not exclusively, for the concentrator in psychology and other behavioral sciences.

Areas are indexed by the second digit in the course numbers. Courses numbered in the 20s through 50s are natural science psychology courses and fall into the College Distribution Group III. Courses numbered in the 60s through 80s are social science psychology courses and fall into the College Distribution Group II. An independent study course is classified in one of these areas and also in Group II or Group III, according to its content.

REQUIREMENTS FOR CONCENTRATION IN PSYCHOLOGY

1. PSY 101 or the equivalent. This requirement must be completed before a student will be accepted as a concentrator. For Venture students only, PSY 218 is an acceptable substitute for PSY 101.
2. An acceptable statistics course, preferably by the end of the sophomore year. STT 211 is strongly recommended, but STT 165, 212, or 202-203 may also meet this requirement.
3. A minimum of 10 four credit-hour courses in addition to PSY 101 and statistics, of which six to eight are from psychology and two to four are from an allied field. The minimum of six psychology courses may not include independent study courses numbered 390 through 395. No more than two courses may be transferred from other colleges.
4. The psychology courses must include at least two from the natural science core courses (131, 141, and 151) and at least two from the social science core courses (161, 171, and 181).
5. A student wishing to concentrate in psychology must offer acceptable arguments for the contribution to his or her program of the applied field courses, which may be from any other department of the University. The question to be answered is, "How do the allied field courses make the applicant a better, more informed student in his or her psychology courses?"



REQUIREMENTS FOR AN HONORS DEGREE IN PSYCHOLOGY

1. Courses taken must include one laboratory class, one upper-level seminar, and three honors courses: Honors Seminar, Honors Research I, and Honors Research II. These courses are described below.
2. Completion of the requirements for a psychology major with an average grade of at least 3.3 in all psychology courses (including the three honors courses) at the time of graduation.

For further details about the honors program consult the Psychology Advising Office, 367 Meliora Hall.

Further information about psychology, including faculty advisors, faculty research interests, and postgraduate opportunities may be obtained during scheduled advising hours in 367 Meliora Hall.

MINORS

The Department offers a choice of five optional minors.

1. Psychology

Six courses are required:

- PSY 101. Introduction to Psychology
- Three core courses, with at least one from the natural science and one from the social science psychology courses.
- Two additional courses (200 or 300 level). Independent study and practicum courses are acceptable.

2. Psychology as a Natural Science

Five courses are required:

- PSY 101. Introduction to Psychology
- Two core courses from the natural science psychology courses:
 - PSY 131. Cognition
 - PSY 141. Biopsychology
 - PSY 151. Sensation and Perception

- Two additional natural science psychology courses (200 or 300 level). Independent study and practicum courses are acceptable.

3. Psychology as a Social Science

Five courses are required:

- PSY 101. Introduction to Psychology
- Two core courses from the social science psychology courses:
 - PSY 161. Social Psychology
 - PSY 171. Developmental Psychology
 - PSY 181. Psychology of Personality
- Two additional social science psychology courses (200 or 300 level). Independent study and practicum courses are acceptable.

4. Organizational Psychology

Five courses are required:

- PSY 101. Introduction to Psychology
- PSY 161. Social Psychology
- PSY 181. Psychology of Personality
- PSY 264. Psychology of Business and Industry
- One course from any of the following:
 - Human Motivation and Emotion
 - Leadership and Management II
 - Any 300-level social psychology seminar, independent study, or a practicum in organizational psychology.

5. Health Psychology

Six courses are required:

- PSY 101. Introduction to Psychology
- PSY 141. Human Biopsychology
- PSY 181. Psychology of Personality
- PSY 282. Abnormal Psychology
- PSY 283. Behavioral Medicine
- One course from any of the following:
 - PSY 289, 382, 383.
 - Any advanced biopsychology course, independent study, or other approved course or practicum.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

- 101. Introduction to Psychology.** A survey. Lectures and class discussions supplemented by demonstrations. Prerequisite to all courses in psychology. (Fall and Spring)
- 218. Explaining Behavior.** This Venture course deals with the nature of psychological explanations through the presentation and discussion of numerous examples.

CORE COURSES

Natural Science

- 131. Cognition.** A psychological approach to human knowledge. Emphasis on information processing concepts. (Spring)
- 141. Biopsychology.** A survey of biological insights and implications for our understanding of human behavior. Same as COG 141. (Spring)
- 151. Sensation and Perception.** Introduction to the fundamental facts, methods, and theories about sensing stimulation, processing information, and perceiving objects in the environment. Psychophysical and physiological aspects of vision, audition, taste, smell, and skin senses are included. (Fall)

Social Science

- 161. Social Psychology.** Broad issues such as social perception, interaction, group dynamics, attitude change and social influence, emotions, and others covered. (Fall)
- 171. Developmental Psychology.** An introductory course which focuses on a number of important and controversial issues in developmental psychology across the life span. (Spring)
- 181. Psychology of Personality.** A survey of personality, emphasizing modern theoretical approaches, basic methods of investigation, and current research findings. (Fall)

LABORATORY COURSES

- 219. Research Methods in Psychology.** A broad survey of research strategies used in the social sciences. Course includes individual student experimental research. (Fall)
- 237. Cognitive Psychology with Lab.** Theory and research concerning human intellectual functioning. (Fall)
- 256. Perception with Laboratory.** Fundamental perceptual processes investigated through laboratory demonstrations and student-conducted experiments. Prerequisites: CVS or PSY 151 and statistics, or permission of the instructor. Same as CVS 256. (Spring)
- 266. Social Psychology with Laboratory.** Individual behavior in social contexts, with selected experiments which illustrate research methods and techniques. Prerequisites: PSY 161 and STT 211. (Fall)
- 375. Lab in Developmental Psychology.** Considers several modules illustrating major experimental paradigms to study infant development and includes individual projects. Same as WST 209. (Spring)

ADVANCED LECTURE COURSES

- 209. Psychology of Human Sexuality.** Survey course on understanding sexuality. Includes such topics as biological sexual differentiation, gender role, gender-linked social behaviors, reproduction issues, intimacy, and the role of social and personal factors in psychosexual development. Same as WST 209. (Spring)
- 231. Human Learning and Memory.** Research and theory on the acquisition, retention, recognition, and recall of information by adults. (Fall)
- 234. Psychology of Language.** This course is concerned with the psychological processes involved in language use. Topics covered include comprehension, production, acquisition, and applied psycholinguistics. (Fall)
- 241. Neurobiology of Behavior.** Survey of biological substrates of behavior focusing on integrative mechanisms of the brain and their expression in sensory, motoric, motivational, and mnemonic functions. Same as NSC 241. (Fall)
- 243. Neurochemical Foundations of Behavior.** Biochemical basis of brain function. Suggested prerequisites: PSY 141 or PSY 241 or NSC 201; BIO 150 or IND 401. Same as NSC 243. (Fall)
- 255. Sensory Systems.** A large part of the brain is concerned with the analysis of information that impinges on the sense organs. This course deals with the operation of the sense organs—the principles of their operation and how their design balances many conflicting demands—and the subsequent analysis by higher centers of the signals sent by the sense organs. Prerequisite: permission of the instructor. Same as CVS 255 and NSC 255. (Spring)
- 262. Human Motivation and Emotion.** A study of the motivational and emotional processes and theories that underlie both adaptive and maladaptive behavior. Includes consideration of research largely with human subjects. (Spring)
- 264. Psychology in Business and Industry.** Applications of psychological findings and methods to problems encountered in business, industry, and the professions. Prerequisites: PSY 161 and STT 211 or equivalent. (Fall)
- 265. Leadership & Management II.** A survey of theories of leadership with the use of case studies and classroom exercises. Intended primarily for NROTC students. (Spring)
- 267. Gender Differences in Social Behavior.** Exploration of the ways males and females differ in interaction, theories of development of sex differences, consequences for social change. Same as WST 272. (Fall)
- 272. Cognitive Development.** A survey of the field of cognitive development from birth to adolescence. Topics include parameters of attention in infancy, early concepts of number, time, space, cognitive styles, language development, information-processing models of problem solving, and Piaget's theory. (Fall)
- 273. Perceptual Development.** Survey of recent research and theory in sensory and perceptual development in humans and animals. Emphasis on visual and auditory development in human infants. Prerequisites: PSY 101, STT 211. Recommended: PSY 151, 171. (Fall)

274. Language Development. A basic introduction to children's language development, including the acquisition of phonology, syntax, and semantics. The course focuses on the acquisition of a first language by young children, comparing the acquisition of a variety of spoken and signed languages to find possible universal principles of language learning. (Spring)

277. Social Development. Study of the socialization of children and the development of social behavior. Prerequisite: PSY 171 or equivalent. (Spring)

278. Adolescent Psychology. A survey of psychological theory and research relating to normal development during adolescence including biological, social, and intellectual development. (Fall)

282. Abnormal Psychology. Etiological factors, clinical descriptions, and treatment of personality aberrations, emphasizing the more serious forms of mental disorder. (Spring)

283. Behavioral Medicine. An overview of the application of behavior/lifestyle change approaches to the treatment of medical disorders, and the examination of interfaces between behavior and physiology. Topics include diabetes, cardiovascular risk factors, chronic pain, and cancer. (Spring)

284. Freud and Jung. An introduction to the theories of Freud and Jung and their application to psychotherapy. (Fall)

289. Childhood Psychopathology. Behavioral disorders of childhood and adolescence and relevant research topics in developmental psychology. Prerequisites: PSY 171 and 181. (Spring)

318. Computers in Psychology Research. Programming, fundamentals, and experimental problems will be studied in didactic and practical situations. Same as CVS 318.

369. Psychology of Women. This course is taught through both lecture and discussion. Examines sex differences and sex-role socialization; compares traditional and contemporary viewpoints of female development and function; covers

areas such as identity, personality, sexuality, role definition, and mental health. Related topics include ethnicity, class, psychological oppression, and feminism.

SEMINAR COURSES

Prerequisites typically include the prior lecture course and/or permission of the instructor.

301. Teaching Psychology. In-depth consideration of topics in psychology and their communication. PSY 101 is a lab for this course. (Fall)

309. Honors Seminar. Taken in either the sophomore or junior year, involves presentations by various faculty describing their research, to be discussed by the class subsequently with the honors coordinator. By exposure to ongoing research, students are directed into their own independent honors research projects. Prerequisite: PSY 101. (Spring)

319. Self-Control and Study Behavior. The applications of behavioral psychology to study behavior are examined through readings and a practicum experience. Topics addressed include self-control and self-instruction, study improvement methods, basic counseling skills, and the comparative effectiveness of various experimental programs in treating maladaptive behavior. (Spring)

334. Language Understanding. This seminar offers an in-depth examination of selected topics in language comprehension, including lexical processing, parsing, and anaphora resolution. Theoretical ideas from linguistics and artificial intelligence are integrated with experimental studies of language processing. Same as COG 301. (Spring)

341. Psychobiology of Motivation and Emotion. A basic survey of the biological substrates of sensation, perception, simple and complex movement, regulatory and "heroic" behaviors, learning, memory, and cognition. An introduction to neuroanatomy, neurophysiology, and neurochemistry is included. (Spring)

342. Issues in Human Biopsychology. Current views of biological explanations of human behavior are examined. Topics may include sexual dimorphism in the brain, pain, sociobiology as a force in human behavior, endowments of a cognizing brain, etc. (Spring)

353. Human Factors. The sensory, motor, and information processing aspects of humans that need to be considered in connection with machines or other systems, ranging from typewriters and television to computers and airplanes, that interact with them. Same as CVS 353. (Spring)

361. Seminar in Social Psychology. Selected areas of current research in social psychology. (Spring)

364. Personal Relationships. Analysis of the development and nature of affective bonds between people.

365. Seminar on Group Dynamics and Organizational Behavior. Reviews basic theories of organizational behavior (Pfeffer, Blau and Scott, Kanter, Deci, Argyris). Considers theories of group behavior in organizations (The Harvard School, Bales, Bavelas, Porter, Weick) and focuses on selected topics in the area, such as socialization and behavior, performance, communication dynamics in work groups, organizational demography and behavior, and leadership. Prerequisite: permission of the instructor. (Spring)

366. Social Psychology and Control. Determinants and consequences of the need for control and perceived control, and their relation to individual and social behavior.

368. Humanistic Psychology. Humanistic psychology theory and its application to one's life experiences. Requires active participation. (Fall)

371. Seminar in Developmental Psychology. Current research and theory in developmental and child psychology. (Fall)

381. Seminar in Personality. Advanced study of selected topics in personality theory and research. (Fall)

382. Seminar in Abnormal Psychology. Advanced study of the clinical descriptions and treatment of personality aberrations, with special emphasis on the etiology. (Spring)

383. Advanced Seminar in Behavioral Medicine. In-depth consideration of behavior/lifestyle factors in medical disorders, from etiological and treatment perspectives. Examples of selected topics are stress, social support, cardiovascular risk factors, diabetes, chronic pain, and cancer. (Spring)

PRACTICA

386. Seminar-Practicum in Community Mental Health and Prevention of Emotional Disorders I. Problems of early detection and prevention of emotional disorder, training new sources of mental health, manpower, and community mental health. (Fall)

387. Seminar-Practicum in Community Mental Health and Prevention of Emotional Disorders II. Continuation of PSY 386. (Spring)

388. Seminar-Practicum in Family Treatment. Behavioral approaches to assessment, treatment, and prevention of child abuse and neglect.

389. Seminar-Practicum in Family Treatment. Continuation of PSY 388. (Spring)

SPECIAL COURSES

Each of the following courses may be offered as a Group II or Group III course with the approval of the instructor.

310. Honors Research I. Students select a faculty sponsor and develop a research proposal to be evaluated by the sponsor and honors coordinator for course credit. Pilot studies and collection of preliminary results are to be completed. To be taken no later than fall of the senior year. Prerequisite: PSY 309. (Fall)

311. Honors Research II. Students conduct research outlined in the proposal and prepare a research paper in standard form. Those receiving honors present their research at a mini-conference held at the end of the semester. Prerequisite: PSY 310. (Spring)

390. Supervised Teaching of Psychology. Teaching of topics in psychology within a regular course under an instructor's supervision.

391. Independent Study in Psychology. Supervised reading on topics not covered by existing courses, or on specialized topics.

392. Practicum in Psychology. Supervised reading and experience in an applied setting. Essential supervision by a University instructor only.

394. Internship in Psychology. Experience in an applied setting supervised on site. Approved and overseen by a University instructor. Limit: two internships in program.

396. Seminar on Special Topics. Consideration of recent experimental and theoretical contributions in several selected areas of psychology.

PUBLIC HEALTH

Charles E. Phelps, Ph.D. (Chicago)
Professor and Chair of Community and Preventive Medicine; Professor of Political Science and of Economics

Stephen J. Kunitz, M.D. (Rochester),
Ph.D. (Yale) *Professor of Community and Preventive Medicine*

Klaus J. Roghmann, Ph.D. (West Germany) *Professor of Pediatrics, of Community and Preventive Medicine, and of Nursing*

William H. Barker, M.D. (Johns Hopkins) *Associate Professor of Community and Preventive Medicine*

Theodore M. Brown, Ph.D. (Princeton) *Associate Professor of History and of Community and Preventive Medicine*

Alvin I. Mushlin, M.D. (Vanderbilt) *Associate Professor of Community and Preventive Medicine*

Michael Weintraub, M.D. (Pennsylvania) *Associate Professor of Community and Preventive Medicine, of Pharmacology, and of Medicine*

James G. Zimmer, M.D. (Yale) *Associate Professor and Associate Chair of Community and Preventive Medicine and M.P.H. Program Director*

Wayne M. Ledner, M.D. (George Washington), Ph.D. (North Carolina) *Clinical Associate Professor of Community and Preventive Medicine*

John E. Vena, Ph.D. (SUNY, Buffalo) *Adjunct Associate Professor*

*Cleve L. Killingsworth, M.P.H. (Yale) *Assistant Professor of Community and Preventive Medicine*

*David H. Klein, M.B.A. (Chicago) *Assistant Professor of Community and Preventive Medicine*

Jack Zwanziger, Ph.D. (Rand) *Assistant Professor of Community and Preventive Medicine*

*Karen M. Bell, M.D. (Tufts) *Clinical Assistant Professor of Community and Preventive Medicine*

*Nancy G. Hildreth, Ph.D. (Yale) *Clinical Assistant Professor of Community and Preventive Medicine*

*Edith Carol Stein, M.D. (Chicago) *Clinical Assistant Professor of Community and Preventive Medicine*

Sarah Trafton, J.D. (Suffolk) *Senior Instructor in Community and Preventive Medicine*

*Susan Barrett Price, M.S. (Rochester) *Assistant in Community and Preventive Medicine*

Robert L. Berg, M.D. (Harvard) *Professor Emeritus of Community and Preventive Medicine*

The Department of Community and Preventive Medicine uses three to four teaching assistants in large lecture courses as graders or section leaders.

Although the Department of Community and Preventive Medicine in the School of Medicine and Dentistry does not offer an undergraduate degree, it does offer courses available to undergraduate students. Furthermore, a concentration in health and society (see page 101) may include courses from the department. In addition, the department offers a 3-2 program that allows students to earn a bachelor's degree in their undergraduate major and a Master of Public Health degree in five years. This program is designed to train future health professionals by developing and enhancing their planning, evaluative, research, and management skills. Graduates are prepared for roles in a wide variety of public and regulatory agencies, in profit and not-for-profit private health agencies, and in health services research. They frequently become agency administrators, research associates, planners, and program coordinators. Some also find academic and teaching positions.

THE 3-2 OPTION

A limited number of undergraduates may complete the Master of Public Health under a 3-2 option. In this program, the first three years are devoted to the completion of most requirements for an undergraduate degree. During the fourth year, students in the 3-2 program begin course work in the master's program by following the full-time first year of the master's program. In some instances, students may need to use these

elective spaces in the fourth year to complete undergraduate requirements. The fifth year of the program is devoted to the completion of the M.P.H. elective course requirement (12 hours of graduate elective credits) and the completion of the master's essay (PM 460, equivalent to 12 credit hours). At the end of the fourth year students receive the bachelor's degree and at the end of the fifth year students receive the Master of Public Health degree from the School of Medicine and Dentistry. Students interested in the 3-2 option are advised to consult the Department of Community and Preventive Medicine's description of the M.P.H. in the *Official Bulletin: Graduate Studies*.

ADMISSION REQUIREMENTS FOR THE 3-2 PROGRAM

Students wishing to apply to the 3-2 program must apply in the spring of their junior year. At that time, students should have satisfied the college basic writing, foreign language, and foundation requirements, taken some special health-related courses, and completed or nearly completed course work in their major. Prospective students are strongly advised to complete at least one semester of college mathematics during their first three years. Applicants to the program will be allowed considerable latitude in meeting the health-related course expectation. Depending on prior or concurrent experience in the health field and on other individual factors, candidates may present one or more courses for consideration.

Applicants must submit the following information: (1) written application with essay, (2) at least two letters of recommendation, (3) official transcript, (4) Graduate Record Examination aptitude test scores, (5) a sample of written work (other than the application essay). Details of the required application materials are enclosed with the application.

All information should be submitted by February 15. Interviews are part of the final selection process. In some cases, successful candidates are advised to pursue some sort of health-related employment or placement/tutorial experience during the summer after their admission to the 3-2 program.

Application materials and additional information may be obtained from Dr. James Zimmer, Program Director, Department of Community and Preventive Medicine, Box 644, University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, New York 14642.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

116. Introduction to Community Medicine. Analysis of current issues in the organization, financing, and evaluation of personal and public health care. Same as CAS 116. Alternate years. (Fall)

392. Health Services Practicum. Introduces students to the organization and function of community agencies. Selected students are expected to spend six to seven hours per week at an agency site working on a project related to health care administration, planning, or evaluation. Same as CAS 392. (Fall)

The following courses are available to 3-2 students studying for the Master of Public Health degree. They are not regularly available to undergraduate students. Undergraduate students and graduate students from other programs must obtain written permission from the course instructor to register for any of the following courses:

415. Applied Epidemiology. Emphasizes epidemiology as an applied science in the study and solution of health and disease problems from the community point of view. Principles and techniques



are taught through selected readings and problem-solving exercises focusing on data-gathering methods for defining health problems, design of analytic studies of the determinants of disease, and design of studies for describing and evaluating health services. Students are required to write a mock protocol for conducting an epidemiologic study. Several guest seminars are presented by health professionals who are employing epidemiology in local health agencies. Prerequisite: permission of instructor. (Fall)

416. Epidemiologic Methods. This course follows PM 415 and is designed to provide in-depth coverage of the quantitative and methodologic issues associated with population-based epidemiologic research. Issues specific to study design, conduct, and analysis are emphasized. Topics covered include: issues in study design, internal and external validity, sample size estimation, methods of data collection, risk assessment, confounding and effect-modification, and analytic techniques. Prerequisite: PM 415 or permission of instructor. (Spring)

420. Politics and Policies in the U.S. Health Care System. The seminar is designed to provide an understanding of the principal health institutions and their behavior. Readings are used to explore selected topics of importance for national health policy and local decision making. Contemporary health politics and policies are examined in terms of the influence of political and economic forces on the health care system and the particular historical development of health services in the United States. Prerequisite: permission of instructor. Same as PPA 420. (Fall)

422. Ethics and the Making of Public Policy. A systematic analysis of the ethical aspects of policy making in five substantive policy areas. Same as PPA 541. (Spring)

425. Management of Human Services. This course introduces organizational issues and measurement techniques important to managing and evaluating health care services. Agency and organizational behavior theories are applied to health care institutions. Methods for measuring costs and benefits and adjusting outcome and utilization measures for severity and other confounding variables are introduced. Techniques are presented through examples of new program evaluation and technology assessment in various health care institutions including hospitals, health maintenance organizations, and community agencies. Same as PPA 425. (Spring)

430. Medical Sociology. This course is designed to run in parallel with PM 420, though it can be taken independently as well. Topics covered are epidemiological studies of health problems that have been influential in the formation of health care policy. Most attention is given to studies in the United States, with less devoted to European and developing nations. Prerequisite: permission of instructor. Same as PPA 426. (Fall)

436. Health Policy. Analysis of factors that affect supply and demand in the market for medical care: risk, insurance, externalities, and regulation. Prerequisites: statistics and PPA 407. Same as PPA 436. (Spring)

445. Aging and Public Policy. The content, rationale, and proposals for reform of public programs for the elderly. Programs analyzed include Social Security, Medicare, and Medicaid. Same as PPA 445. (Spring)

448. Risk and Insurance. Theories of risk and insurance applied to issues of public policy. Same as PPA 448. (Spring)

450. The Organization and Delivery of Health Care Services. This course is designed to provide experience in evaluating health care delivery services. The course consists of two components: a case study exercise and an independent evaluation project. By completion of the course, the student should be able to identify the essential elements necessary to analyze and evaluate a health delivery system and analyze and evaluate a specific community health care service as documented by a project report. Prerequisites: PM 425 and preferably one full year of M.P.H. courses. Enrollment limited to students studying for the M.P.H. Same as PPA 450. (Spring)

460. Health Services and Epidemiology Research (Master's Essay). This research project is designed, carried out, analyzed, and written up by the student under supervision and consultation with an essay advisor and an advisory committee. This project is equivalent to a 12-credit-hour course and is completed during the second year of the program, following the completion of the core course work.

470. Environmental Health. Investigates the effects of the environment, broadly defined, on the health of individuals and populations, and the implications for health policy, organization, planning, and financing. (Spring)

475. Legal Issues in Health Care. This seminar exposes the student to a broad array of the legal issues that arise in the context of health care. The topics covered include the legal basis for government involvement in health care, the rights of the patients and providers, including principles that have developed for the protection of specific patient groups including infants, children, and those who lack capacity, and the legal aspects of health care financing and regulation. (Fall)

PUBLIC POLICY ANALYSIS

479. Health, Medicine, and Social Reform. Pursuit of the theme of public health and medical reform in leading writers committed, from different positions along the political spectrum, to the social and economic reorganization of modern society. Alternate years. (Spring)

481. Payers and Providers. A study of how insurers, hospitals, and physicians interact and how the nature of these interactions affects the system's overall economic performance. (Fall)

485. Medical Decision and Cost Effectiveness. This course provides the tools necessary to understand the elements of medical decisions and a quantitative framework to analyze their implications. It also examines the types of data available to study clinical practices and provides examples of such investigations. (Fall)

480. Changing Concepts of Health and Illness. Historical account of the way disease has been conceptually understood in the Western tradition. Emphasizes the scientific, epidemiological, philosophical, social, cultural, and professional forces that have shaped the development of ideas. Alternate years. (Fall)

494. Special Topics in Preventive Medicine. Credit—to be arranged. Special studies and investigative projects can be arranged with individual members of the Department in the areas of medical care research, medical economics, medical sociology, medical administration, and epidemiology.

Eric A. Hanushek, Ph.D. (M.I.T.)
Professor of Economics and of Political Science

Richard G. Niemi, Ph.D. (Michigan)
Professor of Political Science

Walter Y. Oi, Ph.D. (Chicago)
Milliman Professor of Economics

Charles E. Phelps, Ph.D. (Chicago)
Professor of Political Science and of Economics

William H. Riker, Ph.D. (Harvard)
Joseph C. Wilson Professor of Political Science

David L. Weimer, Ph.D. (California, Berkeley)
Professor of Political Science and of Public Policy

David Austen-Smith, Ph.D. (Cambridge)
Associate Professor of Political Science

Jeffrey S. Banks, Ph.D. (California Institute of Technology)
Associate Professor of Political Science and of Economics

Larry M. Bartels, Ph.D. (California, Berkeley)
Associate Professor of Political Science

Randall Calvert, Ph.D. (California Institute of Technology)
Associate Professor of Political Science

Bruce Jacobs, Ph.D. (Harvard)
Associate Professor of Political Science and of Public Policy; Program Director

Lynda W. Powell, Ph.D. (Rochester)
Associate Professor of Political Science

*Lawrence S. Rothenberg, Ph.D. (Stanford)
Assistant Professor of Political Science and of Public Policy

Edward J. Bird, M.S. (Wisconsin)
Instructor in Political Science and in Public Policy

Michael J. Wolkoff, Ph.D. (Michigan)
Lecturer in Public Policy and in Economics

Walter Broadnax, Ph.D. (Syracuse)
Adjunct Professor of Political Science and Public Policy

The Program occasionally uses teaching assistants as graders.

The Public Policy Analysis Program offers interdisciplinary training to individuals interested in analysis or leadership careers in the design, evaluation, and implementation of public policies. These careers may be in either government or related private companies. The program, which generally requires two years to complete, leads to an M.S. (public policy) degree. Students are encouraged to complete an internship in a government or related agency between the first and second year.

The core curriculum develops tools and techniques generally needed by all analysts, regardless of specialization or areas of interest. The following courses fulfill the core requirements:

- PPA 403. Mathematical Modeling
- PPA 404. Introduction to Statistical Methods
- PPA 405. Multivariate Statistical Methods
- PPA 406. Survey Design and Analysis
- PPA 407. Microeconomic Theory
- PPA 430. Public Policy Methods
- PPA 431, 432, 452. Public Policy Workshop I, II, III
- PPA 433. Public Policy Modeling
- PPA 460. Benefit-Cost Analysis

In addition to the core curriculum, students must complete seven elective courses. These courses develop analytical approaches and techniques in more detail and provide for some experience and specialization in particular policy areas. They are usually drawn from PPA courses or courses in the Department of Political Science, Department of Economics, and the William E. Simon Graduate School of Business Administration; however, they need not be restricted to these. A minimum of two electives must consider governmental decision making and political processes, and two must be related to some policy area (such as education, health care, energy policy, or natural resources).

*These faculty have applied for one or two semesters of leave in 1991-92.

THE 3-2 OPTION

A limited number of undergraduates may complete the public policy analysis degree under a 3-2 option. By satisfying most of the requirements for their undergraduate concentration in the first three years, students under this plan begin the public policy analysis curriculum in their senior year. At the end of that year, they receive their bachelor's degree, and, after one additional year of full-time graduate study, complete the requirements for the M.S. (public policy) degree. Students may combine the Public Policy Analysis Program with virtually any undergraduate concentration. However, some prior exposure to political science, economics, or statistics is helpful. Students interested in the 3-2 option must apply to this program in the spring of their junior year. Applications and additional information can be obtained in 334 Harkness Hall.

M.S. IN PUBLIC POLICY AND MASTER OF PUBLIC HEALTH

Through a cooperative arrangement between the Public Policy Analysis Program and the Department of Community and Preventive Medicine, students may undertake a combined three-year program leading to the degrees M.S. in public policy and Master of Public Health. For this program, the existing M.S. degree program in public policy analysis requires that electives in the policy area be taken in the Department of Community and Preventive Medicine. Part of the required practicum will also be fulfilled in PM 450. Conversely, the elective credits for the Master of Public Health degree must be concentrated in public policy courses.

M.S. IN PUBLIC POLICY AND PH.D. IN EDUCATION

Individuals interested in educational policy may pursue a program leading to both the M.S. degree in public policy and a Ph.D. degree from the Graduate School of Education and Human Development. This program requires at least four years to complete.

Additional information about any of the combined degree programs can be obtained from the Director of the Public Policy Analysis Program in Harkness Hall.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

403. Mathematical Modeling. An introduction to mathematical modeling in the social sciences, designed for students with limited math backgrounds. Develops concepts of calculus, matrix algebra, and set theory. Same as PSC 403. (Fall)

404. Introduction to Statistical Methods. Develops basic concepts of statistical theory for use in public policy analysis. Same as PSC 404. (Fall)

405. Multivariate Statistical Methods. Develops linear statistical models, with special emphasis on multiple regression techniques. Applications in public policy analysis and social science research. Same as PSC 405. (Spring)

406. Survey Design and Analysis. Introduces survey analysis concepts and methodology, including sampling, measurement, data preparation, and analytical methods. The interpretation of existing surveys is treated along with the development of new ones. Same as PSC 406. (Fall*)

407. Microeconomic Theory. Develops basic microeconomic concepts, including supply and demand relationships, market equilibrium, welfare analysis, and uncertainty. Attention is given to the conceptual framework for making decisions about the allocation of resources. ECO 207 may be an acceptable substitute with permission of the Program Director. (Fall)

420. Introduction to Politics and Policy in the U.S. Health Care System.

The seminar is designed to provide an understanding of the principal health institutions and their behavior. Contemporary health politics and policy are examined in terms of the influence of political and economic forces on the U.S. health care system. Same as PM 420. (Fall)

425. Management of Human Services.

This course is about the management of agencies, institutions, and firms that deliver human services and that are broadly classified as health care, education, welfare, etc. Emphasis is placed on health care organizations. Same as PM 425. (Spring)

426. Medical Sociology. This course is designed to run parallel with PPA 420, though it can be taken independently.

Topics include epidemiological studies of health care problems that have been influential in the formation of health care policy. Same as PM 430. (Fall)

430. Public Policy Methods. Considers rationales and limits to public policy and survey techniques commonly used in policy analysis such as benefit-cost analysis and program evaluation. (Fall)

431. Public Policy Workshop I. Involves students in the formulation and conduct of policy analyses for actual "clients." Under the guidance and monitoring of a faculty member, students work directly with agency officials in developing analyses of real-world problems. In the process, they become familiar with the constraints and pressures that exist and learn to cope with the environment often faced in policy analysis jobs. (Spring)

432. Public Policy Workshop II. Follows PPA 431 and emphasizes in-depth analysis of a particular policy problem. Through this course and its companion PPA 452 (spring), students develop a comprehensive essay studying a policy issue of their own choosing. (Fall)

433. Public Policy Modeling. Considers the application of microeconomic theory and organizational analysis to public policy problems. Conceptual

*PPA 406 is taught Sept.-Oct. and PPA 460 Oct.-Dec. Each course is 2 credit hours.



ideas are illustrated in a variety of diverse areas, such as environmental quality, welfare reform, health insurance, and educational finance. Same as ECO 433. (Spring)

435. Organizational Theory and Behavior. An analysis of individual and collective behavior in public and private organizations. Various explanations of bureaucratic decision making and performance are considered. (Spring)

436. Health Policy. Analysis of factors that affect supply and demand in the market for medical care: risk, insurance, externalities, and health care cost control. Same as ECO 236. (Spring)

437. Domestic Social Policy. The content, rationale, assumptions, and development of selected domestic policies. The use of social science theories and findings in policy formation and evaluation. Same as PSC 237. (Fall)

438. Natural Resource Economics. Deals with theories of exhaustible resources, regulatory policy, and industrial organization as related to energy markets, particularly oil and natural gas. Same as ECO 238. (Fall)

439. Family Policy in the United States. General framework for analyzing family policy and its history in the United States as well as specific policy areas such as child care, foster care, and adolescent pregnancy. Same as PSC 239. (Fall)

445. Aging and Public Policy. Analyzes policies in such areas as social security, public assistance, health care, and social services for the elderly. Same as PSC 245. (Spring)

447. Economics of Education. Costs and returns to investment in education; public policy decisions about education; educational finance. Same as ECO 237. (Spring)

448. Risk and Insurance. Applied theories of risk and insurance to issues of public policy. Same as ECO 248. (Spring)

450. Organization and Delivery of Health Care Services. Course is designed to provide graduate students with knowledge and experience in evaluating health care delivery services. Same as PM 450. (Spring)

452. Public Policy Workshop III. Continuation of PPA 432. (Spring)

458. Public Management. The theme of this course is one of developing the capacity to manage public organizations. Various dimensions of managing in the public sector will be examined. (Fall)

460. Benefit-Cost Analysis. Studies modern methods of cost-benefit and cost-effectiveness analysis. Same as PSC 460. (Fall*)

461. State and Local Public Finance. Analysis of state and local governmental tax and expenditure policy and their respective roles in the federal system. Same as ECO 261. (Spring)

463. Public Finance. Government tax and expenditure policies and their effect on resource allocation and income distribution. Same as ECO 263. (Fall)

RELIGION AND CLASSICS

Joseph P. Brennan, S.S.L. (Pontifical Biblical Institute, Rome) *Professor of Religion and Director of University Religious Affairs*

Karen E. Fields, Ph.D. (Brandeis) *Professor of Religion and Director of the Frederick Douglass Institute for African and African-American Studies*

William Scott Green, Ph.D. (Brown) *Professor of Religion, Philip S. Bernstein Professor of Judaic Studies, and Chair of the Department*

Grace Harris, Ph.D. (Cambridge) *Professor of Anthropology and of Religion*

Alfred Geier, Ph.D. (Johns Hopkins) *Associate Professor of Classics*

Edward Wierenga, Ph.D. (Massachusetts) *Associate Professor of Religion*

Kathryn Argetsinger, Ph.D. (Princeton) *Assistant Professor of Classics*

Douglas R. Brooks, Ph.D. (Harvard) *Assistant Professor of Religion and Chair of Committee on Asian Studies*

Emil Homerin, Ph.D. (Chicago) *Assistant Professor of Religion*

**Deborah Lyons, Ph.D. (Princeton) *Assistant Professor of Classics*

J. Andrew Overman, Ph.D. (Boston) *Assistant Professor of Religion*

Ruth Kessler, M.A. (Arizona) *Senior Lecturer in Hebrew*

Harmon R. Holcomb, B.D. (Colgate Rochester) *Professor Emeritus of Philosophy and of Religion*

Abraham J. Karp, M.H.L. (Jewish Theological Seminary) *Professor of History and of Religion and Philip S. Bernstein Professor Emeritus of Jewish Studies*

In the Department of Religion and Classics students explore the great, classical civilizations of West and East and the major religions that emerged from them. The Department offers programs of study in the history and philosophy of the world's major religions, in Greek, Latin, and Hebrew languages and literatures, and in ancient Mediterranean and Oriental civilizations. Through the study

*PPA 406 is taught Sept.-Oct. and PPA 460 Oct.-Dec. Each course is 2 credit hours.

**This faculty member has applied for one or two semesters of leave in 1991-92.

of important classical, biblical, and religious writings, either in the original language or in translation, students critically examine the beliefs, ideas, values, rituals, and traditions that have shaped Western and Oriental cultures and study the ways these have persisted and changed from ancient to contemporary times.

REQUIREMENTS FOR CONCENTRATION IN RELIGION

The goal of a concentration in religion is to achieve an understanding of the nature of diverse religions, the methods employed in their study, and a measure of competence within a specific tradition or area. Seminars, reading courses, and the senior tutorial allow intensive study of particular topics. Students also may enroll in selected courses at Colgate Rochester Divinity School/Bexley Hall/Crozer Theological Seminary and take advantage of its distinguished theological library.

A minimum of 10 courses is required:

1. Either REL 101 or 102.
2. One course in the history of a tradition, either REL 103, 104, 105, 106, or 107.
3. REL 293, normally taken in the junior year.
4. Six other courses, no more than three of which may focus on the same religious tradition.
5. Senior Tutorial (REL 393), a directed, individual study project.

MINOR IN RELIGION

1. Either REL 101 or 102.
2. One course in the history of a religious tradition, either REL 103, 104, 105, 106, or 107.
3. REL 293.
4. Three other courses in religion, selected in consultation with the student's advisor in the Department.

A concentration in religion may include no more than three 100-level courses.

REQUIREMENTS FOR CONCENTRATION IN CLASSICS

The concentration in classics is language-centered. Course work in Greek and Latin is supplemented by studies in ancient

literature, religion, philosophy, history, and art. The goal of the concentration is to be able to analyze and interpret significant texts in the ancient languages and to understand their cultural context. Students may choose a concentration in classics (both languages), or in Greek or Latin alone; all majors, however, are encouraged to take at least one year of each language, if possible.

Classics

A minimum of 11 courses is required:

1. At least eight courses in Greek or Latin numbered 103 or above, with a minimum of two in either language.
2. Three courses in Classical Studies, or related field with permission of departmental advisor.

Greek or Latin

A minimum of 10 courses is required:

1. At least six courses in the major language numbered 103 or above.
2. Four courses in Classical Studies, or related field with permission of departmental advisor.

MINOR IN LATIN

1. LAT 101 and 102, or the equivalent.
2. Four courses of close textual analysis and interpretation, chosen from a wide range of Latin authors, and read in the original language.

MINOR IN GREEK

1. CGR 101 and 102, or the equivalent.
2. Four courses of close textual analysis and interpretation, chosen from a wide range of Greek authors, and read in the original language.

MINOR IN CLASSICAL CIVILIZATION

Six courses are required, of which at least two must be 200-level or above.

1. Two courses in a classical language, either both in Latin or both in Classical Greek, or the equivalent, e.g., completion of the language proficiency requirement in either of these languages.
2. Four courses in classics, or related field with the permission of the departmental advisor.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

RELIGION

101. Old Testament. The historical formation of the Old Testament; a study of its representative books; discussion of their significance then and now. (Spring)

102. Introduction to the New Testament. A survey of all the New Testament writings in their historical and cultural context, with emphasis on the theological themes expressed by that literature. (Fall)

103. History of Judaism. The basic elements of Judaism and their transformations and developments in biblical, rabbinic, and modern periods. Same as HIS 121.

104. History of Christianity. A study of the development of Christian belief and thought about God, Jesus, scripture, ethics, and the church. (Spring)

105. The Asian Search for Self. A study of the basic teachings of Hinduism and Buddhism as to the nature of man, and the paths to liberation. Same as HIS 105. (Fall)

106. From Confucius to Zen. The teachings, practices, and social impact of the major religious traditions of China and Japan. Same as HIS 106. (Spring)

107. History of Islam. This course traces the development of the religion of Islam from its origins in the Qur'an and Muhammad's teachings, through the codification of the Classical tradition in its various forms, and, finally, to the living Islam of the contemporary world. Same as HIS 107.

111. Philosophy of Religion. Historical and recent readings are used to analyze issues such as: existence of God, divine attributes, the relation of God to the world, and faith and reason. Same as PHL 111. (Fall)

140. Greek History and Civilization.

Same as HIS 110, CLA 110. (Fall)

141. Classical and Scriptural Back-

grounds to Western Culture. The great tradition, from Homer, Greek drama, Plato, and Virgil to the Bible and Dante. Same as ENG 140 and LIT 140. (Fall and Spring)

144. Traditional Chinese Civilization.

Same as LIT 178, CHI 178, HIS 178.

(Fall)

190. Classical Civilization.

Same as HIS 190, CLA 190. (Spring)

205. Romanesque Art and Architec-

ture. Same as AH 213. (Fall)

206. Gothic Art and Architecture.

Same as AH 214. (Spring)

208. Chaucer.

Same as ENG 206.

209. Advanced Mythology.

Same as HIS 260, CLA 209. (Spring)

214. Religions: Their Values and

Symbols. Same as ANT 263. (Fall)

215. The Prophets and Their World.

A study of the role played by the prophets in Israelite society from the time of Elijah until after the exile, and their continuing significance in Judaism and Christianity. (Spring)

216. Plato and Logopoesis.

Same as CLA 216, LIT 216. (Spring)

218. The Holocaust.

A historical, theological, and ideological analysis of the holocaust—the ghettos, death camps, and resistance. Same as HIS 218. (Spring)

220. Healing and Ritual.

Same as ANT 220.

221. Literature and Society in Ancient

Rome. Same as CLA 221, HIS 259. (Fall)

224. Augustine, Anselm, and Aquinas.

Three formative philosophical treatments of religious belief are compared on selected topics such as freedom, providence, and the problem of evil. Same as PHL 246/446. (Fall)

225. Ethical Decisions in Medicine.

Examination of a select number of moral issues arising in medicine. Topics include abortion, termination of life, experimentation on human subjects, informed consent, refusal of treatment, and suspension of treatment. Same as PHL 225/425. (Spring)

226. Contemporary Issues in Philo-

sophical Theology. A philosophical examination of such theological concepts as original sin, atonement, incarnation, and trinity. (Spring)

230. Russian Religious Ideas.

Same as HIS 230.

233. The Problem of Evil in the

Hebrew Bible. A study of key texts from the Hebrew Bible which seek to explain the presence of evil in the world. (Fall)

234. Buddhism: The Compassionate

Teachings of the Middle Way. An introduction to the concepts, values, and practice of Buddhist tradition as it spread from its Indian origins into Tibet, South-east Asia, and East Asia. Study focuses on Buddhism as a total cultural phenomenon.

236. Judaism and Christianity.

A historical, topical, and analytical study of the Jewish and Christian religious traditions—where they converge and where they depart; what they share and how they differ. Same as HIS 219.

237. Jewish Legal Tradition.

A history of the development of Jewish law from biblical days to the State of Israel. Same as HIS 237. (Fall)

238. The Divine Lover: Sexual Themes

in Indian Art. Same as AH 228.

239. Catholicism in American Life.

A study of the development of Catholicism from a broadly cultural perspective: political, social, economic, artistic, philosophical, and theological elements will be considered of American Catholicism's story. Same as HIS 239. (Fall)

240. Jews and Judaism in America.

The historical development of Judaism in America, the effects of the frontier, immigration, and democracy on Jewish life. Same as HIS 240.

242. Dharma: The Hindu Way of Life.

A historical study of the ideas, values, and practices that have shaped Indian civilization from the Vedic period to modern times.

243. Hindu Mysticism. An advanced introduction to the esoteric traditions of Hindu spirituality, especially Tantrism, in Sanskrit-based and popular forms.

244. Myth and Ritual in Epic Hindu-

ism. A close examination of the Mahabharata and scholarship pertaining to Indo-European mythology. (Spring)

245. Religion in Ancient Meso-

America. Same as ANT 245.

246. Cry Freedom: Liberation Theol-

ogies in Africa and the Americas. The course examines various theologies of liberation including writers from South Africa, Latin America, and men and women from North America. Same as AAS 246. (Spring)

247. American Black Religion. Examines the evolution of African-American religious thought and experience.

249. Civilizations of South Asia. Same as ANT 249.

250. Greek Religion. An introduction to the religion of ancient Greece through the study of classical texts in English translation. Same as CLA 250.

254. The Buddha Legend and Buddhist

Philosophy. A close examination of the legend of the Buddha and the concept of buddhahood as it is presented in the Pali and Sanskrit canons and in the works of several influential Indian and Tibetan philosophers. (Fall)

259. Ancient Judaism.

An examination of major developments in Ancient Judaism during and beyond the emergence of Christianity.

262. Politics, Rebellion, and Religion.

The struggle between state and empire in Judaism and Christianity, 165 B.C.E.–212 C.E. Same as HIS 257. (Fall)

266. South East Asian Ideologies.

Same as ANT 240.

269. Tolstoy and Dostoevsky. Same as LIT 269. (Spring)

274. Islamic Mysticism.

An advanced introduction to mystical life in Islam which studies mystical experience and theory and traces the importance of Islamic mysticism to religion, philosophy, art, and literature as found in medieval and modern Muslim societies.

275. Roots of the Middle East Crisis.

See HIS 249.

276. Mysticism. This course introduces and examines mystical experience and the quests for it. Ancient and modern views of the subject will be considered as well as mysticism's impact on religion, art, and society.

277. The Qur'an. The course studies the prophet Muhammad, the Qur'an, and their importance to medieval and modern Muslim culture. The prophet's life and major themes of the Qur'an will be discussed together with interpretations of them found in Islamic legal, theological, philosophical, and mystical writings.

278. Islam and the Third World. This course studies some of the important and often dramatic changes occurring in modern Islam by examining the effects on it of Third World political, social, and economic factors. Same as AAS 278, HIS 278. (Spring)

281. Classical Arabic Literature in Translation. Same as ATA 281, LIT 285.

290. Powerful People. Same as HIS 272. (Spring)

293. Theories of Religion. An investigation of important methodological contributions to the critical study of religion. (Spring)

295. Senior Seminar. Advanced seminar required of senior concentrators. (Spring)

309. Byzantine Orthodoxy. Same as HIS 309.

311. Byzantine Civilization. An introduction to the techniques of research in the Byzantine area for the nonspecialist and the prospective specialist. Same as HIS 411. (Spring)

360. Selected Topics in Philosophy of Religion. An examination of issues of contemporary interest in the philosophy of religion.

380. The Idea of the Messiah. Traces the development of this idea from Israelite religion and Judaism through its manifestations in the West in medieval and modern times. (Fall)

391. Independent Study. By arrangement with the chairman and with the consent of an instructor, to permit work beyond the regular course offerings. Limited to juniors and seniors with background in the selected area of reading.

393. Senior Tutorial. A directed, individual study project required of all senior concentrators.

ARABIC

101. Elementary Arabic I. An introduction to Modern Standard Arabic including the alphabet, pronunciation, vocabulary, grammar, elementary conversation, and reading. (Fall)

102. Elementary Arabic II. Continuation of ARA 101. (Spring)

281. Classical Arabic Literature in Translation. A study of classical Arabic literature in English translation ranging from fifth-century pre-Islamic verse through sixteenth-century travel accounts. Same as REL 281, LIT 285.

GREEK

NOTE: Greek 101 and 102, or the equivalent, are prerequisites to all Greek courses at the 200 level.

101. Classical Greek I. An introduction to Greek designed to prepare students to read the Classical Greek dramatists, philosophers, orators, and historians, and the New Testament. (Fall)

102. Classical Greek II. Continuation of GRK 101. (Spring)

103. Intermediate Greek. Review of Greek grammar and readings in an unadapted prose text.

104. Homer's *Odyssey*. Unadapted selections from the *Odyssey* of Homer will be read. The entire *Odyssey* will be read in English and discussed.

203. Aristotle's Philosophy. Study of the language and the philosophy of Aristotle's *De Anima*. Same as PHL 203. (Spring)

206. Plato's *Phaedrus*. Study of the language and thought of the *Phaedrus*. (Spring)

209. Herodotus. Selections from Herodotus, the "Father of History" are read in Greek, and the entire *Histories* are read and discussed in English.

214. Sophocles' *Antigone*. Sophocles' *Antigone* is read in the original. Related plays are read in translation.

391. Independent Study. A study of special literary problems, under the direction of a member of the faculty.

393. Senior Essay. A paper based upon independent study; may be written by concentrators. Students should normally register for this course in the fall term of their senior year.

HEBREW

101. Elementary Hebrew I. Introduction to the structure of Hebrew. Practice in vocabulary, use, reading, and comprehension. (Fall)

102. Elementary Hebrew II. Direct continuation of Elementary Hebrew I with emphasis on enhancing reading, writing, and speaking skills. (Spring)

103. Intermediate Hebrew. Continuation of HEB 102 with emphasis on enhancing reading comprehension and writing skills. Students are expected to have good understanding of the structure of Hebrew including familiarity with verb conjugation patterns. (Fall)

204. Hebrew through Conversation. A conversational course designed to increase oral proficiency in Hebrew. Classes will focus on topic-oriented discussions as well as enactment of real-life situations. (Spring)

LATIN

101. Elementary Latin I. Basics of Latin grammar and vocabulary. No prerequisites. (Fall)

102. Elementary Latin II. Basics of Latin grammar and vocabulary, continued, and some readings from unadapted texts. Prerequisite: LAT 101 or permission of the instructor. (Spring)

103. Intermediate Latin. Review of Latin grammar, and readings in an unadapted prose text. Completion of this course will fulfill the proficiency requirement in Latin. Prerequisite: LAT 102, or a minimum of 420 on the proficiency test, or permission of the instructor. (Fall and Spring)

204. Latin Lyric: Catullus and Horace. A close study of the two principal Latin lyricists, emphasizing translation, interpretation, and metrics.

205. Roman Love Elegy. Selections from the love poems of Propertius, Tibullus, and Ovid. Relevant historical and cultural material is used.

206. Virgil's *Aeneid*. A study of Books 1, 2, 4, 6 of Virgil's *Aeneid*, concentrating on translation and interpretation of the work and improving linguistic and critical skills.

RUSSIAN STUDIES

207. Lucretius. Selections from Lucretius. Prerequisite: Completion of the proficiency requirement, or permission of the instructor. (Spring)

209. Seneca. Selections from Seneca's dramatic and philosophical writings.

391. Independent Study. Advanced readings in unadapted Latin texts, by arrangement with the instructor.

393. Senior Project. (Spring)

CLASSICAL STUDIES

110. Greek History and Civilization. Same as HIS 110, REL 140. (Fall)

190. Classical Civilization. Same as HIS 190.

209. Advanced Mythology. Same as HIS 260.

210. Classical Mythology. Introduction to the major myths of the Greek gods and heroes using readings in translation and slides of Greek art.

215. The Homeric Hero. A close study of the *Iliad* and *Odyssey*, and a comparison of the two chief Homeric heroes, Achilles and Odysseus, and their re-evaluation in Virgil's *Aeneid*.

216. Plato and Logopoiesis. A study of several Platonic dialogues (*Phaedrus*, *Lysis*, *Symposium*) and their themes, especially the relation of eros and speech to divinity. Same as LIT 228.

221. Literature and Society in Ancient Rome. Life at the turn of the millennium. Readings mostly in primary sources (in English). Literature, religion, and society at the height of Rome's power.

250. Greek Religion. An introduction to the religion of ancient Greece through the study of classical texts in translation. Same as REL 250.

273. Sexuality and Gender in Classical Antiquity. Issues of sexuality and gender in ancient Greece and Rome. Readings (in English) include classical texts and modern theory. Same as WST 273.

311. Byzantine Culture and Civilization. Same as HIS 311.

337. Hellenistic and Imperial Civilization. Same as HIS 337/437.

COMMITTEE ON RUSSIAN STUDIES

Brenda Meehan-Waters, Ph.D.

(Rochester) *Senior Associate Dean for Undergraduate Studies, College of Arts and Science; Professor of History*

Jeffrey P. Burds, Ph.D. (Yale) *Assistant Professor of History*

Stephen Hutchings, Ph.D. (Durham, U.K.) *Assistant Professor of Russian*

Laura A. Janda, Ph.D. (California, Los Angeles) *Assistant Professor of Russian and Chair of the Program*

Kathleen Parthé, Ph.D. (Cornell) *Assistant Professor of Russian*

The Russian Studies Certificate Program allows students concentrating in the social sciences and the humanities to broaden their knowledge of Russian language and culture. It serves as a complement to their disciplinary concentration.

Upon graduation, the student receives a Certificate in Russian Studies as well as a B.A. in his or her department of concentration. Those selecting this program, in addition to fulfilling the requirements of their department, must meet the following requirements.

- A reading knowledge of Russian, to be demonstrated by completing RUS 105 or the equivalent.
- Satisfactory achievement in two of the following courses:
RUS/LIT/HIS 128 or RUS 129
RUS/LIT 261, 263, 264, 265, or 269

- Satisfactory achievement in HIS 129 and in one of the following courses: HIS 229 or RUS/LIT/HIS 128
- Satisfactory achievement in a course in Soviet politics or Soviet foreign policy, when given, or a combination of HIS 229 and either PSC 262 or 270. Note that RUS/LIT/HIS 128 can be used only once to satisfy the requirements of this program.

The Russian Studies Certificate Program is administered through the College Center for Interdisciplinary Studies. Students who plan to enroll in the program should pick up an application in the Center office in 206 Lattimore Hall and should also consult the Chair of the Program. Students should enroll in the program by November 10 of their junior year.

SOCIOLOGY

Dean Harper, Ph.D. (Columbia)
*Professor of Sociology and of
 Psychiatry*

Raymond Murphy, Ph.D. (Northwestern)
Professor of Sociology

Thomas Spence Smith, Ph.D. (Chicago)
Associate Professor of Sociology

Though the College offers a dozen or more courses in sociology each year, there is no Department of Sociology, and therefore no major, or minor, in sociology. Students of social science who are particularly interested in sociology, and do not wish to major in one of the departmental programs in the College, are encouraged to arrange an interdisciplinary major through the College Center for Interdisciplinary Studies (see page 113). Through the Center a program including an emphasis on sociology may be submitted for the approval of the Committee on Individualized Interdepartmental Concentrations. Students who plan on graduate study in sociology should consult one or more of the professors of sociology for advice concerning appropriate undergraduate courses, both in sociology and in other departments.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

INTRODUCTORY COURSES

101. Introduction to Sociology. Social organization of behavior. Status and role. Nature of social groups. Social stratification. Social institutions.

SOCIOLOGICAL THEORY

201. Major Social Theories. An examination of the growth of major theoretical traditions in sociology. Students read from classic writings of Marx, Durkheim, Weber, Simmel, and others as background for understanding contemporary theoretical developments in such perspectives as structuralism, social exchange, conflict theory and functionalism.

205. Microsociology. Theories of interaction. Analysis of social networks. Small group processes. Social exchange. Conversation and discourse analysis.

METHODS OF RESEARCH

211. Design of Social Research. Some basic ideas from the philosophy of science applied to sociological investigation. The experiment as the model for sociological research. Necessary alterations in the experimental model. The logic of inference. Prerequisite: one course in statistics.

SPECIALIZED COURSES

221. Love, Friendship, and Community. Sociological study of personal ties and face-to-face social groups: kinship networks, friendship groups, political and religious ideological groups, intellectual circles.

224. Class, Status, and Power. Major theories and empirical studies of stratification in historical and contemporary settings; class structure.

231. Race Relations. Intergroup relations in industrial society, with special attention to black-white relations in America.

233. Deviant Behavior. The theoretical and empirical analysis of deviance as the product of societal reactions, official labeling activities, and other variables.

234. Crime and Delinquency. A review of the major sociological findings and theories about crime and delinquency.

254. Sociology of Jazz. A sociological case study of the relationship between art and society.

262. Medical Sociology. Disease distinguished from illness. Social factors contributing to the onset of disease. Social consequences of disease. Doctor-patient relations. Organization of health care.

263. Sociology of Mental Disorder. Nature of mental disorder. Social factors contributing to the onset of mental disorder. Organization of the psychiatric hospital. Consequences of mental disorder for individuals and for society.

SEMINARS AND READING AND RESEARCH COURSES

301. Senior Seminar in Health and Society. A seminar for seniors completing the interdisciplinary health and society curriculum.

309. Studies in Medical Sociology. An intensive analysis of two or three sociological concepts or theories and their use in the study of health, diseases, and medicine. Prerequisite: permission of instructor.

310. Senior Seminar in Sociology. A seminar in which students integrate their studies in sociology with their studies in an allied field. Independent readings. Supervised writing of an essay on sociology and the allied field. Close discussion of each student's work on the essay.

391. Independent Study in Sociology. Special work individually assigned, with the consent of the Department.

392. Directed Research. Individual research projects, done under the supervision of a faculty member.

394. Internship.

STATISTICS

K. Ruben Gabriel, Ph.D. (Hebrew University) *Professor of Statistics and of Biostatistics*

*William Jackson Hall, Ph.D. (North Carolina) *Professor of Statistics and of Biostatistics, and Acting Director, Division of Biostatistics*

Govind Shrikrishna Mudholkar, Ph.D. (North Carolina) *Professor of Statistics and of Biostatistics*

David Oakes, Ph.D. (London) *Professor of Statistics and of Biostatistics and Chair of the Department*

Poduri S.R.S. Rao, Ph.D. (Harvard) *Professor of Statistics, of Biostatistics, and in the William E. Simon Graduate School of Business Administration*

Martin A. Tanner, Ph.D. (Chicago) *Professor of Biostatistics and of Statistics, and Director of the Division of Biostatistics*

Steven Paul Ellis, Ph.D. (California, Berkeley) *Assistant Professor of Statistics and of Biostatistics*

Michael P. McDermott, Ph.D. (Rochester) *Assistant Professor of Biostatistics, of Statistics, and of Neurology*

Richard F. Raubertas, Ph.D. (Wisconsin, Madison) *Assistant Professor of Biostatistics, of Statistics, and of Oncology*

Julian Keilson, Ph.D. (Harvard) *Professor Emeritus in the William E. Simon Graduate School of Business Administration and of Statistics and of Biostatistics*

W. Allen Wallis, A.B. (Minnesota) *Professor Emeritus of Economics and of Statistics*

The Department employs 10 to 15 teaching assistants as graders or section leaders.

The Department of Statistics offers instruction in statistics from introductory through graduate levels. Programs leading to the B.A., M.A., M.S., and Ph.D. degrees in statistics and joint B.A. and M.A. programs in mathematics and

statistics are available. The Department interprets the term "statistics" very broadly. The courses available permit specialization in statistical theory, probability theory, statistical analysis, biostatistics, medical statistics, and operations research. The Department recognizes and emphasizes both theoretical and applied aspects of statistics. Some computer usage is an essential and integral part of all programs. By appropriate choice of courses, students may coordinate their statistical education with some specific field of application. Or, they may choose a program strong in theory and in supporting mathematics courses. Opportunities for student participation in statistical consulting projects are sometimes available through the affiliated Division of Biostatistics in the School of Medicine and Dentistry.

The objectives of the B.A. program are to provide (1) a background in quantitative methods for graduate work in the social sciences or business administration, (2) training in statistical methods for work in government or industry, and (3) an introduction to statistics in preparation for graduate work in statistics and related fields.

INTRODUCTORY COURSE INFORMATION

The Department offers five introductory courses. Two of the courses (165 and 201/203) are theoretical in nature; the others (145, 211, 212) are applied. STT 165 is an introductory course in probability and statistical theory; it provides a theoretical background for statistics as used in the humanities and sciences. STT 201/203 is a two-semester, thorough introduction to the theory of probability and statistics. (Students should not take both 165 and 201/203.)

STT 145 is a nonmathematical, introductory, terminal course concentrating on interpretation of data and on some of the basic techniques of statistical analysis along with computer implementation.

STT 211 and STT 212 are more technical, though still without any mathematical prerequisite; many of the techniques of statistical analysis are introduced along with computer implementation. Either of these may be followed by STT 216, which further develops techniques of statistical analysis.

STT 201, 203; 211, 216; and 212, 216 are natural two-course sequences for statistics as an allied field. Other two-, three-, and four-course sequences are possible.

CONCENTRATION IN STATISTICS

The concentration in statistics must form a coherent program directed toward the objectives of the student, and must be approved by the statistics departmental advisor. It is recommended that if possible, students considering statistics as a concentration take STT 211 or 212 and one other statistics course, or STT 201/203 during their sophomore year. At least one course involving computer usage or familiarity with some standard software package is required.

REQUIREMENTS FOR STATISTICS MAJORS

- MTH 161-162 or their equivalents (141-143 or 150-152), and 163-164.
- 10 additional courses:
 - a. Six to eight statistics courses, including 201, 203, 211 or 212, 226.
 - b. Two to four courses in an allied field: computer science, mathematics, economics, engineering, political science, psychology, sociology, management, or any cognate field, with the consent of the Department.

Some of the 400-level courses in statistics (see the *Official Bulletin: Graduate Studies*) are also available to concentrators.

*This faculty member has applied for one or two semesters of leave during 1991-92.

DOUBLE MAJORS

The above requirements are needed for double concentrations—statistics and another field, e.g., economics, mathematics, political science, psychology—in addition to the requirements in the other field; the departmental advisor should be consulted.

JOINT CONCENTRATION IN MATHEMATICS AND STATISTICS

MTH 161–164 plus MTH or STT 201, 202, 203, and 207 or 208; MTH 236, 265; STT 226; CSC 100; two additional 200-level courses in mathematics and/or statistics. Approvals of the advisors from both the departments are required.

REQUIREMENTS FOR A MINOR IN STATISTICS

A total of five courses is required:

1. STT 201 (prerequisite: MTH 143, 152 or 162).
2. STT 203 (prerequisite: STT 201).
3. STT 211 or 212.
4. At least one of the following:
STT 216 (prerequisite: STT 211 or STT 212).
STT 226 (prerequisite: STT 203).
5. At least one elective from the offerings of the Department and/or computing (e.g., CSC 171). The choice of elective(s) will be made with the advice/approval of the statistics department advisor for undergraduates.

THE 3-2 PROGRAM IN MEDICAL STATISTICS

With the approval of the advisor, some of the courses for the statistics concentration can be used for this program. Students majoring in statistics can expect to complete the requirements of the M.S. program in a single additional year of study.

Statistical studies in medicine, pharmaceuticals, public health, and related fields have been increasing in recent years with the expansion of medical care and federal monitoring of new drugs and treatments. This has generated a demand for professional statisticians able to design and analyze such studies. The Program in Medical Statistics attempts to meet this demand. It provides a grounding in probability, statistical theory, and computing and then introduces students to the problems met in medical and pharmaceutical studies and the methods of dealing with their design, analysis, and interpretation. Students will obtain hands-on experience with statistical work either in industry or in university research.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991–92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

145. Elements of Applied Statistics.

The nature and meaning of statistics; organization and interpretation of data. Elements of statistical inference, sampling, and regression. Computer usage.

165. Elements of Probability and Mathematical Statistics. Probability, probability distributions, random variables, moments, principles of statistical inference, estimation, hypothesis testing. Prerequisite: MTH 141, 150, or 161.

201. Introduction to Probability.

Probability spaces, combinatorial problems, random variables and expectations, discrete and continuous distributions, generating functions, independence and dependence, binomial, normal, and Poisson laws, laws of large numbers. Prerequisite: MTH 143, 152, or 162. Same as MTH 201.

202. Introduction to Stochastic Processes.

Theory and applications of random processes, including Markov chains, Poisson processes, birth-and-death processes, random walks. Prerequisite: STT 201. Same as MTH 202.

203. Introduction to Mathematical Statistics. Principles of statistical decision theory, point and interval estimation, tests of hypotheses, multivariate normal distribution, linear hypotheses, selected topics. Prerequisite: STT 201. Same as MTH 203.

205. Mathematical Genetics. Selected topics in the mathematics of inherited characteristics, employing only elementary probability theory. Same as MTH 205.

207. Linear Programming and the Theory of Games. The basic properties of convex sets. Linear programming. Duality. Principal theorems. Finite games. Some infinite games. Prerequisite: MTH 164 or 174. Same as MTH 207.

208. Nonlinear Programming. Constrained optimization, Lagrange multipliers, quadratic programming, dynamic programming. Prerequisites: MTH 163 and 164, or 174. Same as MTH 208.

209. Theory of Optimization. Convex sets, convex functions, separating hyperplanes; necessary first and second order conditions for an optimal solution; the method of steepest descent, Newton's method and conjugate direction methods. Behavior of algorithms as to speed of convergence. Constrained minimization problems and the Kuhn-Tucker theorem; quadratic programming; penalty functions. Prerequisite: MTH 164 or consent of the instructor. Same as MTH 209.

211. Applied Statistics for the Social Sciences I. Descriptive statistics, statistical analysis, and statistical inference as used in the social sciences; including elements of correlation, regression, and analysis of variance. Computer usage.

VISUAL SCIENCE

212. Applied Statistics for the Biological and Physical Sciences I. Descriptive statistics, statistical analysis, and statistical inference as used in the biological and physical sciences; including elements of correlation, regression, and analysis of variance. Computer usage.

216. Applied Statistics II. Continuation of 211 or 212. Analysis of variance, regression, correlation contingency table analysis, and associated topics. Prerequisite: STT 211 or 212.

221. Sampling Techniques. Simple random, stratified, systematic, and cluster sampling; estimation of the means, proportions, variance, and ratios of a finite population. Ratio and regression methods of estimation and the use of auxiliary information. The nonresponse problem. Prerequisite: STT 211 or 212.

222. Design of Experiments. A practical introduction, including block and simple factorial designs and stress of basic principles such as randomization and blocking. Prerequisite: STT 216 or 226.

226. Introduction to Linear Models. Vector variables, normal and related distributions. General linear model—matrix formulation. Estimation, prediction, testing, and simultaneous inference. Applications to regression and to analysis of variance and covariance of experimental data. Prerequisites: STT 203 and STT 211 or 212.

241. Applied Multivariate Analysis. Methodology and applications of multivariate analysis. Hotelling's T^2 , multivariate regression and analysis of variance. Classification and discrimination. Principal components, clustering, multidimensional scaling. Use of computer packages, including SAS. Prerequisite: STT 226 or 476.

280. Introduction to Numerical Analysis. Same as MTH 280 and CSC 280.

391. Independent Study in Statistics. Supervised reading arranged on an individual basis. Prerequisite: consent of the Department.

Richard N. Aslin, Ph.D. (Minnesota)
Professor of Psychology and in the Center for Visual Science and Chair of the Department of Psychology

Dana H. Ballard, Ph.D. (California, Irvine)
Professor of Computer Science and in the Center for Visual Science

Robert M. Chapman, Ph.D. (Brown)
Professor of Psychology and in the Center for Visual Science

Gerald Howard Cohen, Ph.D. (Wisconsin)
Professor Emeritus of Electrical Engineering and Professor of Ophthalmology and in the Center for Visual Science*

Manuel Del Cerro, M.D. (Buenos Aires)
Professor of Neurobiology and Anatomy, and in the Center for Visual Science and Associate Professor of Ophthalmology

James R. Ison, Ph.D. (Michigan)
Professor of Psychology and of Toxicology and in the Center for Visual Science

John Krauskopf, Ph.D. (Texas)
Professor of Psychology (New York University) and Adjunct Professor in the Center for Visual Science

Peter Lennie, Ph.D. (Cambridge)
Professor of Psychology and in the Center for Visual Science and Director of the Center for Visual Science

David MacAdam, Ph.D. (M.I.T.)
Professor of Optics and of Engineering and Adjunct Professor in the Center for Visual Science

Walter Makous, Ph.D. (Brown)
Professor of Psychology and of Ophthalmology and in the Center for Visual Science

Henry S. Metz, M.D. (SUNY, Downstate)
Professor and Chair of Ophthalmology and Professor in the Center for Visual Science

David R. Williams, Ph.D. (California, San Diego)
Professor of Psychology and of Optics and in the Center for Visual Science and Associate Director of the Center for Visual Science

Mary M. Hayhoe, Ph.D. (California, San Diego)
Associate Professor of Psychology and in the Center for Visual Science

W. Michael King, Ph.D. (Washington)
Associate Professor of Physiology and in the Center for Visual Science

William H. Merigan, Ph.D. (Maryland)
Associate Professor of Ophthalmology, of Biophysics, and in the Center for Visual Science

Gary D. Paige, M.D. (Chicago)
Associate Professor of Neurology, of Physiology, of Ophthalmology, and of Otolaryngology and in the Center for Visual Science

Tatiana Pasternak, Ph.D. (Copenhagen)
Associate Professor of Neurobiology and Anatomy, and of Psychology, and in the Center for Visual Science*

Robert C. Emerson, Ph.D. (Pennsylvania)
Senior Scientist of Ophthalmology, Assistant Professor of Psychology, and in the Center for Visual Science*

Kyunghee Koh, Ph.D. (Michigan)
Assistant Professor of Psychology and in the Center for Visual Science

John H. R. Maunsell (California Institute of Technology)
Assistant Professor of Physiology and in the Center for Visual Science

Inger Williams, Ph.D. (Penn State)
Adjunct Assistant Professor in the Center for Visual Science

Joanne E. Albano, Ph.D. (Duke)
Research Associate in the Center for Visual Science

Teaching assistants occasionally assist instructors in the courses offered in the Center, primarily in large courses or those requiring laboratories or numerous demonstrations.

The Center for Visual Science (CVS) is located on the River Campus in Meliora Hall. Its primary purpose is to provide specialized course work and advanced research facilities for students and post-doctoral workers in various disciplines whose work or interest involves the field of visual science. This is done with the cooperation of faculty who have their primary appointments elsewhere in the University. Prospective students with an interest in this area typically come from

*Part-time.



any one of the following departments: computer science, neurobiology and anatomy, ophthalmology, optics, physiology, or psychology. CVS courses are available to students working toward degrees in any of the regular departments of the University. Undergraduate students can participate in research and graduate courses with special approval.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

151. Sensation and Perception.

Introduction to the fundamental facts, methods, and theories about sensing stimulation, processing information, and perceiving objects in the environment. Psychophysical and physiological aspects of vision, audition, taste, smell, and the skin senses are included. Same as PSY 151. (Fall)

255. Sensory Systems. A large part of the brain is concerned with the analysis of information that impinges on the sense organs. This course deals with the operation of the sense organs—the principles of their operation and how their design balances many conflicting demands—and the subsequent analysis by higher centers of the signals sent by the sense organs. Prerequisite: CVS or PSY 151 or permission of the instructor. Same as PSY 255. (Spring)

256W. Perception with Laboratory.

Fundamental perceptual processes investigated through laboratory demonstrations and student-conducted experiments. Prerequisites: CVS or PSY 151 and statistics, or permission of the instructor. Same as PSY 256. (Spring)

318. Computers in Psychology. Programming, fundamentals, and experimental problems (e.g., timing, randomization, stimuli, response recording, data handling). Practical experience includes final project. Same as PSY 318. (Spring)

353. Human Factors. Use of the data, principles, and methods of human factors in the design of specific systems. Same as PSY 353. (Spring)

401. Introduction to Sensory Systems.

A survey of the functional properties and underlying physiological mechanisms of sensory systems and their general biological and psychological significance. Same as PSY 401.

403. Introduction to Computers in Psychology.

Programming, fundamentals, experimental problems (e.g., timing, randomization, stimuli, response recording, data handling). Practical experience includes final project. Same as PSY 403.

412. Mathematical Methods in Psychology.

This course examines mathematical/computational models of visual perception, decision making, learning, and movement control. The objective is to develop technical knowledge and skills needed to formulate, evaluate, and understand such models. Same as PSY 412. (Fall)

418. Real-Time Lab Computing.

Deals with the particular hardware required for real-time control of experiments, and the kinds of programs and programming languages, that permit the easiest control of experiments. Focuses on the C programming language. Same as PSY 418.

WOMEN'S STUDIES

444. Visual Development. A comprehensive overview of the development of the visual system: fundamental aspects of the anatomy and physiology of the developing visual system; oculomotor development; and the basic psychophysical aspects of visual development, including spatial vision, temporal vision, color vision, binocular vision, perceptual constancies, pictorial depth, and object perception. Same as PSY 444. (Spring)

445. Computational Problems in Vision. An advanced seminar on the union of computational work and human vision. Topics vary but typical examples include levels of representation, parallel and serial processing, object recognition, distributed versus local representations, vision with a moving observer, and attention. Same as PSY 445. (Spring)

446. Color Vision. The psychophysics and physiology of color vision, from the absorption spectra of the cone photopigments to high-level processes such as those that allow the extraction of object reflectances despite changes in the color of the illuminant. Same as PSY 446. (Fall)

447. Visual Space Perception. Discusses the sources of information that allow the visual system to construct a useful representation of visual space. Topics include stereopsis and other depth mechanisms, the stability of the visual world despite head and body movements, and the problem of maintaining consistent relations between the information provided by different sensory modalities. Same as PSY 447. (Spring)

449. Motion Perception. A detailed treatment of what is known about psychophysical, physiological, and computational aspects of the perception of motion. Same as PSY 449. (Fall)

492. Spatial Vision. The course explores the design of the human eye, revealing the optical and neural factors that limit vision in space, time, and wavelength. The course treats the information losses associated with the eye's optics, the photoreceptor mosaic, the optic nerve, and visual cortex. Same as OPT 448. (Spring)

Women's studies offers an interdisciplinary concentration leading to a bachelor's degree, supervised by the Academic Affairs Committee of the program. A minor in women's studies is also available.

STEERING AND ACADEMIC AFFAIRS COMMITTEE

Bette London, Ph.D. (California, Berkeley) *Associate Professor of English and Director, Susan B. Anthony Center for women's studies*

Mary Young, Ph.D. (Cornell)
Professor of History

Lynn Gordon, Ph.D. (Chicago)
Associate Professor and Associate Dean, Graduate School of Education and Human Development

Rosemary G. Feal, Ph.D. (SUNY, Buffalo) *Associate Professor of Spanish*

Grace Seiberling, Ph.D. (Yale)
Associate Professor of Art and Art History

Sharon Willis, Ph.D. (Cornell)
Associate Professor of French Literature

Anne B. Dalton, Ph.D. (California, Davis) *Susan B. Anthony Postdoctoral Fellow*

The field of women's studies is interdisciplinary in nature, drawing coherence from its subject matter. Using insights and methodologies of the natural and social sciences and the humanities, women's studies integrates the findings of individual disciplines. In so doing, it develops a perspective on women's experience not afforded by any single discipline. Women's studies is not a field that can be fragmented and still be effective because it depends on breadth of understanding and inquiry. Less narrow than traditional academic fields, women's studies facilitates an understanding not only of women but also the changing nature of psychological, economic, social, cultural, and political relationships between women and men.

In July of 1986 the University opened the Susan B. Anthony Center for women's studies to address curricular and scholarly issues important for understanding the role of women in contemporary society.

The Center is named to honor Susan B. Anthony, the nineteenth-century suffragist who led a campaign to have women admitted to the University of Rochester in 1900. The Center is intended to advance her goals and ideals and to preserve Anthony's rich historical connections with the city of Rochester.

In addition to the existing curricular programs and the creation of a Susan B. Anthony Chair, other programs include postdoctoral fellowships in women's studies, internships in the Rochester community, and public lecture series and conferences.

REQUIREMENTS FOR CONCENTRATION IN WOMEN'S STUDIES

The interdepartmental major in women's studies requires three core courses, WST 201, 202, and 203; either WST 392 or 395; WST 396; and a supplementary or allied field. The total number of courses required is 12; however, only eight are required in women's studies. The remaining four are in a *single* other University department.

1. WST 201. Rise of Modern Women.
2. WST 202. Women in Society: A Cross-Cultural/Contemporary Survey.
3. WST 203. Women's Studies: Issues and Methods.
4. through 6. Three core courses in women's studies from at least two different departments. Core courses are courses cross listed with a department and with the Women's Studies Program.
7. WST 392. Practicum in Women's Studies.

or

- WST 395. Independent Research.
8. WST 396. Seminar.
9. Courses from supplementary or allied field: Four courses must be taken in a single department. They must not be core courses in women's studies.

REQUIREMENTS FOR A MINOR IN WOMEN'S STUDIES

- Two of the following:
 - WST 201. Rise of Modern Women.
 - WST 202. Women in Society: A Cross-Cultural/Contemporary Survey.
 - WST 203. Women's Studies: Issues and Methods.
- Any three women's studies core courses (see above).

No more than two courses included in the student's major may be counted toward the minor.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

201. The Rise of Modern Women: Historical and Literary Perspective.

Examines the changing social, economic, and cultural roles of European, English, and American women in the period between the late seventeenth and early twentieth centuries. Organized chronologically, the course studies historical developments that involve or affect women, and literary texts written by or about them. Same as HIS 255.

202. Women in Society: A Cross-Cultural/Contemporary Survey. Examines contemporary conceptions of gender and the current social positions of women from a cross-cultural perspective. Same as ANT 235.

203. Women's Studies Issues and Methods. Provides an introduction to a general theoretical framework for feminist analysis and offers several methodological examples to explore and test through a thorough examination of a problem or problems of current urgency in both women's studies and women's daily lives.

392. Practicum in Women's Studies. Students design their own field project based upon an issue raised about the nature, status, or experience of women. The student is expected to use the material from core courses.

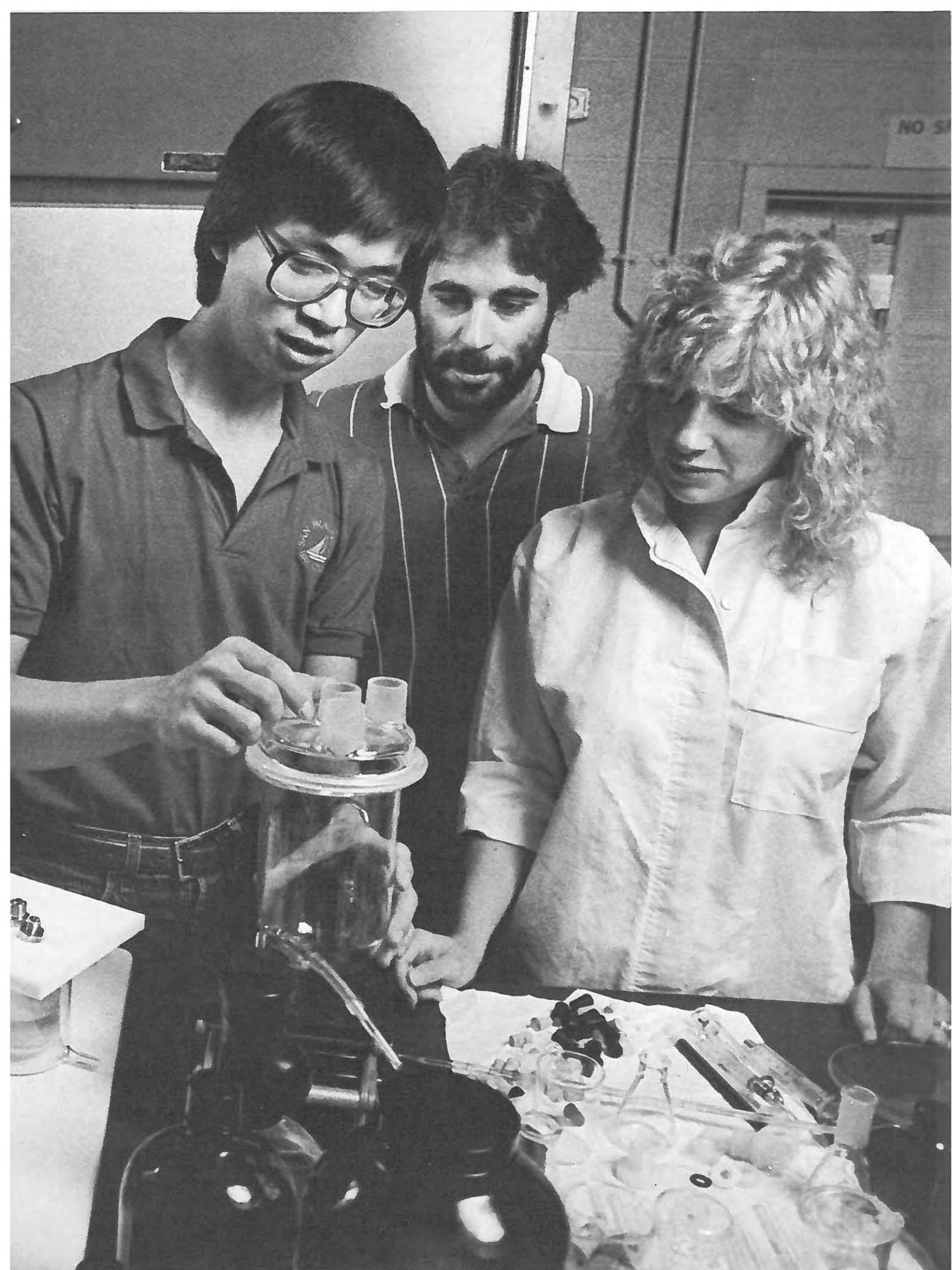
395. Independent Research. Students design their own research project based upon an issue raised about the nature, status, or experience of women. The student is expected to use the material from core courses.

396. Seminar in Women's Studies. Examines from a multidisciplinary perspective various themes in women's past and current experience, identifying those themes which are supported by data and those which are not.

In addition to these core courses, the following list gives a general indication of courses offered in women's studies:

- WST 207. Women as Image and Text.
- WST 209. The Psychology of Human Sexuality.
- WST 211. Women in Politics.
- WST 217. The American Family in a Changing Society.
- WST 222. Theories and Ethics of Reproductive Technology.
- WST 223. Psychology of Women.
- WST 227. African-American Women Writers.
- WST 237. Sociology of the Family.
- WST 247. Women and the Law.
- WST 250. Feminism and Film Theory.
- WST 251. Major Women Novelists.
- WST 258. Third World Women: Latin America.
- WST 260. Women in Theater: Contemporary Theater.
- WST 261. Women: A Unique Perspective.
- WST 263. Modern French Women Writers.
- WST 264. Women's Health and Aging.
- WST 267. Gender Difference and Social Behavior.
- WST 271. Anthropologies: Constructions of Masculinity in Literature and Theory.
- WST 280. Women and Film.
- WST 283. Women and History in Africa.
- WST 284. Women in the Bible.
- WST 285. Women in Utopian Thought.
- WST 289. Women in United States History.
- WST 295. Philosophical Foundations of Feminism.
- WST 347. History of Feminism.
- WST 396. Feminist Theory and Identity Politics: Intersections of Gender, Sexuality, and Race.
- WST 414. Gender, Language, and Education.

Further information is available from the Susan B. Anthony Center for Women's Studies, 538 Latimore Hall, University of Rochester, Rochester, New York 14627-0434.



College of *Engineering & Applied Science*

ADMINISTRATIVE OFFICERS

Bruce W. Arden, Ph.D. (Michigan)

Dean

William E. Kiker, Ph.D. (Tennessee)

Associate Dean

Richard C. Benson, Ph.D. (California,
Berkeley) *Associate Dean for*

Graduate Studies

Nicholas George, Ph.D. (California
Institute of Technology) *Associate*

Dean for Research

Robert L. McCrory, Jr., Ph.D. (M.I.T.)

*Director of Laboratory for Laser
Energetics*

Donna Lampen Smith, M.A. (N.Y.U.)

*Assistant Dean for Undergraduate
Affairs*

The College of Engineering and Applied Science offers degree programs leading to the bachelor of science, master of science, and doctor of philosophy degrees. Based on the fundamentals of science and engineering, the programs exist in and benefit from a strong liberal arts environment.

The undergraduate program provides education for a lifetime career, not simply training for a specific job. The program has two major objectives:

1. To prepare students for positions as practicing engineers and leaders in industry, government, education, and other areas of society.
2. To prepare students for graduate work leading to professions in medicine, law, and business as well as engineering, giving them an understanding of science and technology that will provide a firm foundation for their lifework.

The emphasis is on individual opportunity. Students are encouraged to participate in the many active research projects in the College, and flexibility in each program makes it possible to incorporate specialized course work. For instance, engineering students pursue elective work and undertake research projects in such fields as biomedical engineering, computer engineering, environmental studies, and materials science.

Students stating their intentions to be engineering concentrators are assigned faculty advisors in the College of Engineering and Applied Science in their freshman year, and they may and usually do begin taking engineering courses as early as the first semester.

Undergraduate students formally enter the College of Engineering and Applied Science at the junior level after two years of science, mathematics, and liberal arts electives. During this period of time the student will have completed the requisite freshman and sophomore courses as published in the *Official Bulletin: Undergraduate Studies* of his or her freshman year.

Normally, formal application to the College of Engineering and Applied Science is accomplished by the student's submission of a concentration approval form in the spring of the sophomore year. The form will contain an approved plan of study for the junior and senior years and will be based on the *Official Bulletin* current in the student's junior year.

The list of specific courses required to complete the degree is approved by the faculty and is available from faculty advisors. Students who submit approval forms later than the end of the sophomore year must make special arrangements with their faculty advisors so they will not be reclassified from their current status.

Four-year courses of study lead to the bachelor of science degree in chemical engineering, electrical engineering, geomechanics, mechanical engineering, optics, or an interdepartmental program in engineering and applied science. The bachelor of science degree programs in electrical, chemical, and mechanical engineering are accredited by the Accreditation Board for Engineering and Technology; seniors in these programs are eligible to take the "Fundamentals of Engineering Examination" and are encouraged to do so. This is the first of two examinations leading to professional licensure. See pages 166-188 for details about these programs.

REQUIREMENTS FOR THE DEGREE BACHELOR OF SCIENCE

In addition to the specific courses stipulated in the degree programs, students must satisfactorily complete the following:

1. Semester hour requirements: The Departments of Electrical Engineering and Optics require a minimum of 128 semester hours. For the Department of Mechanical Engineering, a minimum of 129 semester hours is required, while in the Department of Chemical Engineer-

ing, the minimum number of hours is either 130 or 132. Note: If MTH 141, 142, 143 are substituted for MTH 161, 162, students in all engineering programs except optics become responsible for four additional credits.

2. English: Entering students are advised by the Department of English in the selection of an appropriate course, normally ENG 103, 104, 107, 108, or 109. Students complete this requirement by the end of their freshman year.

3. Distribution requirements: Distribution requirements are an important and integral part of an engineering education, and should be carefully chosen with the help of faculty advisors. In completing distribution requirements, students in bachelor of science degree programs in chemical, electrical, mechanical engineering, or optics, or in programs in the geomechanics or interdepartmental areas, first elect to take two courses from the humanities and two from the social sciences. Then, depending on their major, an additional course or courses in either the humanities or social sciences must be taken to complete requirements. Specifically, the chemical and mechanical engineering programs require one additional course; programs in electrical engineering and in the interdepartmental, geomechanics, and optics programs require two additional courses. Another way of fulfilling distribution requirements is to declare a minor from the offerings within the humanities or social science areas (which still requires a total of five or six courses from these areas). In either option, at least one course *must* be above the introductory level.

Students should not in general elect social science or humanities courses that emphasize basic skills in mathematics or computer programming. Such courses may not fulfill distribution requirements.

Courses cross-listed with CSC 110, for example, are unacceptable.

a. *Humanities*: any English course *except* the course taken to satisfy the English degree requirement (see above). [Note: in chemical engineering, ENG 113–129 are not acceptable.] Any art and art history course; any foreign and comparative literature course; any music theory or music history course; any philosophy course; any religion course; any film studies course cross-listed in a humanities department. Foreign language courses beyond the introductory level (e.g., 102 and higher) are considered to be humanities courses. An introductory language course (e.g., 101) *not* followed by a higher level course in the same language cannot be included in the five- or six-course distribution requirement, but it may be included as a free elective. Although foreign language is not required for the bachelor of science degree programs in the College of Engineering and Applied Science, students are encouraged to consider course work in a foreign language, if schedules permit.

b. *Social Sciences*: any anthropology course; any economics course; any history course; any linguistics course; any political science course; any psychology course; any sociology course.

c. *Additional requirements*: After satisfying the first two social science and humanities requirements with courses in the subjects listed above, the remaining one or two required distribution courses *may* include music performance courses and film studies courses *not* cross-listed in humanities departments. Refer to individual department sections in this bulletin for further details.

Courses designated as CAS can be counted only as free electives. Policies regarding other elective courses are included in departmental curriculum descriptions.

NROTC students concentrating in engineering must take certain naval science courses in addition to the regular courses listed. A maximum of two NROTC courses (8 hours) may be used as free electives. Other NROTC courses must be taken as overloads.

4. Residency requirement: Students must be admitted to and registered in the College with an approved degree program for at least two semesters (not necessarily consecutive); during each of these two semesters, students must complete at least 12 hours of course credit at the University of Rochester.

5. Cumulative grade-point average: an average of at least 2.0 for all courses taken for credit at the University of Rochester, and an average of at least 2.0 in courses specified by the department or program of concentration.

6. Equipment fees: Once accepted into the College of Engineering and Applied Science, students become responsible for two years of equipment fees. See the section in this bulletin on "Financing an Education" for further details.

COMMON FIRST YEAR

Students intending to major in an engineering field take substantially the same courses during their freshman year. Students who come to the University interested in engineering but uncertain of the specific area are encouraged to consider themselves as interdepartmental program students initially while they explore different options with the help of engineering faculty advisors.

BACHELOR OF ARTS IN ENGINEERING SCIENCE

Another option for students, who are uncertain about their intended specialization or are interested in a broad introduction to several fields of engineering, is the B.A. (engineering science). This program (pending New York State approval) provides a strong, technological education for students considering ultimate careers in law, medicine, or business, or wishing to delay engineering specialization to the graduate level. The underlying science and mathematics requirements are similar to those needed for most science and engineering concentrations. The other distribution requirements, including foreign language, are the same as those prescribed for liberal arts degrees. As a result, the decision on a wide variety of possible concentrations can be made at the beginning of the junior year, later than the usual timing for prospective B.S. (engineering) students. (See page 187 for more details.)

MINORS

The College of Engineering and Applied Science recognizes all minors offered by the College of Arts and Science. The College of Engineering and Applied Science offers a minor in chemical engineering.

MANAGEMENT STUDIES

Students may pursue a Certificate in Management Studies through the College of Arts and Science. Further information on this program can be found on page 115.

"TAKE FIVE" PROGRAM

Students may extend undergraduate work beyond the normal four-year period to include additional courses in the liberal arts by applying to the "Take Five" Program; if accepted, there is no charge for tuition for the fifth year of study. They must apply at the end of



their sophomore year or the beginning of their junior year *after* they have been accepted into an area of concentration in the College of Engineering and Applied Science. Students wishing to follow such a program should consult their faculty advisors. Those participating in the "Take Five" Program will complete degree requirements at the end of the fifth year rather than in their senior year.

EXPANDED DEGREE PROGRAMS

Students interested in additional courses in the sciences may also extend undergraduate study over a five-year time span. The fifth year, however, will not be tuition free.

By properly choosing the electives in a five-year program, students can meet requirements for both the B.S. degree in the College of Engineering and Applied Science and a B.A. or B.S. degree in a chosen liberal arts or science concentration. These students essentially complete a program similar to a two-college program, but do so entirely at the University of Rochester. (See the 3-2 program described below.)

Students who wish to complete a bachelor's degree in engineering and a master of business administration may be able to combine an undergraduate engineering program with work in the William E. Simon Graduate School of Business Administration. This program may require that students take an overload or summer courses during the junior or senior year; students should also be aware that the Simon School operates on a quarter-system calendar.

THE 3-2 PROGRAM

The 3-2 program offers extensive education in the humanities, social sciences, and natural sciences in combination with professional education in engineering. In this five-year program the student attends a liberal arts college for three years and then transfers to the College of Engineering and Applied Science. Currently this program is available through The Institute of Optics and the Department of Chemical Engineering.

TWO-DEGREE PROGRAM

Students may earn two undergraduate degrees from the College of Engineering and Applied Science under the following conditions:

1. The interdepartmental program may not be one of the two degrees, unless approved by the Administrative Committee.
2. The time span involved must be greater than that normally required for one degree. Advanced placement and summer courses may be counted as the equivalent of time.
3. The student must have the written approval of his or her advisor and the department chairs concerned. A written request should include a list of the courses being submitted for each degree, noting those being counted for both degrees. The signatures of the department chairs indicate their agreement that the proposed two-degree program meets, in their judgment, the requirements of the New York State Education Department (Memo No. 4) and the University policy approved by the Cabinet of Deans (both are on file in the Office of the Dean, College of Engineering and Applied Science).

4. After approval by the department chairs, the request should be routed to the Administrative Committee of the College of Engineering and Applied Science for final approval.

ACADEMIC INFORMATION AND ADVISING

The Dean's Office in Dewey Hall assists students with course changes, summer school approval, preparation for graduate and professional study, independent study and special courses, and academic petitions. For specific regulations on these and other aspects of program planning, turn to the Academic Services and Information section of this bulletin (pages 205-212).

College of Engineering and Applied Science faculty advisors are assigned to each known prospective engineering student in the freshman year to provide information about different engineering fields and to help students plan and review course schedules and degree programs. The Dean's Office coordinates the advising process, and every attempt is made to match advisors with individual interests and needs.

All courses in the College are taught by full-time faculty members with professorial rank or by part-time faculty members with the rank of professor or lecturer. In courses that have more than 25 students, student teaching assistants may aid the professor in supervising laboratory sessions, running regularly scheduled problem sessions, or grading homework.

CHEMICAL ENGINEERING

- Martin Robert Feinberg, Ph.D.
(Princeton) *Professor of Chemical Engineering*
- John Royal Ferron, Ph.D. (Wisconsin)
Professor of Chemical Engineering
- John C. Friedly, Ph.D. (California, Berkeley) *Professor of Chemical Engineering*
- Jacob Jorne, Ph.D. (California, Berkeley)
Professor of Chemical Engineering
- Robert H. Notter, Ph.D. (Washington), M.D. (Rochester) *Professor of Pediatrics, of Biophysics, and of Chemical Engineering*
- *Harvey John Palmer, Ph.D. (Washington) *Professor of Chemical Engineering and Chair of the Department*
- Howard Saltsburg, Ph.D. (Boston)
Professor of Chemical Engineering
- Shaw-Hong Chen, Ph.D. (Minnesota)
Associate Professor of Chemical Engineering and Scientist, Laboratory for Laser Energetics
- Eldred H. Chimowitz, Ph.D.
(Connecticut) *Associate Professor of Chemical Engineering*
- Richard H. Heist, Ph.D. (Purdue)
Associate Professor of Chemical Engineering
- Samson A. Jenekhe, Ph.D. (Minnesota)
Associate Professor of Chemical Engineering
- Stratis V. Sotirchos, Ph.D. (Houston)
Associate Professor of Chemical Engineering
- J. H. David Wu, Ph.D. (M.I.T.)
Assistant Professor of Chemical Engineering and of Microbiology and Immunology
- Thor Olsen, Siv.Ing. (Technical University of Norway) *Instructor and Laboratory Supervisor*
- Richard Frederick Eisenberg, M.S.
(Rochester) *Professor Emeritus of Metallurgy.*
- Gouq-Jen Su, Sc.D. (M.I.T.) *Professor Emeritus of Chemical Engineering*

Chemical engineers apply the chemical and physical sciences to the solution of practical problems. They often work in the chemical industry supervising design and construction of new manufacturing units, seeing that these operate economically and efficiently, accumulating and analyzing scientific information needed for useful process designs, and taking part in the development and marketing of new products. They may also use their engineering backgrounds in a wide variety of other occupations. For example, chemical engineers may enter legal work, particularly in patent law; their special understanding of chemical and physical processes is invaluable for further training in medical or biomedical research. Some of our recent graduates work as environmental engineers, design biochemical processes, and develop new materials or processing methods for the microelectronics industry.

The versatility demanded of chemical engineers requires that their abilities to use the basic sciences be especially well developed. Moreover, because the solutions to society's problems frequently involve questions which transcend technical considerations and because our faculty is committed to a true university education for chemical engineering students, the curriculum is designed to include humanities and social sciences as well as the physical and biological sciences, mathematics, and engineering.

Courses in chemical engineering are coordinated with separate laboratory courses in the sophomore, junior, and senior years. The laboratory experiments are designed to test fundamental concepts learned in lectures, and to give students experience in problem definition and experiment design in a project format. All laboratories make extensive use of microcomputers for data acquisition and analysis, complementing their use for computation in all other courses. Students are required to demonstrate proficiency in computer languages during their program. FORTRAN is introduced during the second year for use on

*Licensed professional engineer.

the department microcomputers, as well as for more advanced computation and simulations.

For admission to the chemical engineering department the student is required to have a grade-point average of 2.15 in all chemistry and chemical engineering courses taken during the first four semesters. For graduation a student must earn a grade-point average of 2.0 in all chemical engineering courses in addition to having an overall average of 2.0.

A minor in chemical engineering is available and is especially useful for students interested in technical management or careers which involve the assessment of technology and society.

ADVISING

Each student is assisted by a faculty advisor in planning an individual program of study, especially in the choice of electives. Faculty advisors help students to make sure that programs satisfy minimum degree requirements and, in addition, the minimum professional accreditation requirements of the Accreditation Board for Engineering and Technology and of the American Institute of Chemical Engineers. Concentrators in chemical engineering are required to file current program forms with their advisor each semester demonstrating how their selection of courses will be used to meet department and accreditation requirements.

ELECTIVES

The program consists of the equivalent of 31 4-credit courses plus four 1- or 2-credit chemical engineering laboratories and an organic chemistry laboratory. Depending on which organic laboratory and which chemistry elective is chosen, the program will total 130 to 132 credit hours. Twelve courses in a four-year program are electives; a five-year enriched program includes an additional eight. Five electives are distribution courses which must include two humanities and two social science subjects (see page 164)

or an approved humanities or social science minor. ENG 113-129 do not count toward these distribution requirements in the chemical engineering program. One elective (or nine in an enriched program) may be used however the student wishes. Not all distribution electives can be at an introductory level.

The six remaining electives are chosen from technical courses in consultation with faculty advisors. These technical electives are subject to the following restrictions:

1. One course must be in applied mathematics.
2. One course must be in advanced chemistry to supplement the five required chemistry courses in the typical four-year program below. Any chemistry course beyond the required sequence is acceptable, except for CHM 219. In addition, chemistry-related courses in other departments, for example, BIO 150, GEO 248, or IND 401, are acceptable.
3. The four remaining technical courses must include a chemical engineering course of at least 2 credits that covers an application to new technologies. The balance must be chosen to satisfy minimum professional accreditation requirements regarding engineering science and design content. The department maintains a current list of acceptable chemical engineering electives and equivalent credit hours of content for each undergraduate engineering course.

Technical electives may be chosen to broaden the student's engineering background or to pursue an area of special personal interest in more depth. These courses are usually completed in the junior and senior year and normally do not include more than one course at the 100 level. Qualified undergraduates may also consider 400-level graduate courses, or personal research or design projects as technical electives. Students are urged to consult widely and select their technical electives carefully. Some opportunities for in-depth study include:

biotechnology—problems of common interest to biologists, biochemists, physicians, and engineers
polymers and plastics—their structure, properties, and manufacture
energy resources—fossil fuels, their production, chemical processing, and uses; other sources: nuclear fission and fusion, solar, hydroelectric, geothermal, etc.
systems and controls—the behavior of complex chemical processes and their on-line control
environmental engineering—engineering methods applied to community or ecological problems
surface chemistry and catalysis—unique properties of interfaces separating solids, liquids, and gases
computer applications—computer use in chemical processing systems.

TYPICAL FOUR-YEAR PROGRAM

First Year

| | |
|----------------------|----------------------|
| MTH 161 ¹ | MTH 162 ¹ |
| CHM 105 ² | CHM 106 ² |
| English | PHY 121 |
| CHE 92 | CHE 92 |
| Elective | Elective |

Second Year

| | |
|---------------------------|---|
| MTH 163 ¹ | Elective |
| CHM 205, 209 ² | CHM 206 ² , 210 ³ |
| CHE 113 | CHE 243, 116 |
| Elective | Elective |

Third Year

| | |
|--------------|--------------|
| CHE 244, 245 | CHE 231, 246 |
| CHE 225 | CHE 250, 94 |
| PHY 122 | Elective |
| Elective | Elective |

Fourth Year

| | |
|--------------|----------|
| CHE 272, 255 | Elective |
| CHE 273 | Elective |
| CHM 251 | Elective |
| Elective | CHE 274 |

¹ An alternative approved sequence is MTH 171, 172, 173 for those considered eligible by the Department of Mathematics. An acceptable alternative sequence to MTH 161, 162 is MTH 141, 142, 143 (but only 8 credits can be counted toward the degree requirements).

² This chemistry sequence is recommended for those considered eligible by the Department of Chemistry, but the alternative sequence of CHM 103, 104, 203, 204, 207 is also acceptable.

³ CHM 210 is an elective course which may be used in conjunction with CHM 209 to satisfy the advanced chemistry elective requirement.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

92. Introduction to Chemical Engineering. No credit. Group discussions of chemical engineering's current problems and relationship to the community. For entering students designating chemical engineering as their intended field of concentration.

94. Plant Visits. No credit. Visits to industrial plants that illustrate chemical engineering in practice, preceded by explanation and followed by discussion.

113. Chemical Process Analysis. Formulation and solution of chemical engineering problems involving physical and chemical changes and accompanying energy effects. Stoichiometric and compositional relationships, material and energy balances, materials properties, chemical processing systems. Prerequisites: CHM 103 (or CHM 105), MTH 143 or 162.

116. Fundamentals of Computing and Data Acquisition. Credit—2 hours. Introduction to techniques of computing and the use of the computer in laboratory data processing and real-time data acquisition. Instruction is based upon the use of microcomputers in an interactive environment. FORTRAN programming is introduced. Prerequisite: CHE 113.

225. Thermodynamics. Application of thermodynamics to chemical engineering problems. The thermodynamic potential is formalized from postulates and applied quantitatively to ideal and non-ideal systems. Complex equilibria involving multicomponent, multiphase, reacting systems.

231. Chemical Reactor Design. Review of chemical kinetics; methods of kinetic data collection, analysis, and interpretation; calculation of simple reactor designs. Emphasis is on homogeneous uncatalyzed reactions, but heterogeneous

and catalyzed reactions are considered. Prerequisites: MTH 163, CHE 113.

243. Fluid Dynamics. Basic principles of fluid flow, conservation of mass, momentum, laminar flow problems, dimensional analysis, macroscopic balances, and design of fluid flow systems. Prerequisites: PHY 121, MTH 163 (may be concurrent).

244. Heat and Mass Transfer. Continuation of CHE 243. Theory of energy and mass transfer with reference to diffusive and convective transport of material and energy in static and flowing systems. Prerequisite: CHE 243.

245. Junior Laboratory I. Credit—2 hours. Laboratory safety, treatment of data, FORTRAN programming and computing, required experiments involving physical property measurement, gas chromatography, and fluid mechanics. Group projects, preliminary experiment design, as well as written and oral reports, are required.

246. Junior Laboratory II. Credit—1 hour. Heat and mass transfer, chemical kinetics, and equilibrium thermodynamic measurements. Group projects, preliminary experiment design, as well as written and oral reports, are required.

250. Separation Processes. The theory of equilibrium stage and continuous separation of processes, with applications to such operations as distillation, absorption, extraction, and crystallization. Fixed-bed operations, such as gas adsorption and chromatography, and membrane processes are also considered.

252. Pollution and Water Environment. Types, sources, and effects of water pollutants and liquid wastes. Biological and chemical aspects; river and lake modeling; treatments; economics; legislation. Prerequisites: CHM 103, MTH 163, or permission of the instructor. No prior engineering study assumed.

253. Pollution and the Air Environment. Types, sources, and effects of air pollutants. Identification and measurement. Photochemical processes; aerosols; atmospheric and stack modeling; treatments; economics; legislation. Prerequisites: CHM 103, MTH 163, or permission of the instructor. No prior engineering study assumed.

254. Pollution: Industrial and Hazardous Wastes. Studies of characteristics of industrial and hazardous wastes and their effect on the environment. Principles of industrial and hazardous waste control, including biological, chemical, and physical treatment processes and sludge handling and disposal. Incineration, ocean dumping, and landfill of hazardous wastes. Transportation of hazardous wastes. Mutant microbial adaptation to toxic wastes.

255. Senior Laboratory I. Credit—1 hour. Experiments involving chemical process equipment: double effect evaporator, distillation column, gas absorber, and continuous stirred tank reactor. Exploratory experiments and preliminary experimental design, as well as written and oral final reports, are required.

256. Senior Laboratory II. Credit—1 to 4 hours. Design studies and independent projects. Some examples are chemical process systems, biochemical and biomedical applications, polymers and plastics, reactors and separators, environmental problems, energy usage, food technology, and on-line computer control.

272. Process Dynamics and Control. Introduction to modeling chemical engineering systems and studying their dynamic behavior. Analysis and design of feedback control systems. Introduction to the design of digital controllers. Prerequisite: CHE 113.

273. Chemical Engineering Process Design I. An intensive course for seniors involving the formulation and solution of entire chemical process flowsheets. Course covers fundamental material in thermodynamics, applied mathematics, computer programming and energy systems design. Concepts are illustrated with two major design projects. Prerequisites: CHE 231, 250, or permission of the instructor.

274. Chemical Process Design II. Continuation of CHE 273.

277. Energy Resources and Utilization. Emphasis on the chemical engineering aspects of various energy problems: combustion of fossil fuel for heat and work; coal gasification and liquefaction; nuclear

energy; solar energy; environmental and economic considerations.

278. Structure of Chemical Processing Industries. Quantitative presentation and analysis of the production of chemicals and related products by firms in the chemical process industries; the organization and use of resources of manpower, capital, plant and equipment, technology and innovation.

280. Materials Engineering and Mechanical Design. Evaluation and selection of materials for engineering design. Correlation of structure and properties, control of properties, fabrication methods, strength of materials and mechanical glasses, and ceramics.

282. Processing of Microelectronic Devices. An overview of processes used in the fabrication of microelectronic devices. The application of chemical engineering principles to the analysis, modelling, and processing of microelectronic devices. Topics include introduction to physics and technology of semiconductor devices, manufacturing of device grade silicon, microlithography, thermal processing, chemical vapor deposition, etching, and ion implantation.

286. Fundamentals of Polymeric Materials. This course features the science of synthetic macromolecules. Topics covered include polymerization reactions, characterization of polymers, and structure and properties of both crystalline and amorphous polymeric materials.

391. Reading Course. See approval procedures for Independent Study on page 207.

392. Special Topics. New technologies, special applications, and developments in chemical engineering and related areas for juniors and seniors; subjects vary from year to year.

393. Special Project, Essay, or Thesis.

395. Research Course. See approval procedures for Independent Study on page 207.

396. Chemical Engineering Projects. Credit—1 to 4 hours. Students pursue original problems related to chemical engineering. Projects may be experimental, theoretical, or computational. Prerequisite: permission of the instructor.

The following graduate-level courses are open to qualified undergraduates.

411. Applied Mathematics for Chemical Engineering I.

412. Applied Mathematics for Chemical Engineering II.

413. Numerical Methods for Chemical Engineering.

415. Chemical Reaction Networks.

421. Classical and Statistical Thermodynamics.

422. Phase Equilibria.

423. Applications of Statistical Mechanics.

424. Two-Dimensional Equilibrium Structures.

431. Analysis of Chemical Reactors.

432. Polymerization Reaction Engineering.

433. Mixing with Chemical Reactions.

441. Principles of Transport Phenomena.

443. Molecular Basis of Transport Phenomena.

447. Heat Transfer.

448. Mass Transfer in Chemically Reacting Systems.

449. Interphase Mass Transport.

451. Physical Chemistry of Interfaces.

452. The Kinetics of Phase Transitions.

453. Micelle Chemistry.

454. Interfacial Mechanics.

455. Gas-Solid Interactions.

458. Electrochemical Engineering.

465. Transport Phenomena in Biological Systems.

468. Industrial Microbiology.

469. Biochemical Engineering.

470. Advanced Unit Operations.

471. Process Dynamics I.

472. Process Dynamics II.

473. Computer-Aided Design.

474. Process Control.

475. Optimization.

480. Structure and Bonding of Solids.

481. Corrosion.

484. Polymer Surfaces and Adhesion.

485. Chemistry in the Defect Solid State.

486. Polymer Science.

487. Polymer Processing.

488. Polymer Morphology.

489. Polymer Blends and Composites.

ELECTRICAL ENGINEERING

Bruce Wesley Arden, Ph.D. (Michigan)
Professor of Electrical Engineering and of Computer Science and Dean, College of Engineering and Applied Science

Thomas Y. Hsiang, Ph.D. (California, Berkeley)
Professor of Electrical Engineering

Thomas Byron Jones, Jr., Ph.D. (M.I.T.)
Professor of Electrical Engineering

*Edwin Kinnen, Ph.D. (Purdue)
Professor of Electrical Engineering and Chair of the Department

Charles Wolcott Merriam, Sc.D. (M.I.T.)
Professor of Electrical Engineering

Sidney Shapiro, Ph.D. (Harvard)
Professor of Electrical Engineering

Edward Lawrence Titlebaum, Ph.D. (Cornell)
Professor of Electrical Engineering

*Robert Charles Waag, Ph.D. (Cornell)
Professor of Electrical Engineering and of Radiology

Alexander Albicki, Ph.D. (Institute of Telecommunications, Warsaw)
Associate Professor of Electrical Engineering

Mark Frederick Bocko, Ph.D. (Rochester)
Associate Professor of Electrical Engineering

Robert J. Bowman, Ph.D. (Utah)
Associate Professor of Electrical Engineering

Philippe Fauchet, Ph.D. (Stanford)
Associate Professor of Electrical Engineering and Scientist in Laser Energetics

Marc J. Feldman, Ph.D. (California, Berkeley)
Senior Scientist and Associate Professor of Electrical Engineering

Alan M. Kadin, Ph.D. (Harvard)
Associate Professor of Electrical Engineering

Kevin James Parker, Ph.D. (M.I.T.)
Associate Professor of Electrical Engineering and of Radiology; Director, Rochester Center for Biomedical Ultrasound

A. Murat Tekalp, Ph.D. (Rensselaer Polytechnic)
Associate Professor of Electrical Engineering



- Vassilios Dimitrios Tourassis, Ph.D.
(Carnegie Mellon) *Associate Professor of Electrical Engineering*
- Jack Grigsby Mottley, Ph.D. (Washington University) *Assistant Professor of Electrical Engineering*
- Michael J. Wengler, Ph.D. (California Institute of Technology) *Assistant Professor of Electrical Engineering*
- A. B. Bhattacharyya, Ph.D. (Banavas Hindu University) *Adjunct Professor of Electrical Engineering*
- Erich Carr Everbach, Ph.D. (Yale) *Adjunct Assistant Professor of Electrical Engineering*
- David T. Blackstock, Ph.D. (Harvard) *Visiting Professor of Electrical Engineering*
- Andrzej Krasniewski, Ph.D., D.S. (Warsaw University of Technology) *Visiting Associate Professor of Electrical Engineering*
- Roman Sobolewski, Ph.D. (Polish Academy of Sciences) *Visiting Scientist in Laser Energetics and Visiting Associate Professor of Electrical Engineering*
- *Victor Vincent Derefino, M.S. (Virginia) *Senior Lecturer in Electrical Engineering*
- Edwin Lorenz Carstensen, Ph.D. (Pennsylvania) *Yates Professor of Engineering Emeritus, Professor of Electrical Engineering Emeritus, and Senior Scientist of Electrical Engineering*
- Hugh Guthrie Flynn, Ph.D. (Harvard) *Senior Scientist and Professor Emeritus of Electrical Engineering*
- Gerald Howard Cohen, Ph.D. (Wisconsin) *Professor Emeritus of Electrical Engineering*
- Lloyd Philip Hunter, D.Sc. (Carnegie Institute of Technology) *Professor Emeritus of Electrical Engineering*

To carry out the task of putting electricity to work, electrical engineers need to understand the physical principles underlying electrical phenomena and the mathematical formulae used to describe the behavior of electrical systems. Furthermore, they need to learn and to

practice the principles of design and problem solving so that they can apply their knowledge efficiently and effectively. Finally, they need to keep themselves informed of new developments in science and technology in order to handle tomorrow's challenges.

UNDERGRADUATE PROGRAMS

The bachelor of science electrical engineering curriculum at the University of Rochester encourages students to pursue individual interests and goals with respect to both general education and professional training. The curriculum emphasizes fundamentals that prepare a student for lifelong learning to meet the career challenges presented by rapidly changing technologies.

Curricular flexibility in the fourth year permits specialization in traditional fields such as communications, systems and control, and electromagnetics, as well as in the newer field of VLSI systems, solid-state devices, computer engineering, and biomedical engineering. A premedical program is available for students interested in the combination of engineering and medicine. In addition, students interested in law or management may take preparatory courses in these subjects as electives. Study of related social, behavioral, and biological disciplines is also encouraged.

The curriculum is based on a set of lower- and upper-division core courses required of all students and emphasizing the application of mathematical and physical concepts to the solution of engineering problems. Many of the undergraduate courses include laboratory work intended to provide students with extensive design experience.

At the end of the second year, all students select an area of concentration which specifies a sequence of three upper-division courses and a senior design project. The senior design project is carried out under the supervision of an electrical engineering faculty member. Undergraduate students are also encouraged to participate in active research programs under the direction of University faculty by enrolling in special project courses (EE 396).

A distinctive feature of the curriculum is the removal of artificial boundaries between undergraduate and graduate courses. Basic graduate courses can be taken by undergraduates in addition to advanced undergraduate electives. This feature facilitates preparation for graduate study in electrical engineering or in related areas such as computer science.

STANDARD FOUR-YEAR PROGRAM

Below is the standard four-year, 128-credit-hour bachelor of science electrical engineering curriculum, showing the University requirements, electrical engineering core courses, and other departmental requirements. The order of completion of upper-division requirements is primarily in the hands of the student and his or her advisor, although attention must be given early in the program planning to prerequisites.

First Year

| | |
|----------------------|-------------------------|
| EE 171 or CSC | EE 172 |
| 181 | MTH 162 ¹ |
| MTH 161 ¹ | PHY 121 |
| CHM 103 or 105 | Elective (hum. or |
| ENG 103 or 104 | soc. sci.) ² |

*Licensed professional engineer.

Second Year

| | |
|--|--|
| EE 111 | EE 212 |
| MTH 163 ¹ | MTH 164 ¹ |
| PHY 122 | PHY 123 ³ |
| Elective (hum. or soc. sci.) ² | Elective (hum. or soc. sci.) ² |

Third and Fourth Years

| | |
|--------|--------|
| EE 223 | EE 224 |
| EE 231 | EE 232 |
| EE 241 | |

Plus the following:

- Three electrical engineering courses from an approved set³
- One electrical engineering senior design course³
- Three additional humanities or social science electives²
- One nonelectrical engineering science elective⁴
- Two or three free electives

ACCREDITATION

In making specific course selections, a student's program of study must satisfy not only the core requirements shown in the standard curriculum above but also certain minimum professional accreditation requirements established by the Accreditation Board for Engineering and Technology (ABET) and the Institute of Electrical and Electronics Engineers (IEEE). These are

| | |
|----------------------------------|-----------------------------|
| Humanities and Social Science | ½ year (16 credit hours) |
| Mathematics and Basic Science | 1 year (32 credit hours) |
| Engineering Science | 1 year (32 credit hours) |
| Engineering Design | ½ year (16 credit hours) |

¹ An alternative approved sequence is MTH 171, 172, 173, 174 for those considered eligible by the Department of Mathematics. Another acceptable alternative sequence to MTH 161, 162 is MTH 141, 142, 143. Note: When the MTH 141, 142, 143 sequence is taken, a total of 132 credit hours is required for the bachelor of science electrical engineering degree.

² Not all of these courses can be at the introductory level.

³ Refer to Appendix 5 of the *Curriculum guide for EE majors* for a list of the available EE concentrations.

⁴ Refer to Appendix 1 of the *Curriculum guide for EE majors* for a list of acceptable electives.

⁵ A second chemistry course, such as CHM 104 or 106, may be substituted for PHY 123.

Full details of the ABET/IEEE degree accreditation requirements are found in the *Curriculum guide for EE majors*.

ADMISSION

To be considered for admission to a concentration in electrical engineering, a student must have passed the four required freshman-sophomore courses, EE 171, 172, 111, and 212 with a minimum grade-point average of 2.3 in these courses. In addition, a minimum grade-point average of 2.0 must be achieved overall.

Note that at least three of these four required courses must be taken at the University of Rochester, except for students who have been admitted directly into the program via the transfer admissions process. Only the courses taken at Rochester are used in calculating the grade-point average.

Any student who wishes to major in electrical engineering is required to file a Concentration Approval Form together with a complete EE Program Planning Form approved by a faculty advisor during the fourth semester of study. For graduation, electrical engineering majors are required to achieve a cumulative grade-point average of at least 2.0 in the nine courses constituting the undergraduate core.

Pending faculty approval and beginning in 1992, all fourth-year students are required to take a 2-credit hour senior seminar during the fall semester. This course examines and discusses some of the ethical, social, economic, and safety considerations that arise in engineering practice.

COMPUTER ENGINEERING

Students who wish an ABET-accredited degree program that may include appreciable computer engineering should enroll in the electrical engineering degree program. Students may include at least nine computer courses in a program that satisfies all academic and professional accreditation requirements for the B.S. in electrical engineering. The first two years of a typical program are

identical to those shown above. In the junior and senior years, students would take courses in computer architecture and computer design.

Students who desire a more flexible program and who elect to forego an ABET-accredited degree may plan a degree program under the Interdepartmental Program (see page 186). The Department recommends that such students who plan computer engineering specializations include *at least one* sequence in computer hardware and one sequence in computer software. It is also recommended that such students seek the advice of the Department in planning their programs.

B.S.-M.S. PROGRAM IN ELECTRICAL ENGINEERING

Electrical engineering juniors contemplating graduate work should consider the special five-year program outlined below. Students are accepted into this program in the spring of their junior year and can begin master's level independent work in their senior year. At the end of the five-year program, both a B.S. and an M.S. in electrical engineering are awarded. Students may pursue either a Plan A (with thesis) or a Plan B (with a comprehensive examination) M.S. degree program.* The chief advantage of this program is that it provides a smooth transition into graduate study with no deficiency or discontinuity between undergraduate preparation and graduate work. Another advantage is the increased flexibility that the additional EE courses provide the student in satisfying accreditation and minimum curriculum requirements.

To be accepted, students must have a good academic record and must have completed the lower-division core courses and at least two of the upper-division core courses by the end of their junior years. Students admitted to the program may also compete with other M.S. candidates for financial aid in the fifth year.

* See the *Official Bulletin: Graduate Studies* for a description of the Plan A and Plan B M.S. degree options.

B.S.-M.S. PROGRAM EXAMPLE**Fourth Year**

| | |
|------------------------------|------------------------------|
| EE core course | EE core course |
| EE elective | EE elective |
| Technical elective | EE 495 (thesis) or |
| Elective (hum. or soc. sci.) | EE elective |
| | Elective (hum. or soc. sci.) |

Fifth Year

| | |
|---------------------------------|-----------------------------------|
| EE 495 or EE 400-level elective | EE 495 or EE 400-level elective |
| EE 410* | EE 406* |
| EE 400 level Elective | EE elective Technical elective |

Not less than six nor more than 12 hours of EE 495 may be used in the Plan A degree. For those students intending to pursue a Ph.D. degree at the University of Rochester, there is the additional requirement that, if the Plan A program is followed, the comprehensive examination must be taken in addition to the normal Plan A requirements.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

COMPUTERS AND COMPUTATION

171. Introduction to Computers and Programming. Algorithmic formulation of computing problems. Introduction to Pascal programming. Structured programming, introduction to data structures, data base management. Applications. No prerequisites.

172. Digital Circuits. Combinatorial switching circuit analysis and design. Synchronous and asynchronous systems. Flip-flops, counters, registers, and other MSI and LSI circuits and their applications. Laboratory. No prerequisites.

200. Computer Architecture. Machine-level phenomena. Comparative computer architecture. Concurrency, synchronization, Petri nets, supervisory control, virtual memories. Computer emulation, and meta assembly. Prerequisite: EE 171 or CSC 181.

201. Computer Organization. Registers, data paths, processors. Coding of binary data. Pipelining, memory interleaving, cache memories. Parallel processors, and interconnection networks. Laboratory. Prerequisites: EE 172, EE 200.

209. Computer Design Project. Organization and implementation of control and input/output units. Term design project performed in two-person teams. Prerequisites: EE 172, EE 200.

405. Data and Computer Communications. Data transmission and encoding. Frequency and time division multiplexing. High-speed networks, communication protocols, medium screen control. Network control and stability. Prerequisite: EE 242.

406. Computational Methods for Engineers. Computational methods for solving linear and nonlinear algebraic equations, ordinary and partial differential equations. Sparse matrix techniques, factoring polynomials, eigenvalue problems. Prerequisites: MTH 164 and a working knowledge of Pascal.

408. Switching Theory and Design. Analysis of sequential circuits in fundamental mode of operation and with multiple-input changes. Metastable operation of a flip-flop. Testing for digital circuits and systems. Prerequisites: EE 201 and permission of instructor.

492. Special Topics: Computer Networks. Network functions and protocol concepts. OSI reference model. Flow and congestion control. Queuing theory. Design issues. Prerequisites: EE 242 and permission of instructor.

SYSTEMS AND CONTROL

111. Circuits. Circuit analysis considering passive RLC elements, ideal and controlled sources. Network theorems, steady state and transient solutions.

Complex frequency, harmonic wave-form analysis. Two-port network descriptions. Laboratory. Prerequisites: concurrent registration in MTH 163 and PHY 122.

212. Systems. Systems descriptions with application to circuits. Network topology, vector/matrix formulation of equations, equivalent circuits and biasing. Fourier series and Fourier transforms, convolution. Laplace transform, transfer functions, multipoint networks, feedback. Laboratory. Prerequisites: EE 111, MTH 163, and concurrent registration in MTH 164.

213. Control Systems. Analysis and synthesis of linear feedback systems. Mathematical models of electromechanical systems, linearization of energy storage systems. Review of Laplace transform properties of linear systems. Transfer function algebra, flow graphs, stability, and design methods. Prerequisite: EE 212.

215. Integrated Circuit Systems. Characteristics and specifications of analog integrated circuits. Operational amplifiers, voltage regulators, signal generators, active filters, phase-locked loops, analog-to-digital converters, and digital-to-analog converters. Performance measures, error budgets, and parameter design trade-offs. Laboratory. Prerequisite: EE 224.

216. Microprocessors and Data Conversion. Characteristics and specifications of microcomputer components including microprocessors, memories, and interfacing devices. Additional topics covered are machine language programs, data conversion, and database configurations. Laboratory. Prerequisites: EE 172, 212.

275. Introduction to Robotic Systems. Principles of manipulation and sensing. Kinematic and dynamic modeling of mechanical manipulators. Robot planning, programming, and control. Sensor-based strategies and automatic reasoning. Robotic systems and applications. Prerequisite: EE 212 or permission of instructor.

* Required course for M.S. degree.

410. Mathematical Methods for Engineers. Analysis of both continuous and discrete linear systems using state space techniques. Controllability, observability, and stability of dynamical systems. Integral transforms. Prerequisite for undergraduates: permission of instructor.

SOLID STATE ELECTRONICS

220. Electronic Properties of Materials. Introduction to the solid-state physics governing modern electronic devices. Principles of quantum mechanics, free electrons, band theory, semiconductors, dielectrics, magnets, lasers, and superconductors. Prerequisites: PHY 123, MTH 164.

223. Solid State Electronics. Semiconductor transport properties. DC and AC characteristics of pn junction diodes, bipolar junction transistors, and MOS devices. Modeling of transistors and transient analyses. Laboratory. Prerequisites: PHY 123, MTH 164, EE 111.

224. Introduction to Electronic Circuits. Introduction to the analysis and design of analog integrated circuits. Semiconductor diode circuits. Amplification stages containing one transistor and multiple transistors. Small-signal analysis, bias design, time and frequency response of BJT and MOSFET circuits. IC amplifier design, circuit simulation models. Laboratory. Prerequisites: EE 212, 223.

225. Introduction to Analog Integrated Circuit Design. Analysis and design of analog integrated circuits. Semiconductor device models. Stage level design. Frequency response, feedback, stability analysis. Computer simulation. Laboratory. Prerequisite: EE 224.

261. Digital Integrated Circuit Design. Review of MOSFET theory, models, and fabrication processes. CMOS circuits, logic design, performance estimation, clocking schemes. Layout and design verification. Subsystem design, timing, testing. Design projects using design aids. Prerequisite: EE 224.



262. VLSI Design Project. Design of a functional block such as a multiplier, sequencer, or op amp. Function simulators and graphic editor written report. Completed designs are fabricated. Prerequisite: EE 261 or EE 225.

327. Solid State Electronics Laboratory. Laboratory course involving techniques of device fabrication related to solid-state electronics components. Data analysis, thin films, ion implantation, UV lithography, and wafer processing. This course may not be taken for credit more than once. Students interested in further laboratory projects may register under EE 396. Prerequisites: EE 223 and permission of instructor.

328. Solid State Device Design Project. This course is an alternative senior design course to EE 327 for the concentration in "Solid State Devices." To enroll, students must have prior approval from a faculty member for a design project proposal. Each student will work closely with the faculty member supervising the project. Progress reports, a written final report, and a final oral report on the project are required. Teams of two or three students may be appropriate for some projects.

420. Physics of Solid State Devices. Elements of solid state theory. Crystal lattices, lattice vibrations and phonons, energy band theory, semiconductor crystals, donor-acceptor statistics. Electron transport in semiconductors. Tunneling phenomena in solids. Prerequisite: EE 223.

422. Fabrication Principles in Solid State Electronics. Theoretical and practical aspects of fabrication technology. Wafer preparation, diffusion, oxidation, lithography, etching, film deposition, and epitaxy. Prerequisite: EE 223.

423. Modeling and Simulation of Integrated Circuit Processes. Analysis of computer models for integrated circuit process, device, and circuit simulation. Numerical methods for simulation. Application of standard CAD tools. Term project. Prerequisite: EE 224; EE 422 preferred.

425. Superconductivity and the Josephson Effect. Introduction to superconductivity, electron tunneling, and properties of barriers between superconductors. DC and AC Josephson effects. Prerequisites: EE 232, 220.

426. Superconducting Electronics. Superconducting Josephson junctions, tunnel diodes, transmission lines. Applications in amplifiers, millimeter wave detection, SQUID magnetometers, logic elements. Prerequisites: EE 232, 220.

461. VLSI Digital Systems I. CMOS circuits. Logic design and performance evaluation. Digital subsystem design. Clocking schemes. Testing principles. Design project using CAD VLSI tools. Prerequisites: EE 201, 224, or permission of instructor.

462. VLSI Digital Systems II. Design of VLSI chip that represents a digital/analog system. Extensive use of CAD VLSI tools for layout, verification, or function and testing of the system. Completed designs are fabricated and tested. Prerequisite: EE 461 or EE 225.

463. Analog Integrated Circuit Design. Design methods for analog integrated circuits. Analog macrocells, switched capacitor filters, monolithic filters, and precision analog-to-digital conversion. Device model parameter extraction. Computer-aided design methods. IC design project and paper review. Prerequisites: EE 225, 261, or permission of instructor.

464. Device Characterization of IC Design. Physical and analytical basis of semiconductor device behavior. Measurement protocols for device characterization. Design of test structures for integrated device parameter extraction. Extraction of parasitic circuit elements from physical layout. Prerequisites: EE 223, 224.

FIELDS AND WAVES

231. Fields. Fundamentals of electromagnetic field relations in various media. Boundary-value problems in electrostatics and magnetostatics. Time-varying fields and Maxwell's equations. Prerequisites: MTH 163, 164, PHY 122.

232. Waves. Wave phenomena. Plane electromagnetic waves, transient and steady state solutions of transmission line problems. Propagation and radiation of electromagnetic waves, wave guides, and antennas. Laboratory. Prerequisite: EE 231.

431. Microwaves. Generation, transmission, control, and detection of rf energy at microwave frequencies. Transmission of guided waves, impedance transformation and matching, cavities, couplers, and junctions. Prerequisite: EE 232 or permission of instructor.

433. Acoustic Waves. Acoustic wave motion, energy, and momentum. Transmission through infinite media and reflection from surfaces. Radiation from points, spheres and pistons. Plane waves in uniform flow, and scattering by turbulence. Prerequisite: EE 232.

436. Electromechanics of Particles. Description and development of models for the forces, torques, and electrohydrodynamics of particles, droplets, and bubbles in electric fields. Prerequisite: EE 232.

438. Heterogeneous Dielectrics. Heterogeneous dielectric and conductive media, Maxwell's and other formulae, the Wiener limits, granular materials. Maxwell-Wagner polarization and circuit representations for lossy heterogeneous dielectrics. Nonlinear models. Heterogeneity in magnetic and semi-conducting materials. Prerequisite: EE 232 (permission of instructor for undergraduates).

450. Bioelectric Phenomena. Passive and active dielectric properties of biological material, including macromolecular solutions, membranes, cells, and tissues. Physical and biological effects of electric fields, including diagnostic and therapeutic uses and biological hazards of electric fields and electromagnetic radiation. Effects of low frequency magnetic fields. Prerequisite: permission of instructor.

451. Biomedical Ultrasound. The physical basis for the use of high-frequency sound in medicine (diagnosis, therapy, and surgery) and biology. Acoustic properties of tissues, sound propagation in tissues, including linear processes, finite amplitude sound propagation and the development of shock waves, interactions of ultrasound with gas bodies leading to the phenomenon of acoustic cavitation, thermal and nonthermal biological effects of ultrasound, ultrasonography, dosimetry, radiation diathermy, thermal surgery, lithotripsy. Prerequisite: permission of instructor.

452. Medical Imaging—Theory and Implementation. Physics and implementation of X-ray, ultrasonic, and NMR imaging systems. Special attention is given to the Fourier transform relations and reconstruction algorithms of X-ray and ultrasonic-computed tomography, and MRI. Prerequisite: EE 242. Cross-listed with OPT 452.

453. Medical Imaging. Imaging methods in medicine, with emphasis on nuclear medicine, magnetic resonance imaging (MRI), endoscopic imaging, and electromagnetic imaging. Conventional x-ray, x-ray computerized tomography (CT), and ultrasound imaging. Generation, propagation, detection, and processing of physical probes used for each imaging modality. Review of linear systems theory. Cross-listed with OPT 453.

SIGNALS AND COMMUNICATIONS

241. Signals. Theory and practice of communication engineering. Functions of complex variables; Fourier analysis. Filtering and distortion of signals by linear networks. Sampling and multiplexing of signals. Modulation theory (continued in EE 242). Laboratory. Prerequisites: MTH 164 and EE 212.

242. Communications. Modulation and demodulation. Introduction to probability theory and stochastic processes. Statistical characterization of noise and communication channels. Performance of communication systems in the presence of noise. Laboratory. Prerequisite: EE 241.

349. Communications, Signals, and Systems Senior Design Project. This course is an alternative senior design course for the concentration in "Communications, Signals, and Systems." To enroll, students must have prior approval from a faculty member for a design project proposal. Each student will work closely with the faculty member supervising the project. Progress reports, a written final report, and a final oral report on the project are required. Teams of two or three students may be appropriate for some projects.

440. Communication Theory I. Introduction to statistical methods in communication engineering. Topics include: probability and statistics, random waveform descriptions, Gaussian random process, matched Weiner, and Kalman-Bucy filtering, and efficient signaling for message sequences. Prerequisite: EE 242 or permission of instructor.

441. Communication Theory II. Deterministic and random filter channel models. Performance and optimization of continuous amplitude and frequency modulation systems. Digital amplitude phase and frequency modulation. System performance and optimization. Coding, theorems, coding techniques, and transmitter-receiver implementation. Prerequisite: EE 440.

446. Digital Signal Processing. Review of discrete-time linear systems and random processes, Z-transforms, difference equations, and state-space formulations. Discrete Fourier analysis, circular convolutions, FFT algorithms, and optimum discrete-time filtering based on second-order statistical properties. Laboratory. Prerequisites: EE 242 and permission of instructor.

447. Digital Image Processing. Two-dimensional signals and systems sampling theory; two-dimensional filtering; image enhancement, estimation, restoration, reconstruction, and coding. Prerequisites: EE 242; recommended: EE 446.

MECHANICAL ENGINEERING

448. Pattern Recognition. Statistical methods in pattern recognition, Bayes decision theory, hypothesis testing, linear classifiers, parameter estimation; feature selection; parametric techniques and supervised learning; unsupervised learning and clustering techniques. Prerequisite: EE 440.

SPECIAL COURSES

391. Independent Reading.

392. Special Topics: Introduction to Opto-Electronics. Introduction to the fundamentals of optical electronics, principles, and techniques of the generation, modulation, transmission, amplification, and detection of light using solid-state devices. Prerequisites: EE 231 and 223, or equivalent.

392A. Senior Seminar. An examination and discussion of some of the ethical, social, economic, and safety considerations that arise in engineering practice. Required of all fourth-year electrical engineering students.

396. Special Projects.

477. Reduction and Analysis of Noisy Data. Develops the basic ideas of sampling, statistics inference, and deduction from noisy data. Properties of various distributions, testing of hypotheses, statistical inference, analysis of variance, regression analysis and curve fitting, and nonparametric statistics. Problems and examples are from areas of interest, such as biomedical ultrasonics and materials testing. Emphasis is on appropriate use of statistical measures in reporting and drawing conclusions from data. Prerequisite: MTH 162.

492. Special Topics: Noise and Receivers. Detection of weak signals in presence of random noise. Optimum filtering. Low-noise radiation detectors with superconducting tunnel junction mixers and parametric amplifiers. Squeezed noise. Nonreciprocal transducers. Quantum noise limits of signal detection. Prerequisites: EE 241, 420.

*Richard C. Benson, Ph.D. (California, Berkeley) *Professor of Mechanical Engineering and Associate Dean for Graduate Studies*

*Stephen J. Burns, Ph.D. (Cornell) *Professor of Mechanical Engineering and of Materials Science*

*Alfred Clark, Jr., Ph.D. (M.I.T.) *Professor of Mechanical Engineering*

*Roger F. Gans, Ph.D. (California, Los Angeles) *Professor of Mechanical Engineering and Chair of the Department*

James C. M. Li, Ph.D. (Washington) *Professor of Mechanical Engineering and of Materials Science; Hopeman Professor of Engineering; Senior Scientist in Laser Energetics*

Robert L. McCrory, Jr., Ph.D. (M.I.T.) *Director of Laboratory for Laser Energetics; Senior Scientist, Laboratory for Laser Energetics; and Professor of Mechanical Engineering*

*David J. Quesnel, Ph.D. (Northwestern) *Professor of Mechanical Engineering and of Materials Science*

*Albert Simon, Ph.D. (Rochester) *Professor of Mechanical Engineering and of Physics and Senior Scientist in Laser Energetics*

*John H. Thomas, Ph.D. (Purdue) *Professor of Mechanical and Aerospace Sciences and of Astronomy and University Dean of Graduate Studies*

Paul D. Funkenbusch, Ph.D. (Michigan Tech.) *Associate Professor of Mechanical Engineering and of Materials Science*

Sheryl M. Gracewski, Ph.D. (California, Berkeley) *Associate Professor of Mechanical Engineering and Scientist in Laser Energetics*

John Lambropoulos, Ph.D. (Harvard) *Associate Professor of Mechanical Engineering and of Materials Science and Scientist in Laser Energetics*

Renato Perucchio, Ph.D. (Cornell) *Associate Professor of Mechanical Engineering*

Larry A. Taber, Ph.D. (Stanford) *Associate Professor of Mechanical Engineering and of Pediatrics*

Richard E. Waugh, Ph.D. (Duke) *Associate Professor of Biophysics and of Mechanical Engineering*

Robert S. Frank, Ph.D. (Duke) *Assistant Professor of Mechanical Engineering*

Colin J. McKinstrie, Ph.D. (Rochester) *Assistant Professor of Mechanical Engineering and Scientist in Laser Energetics*

David D. Meyerhofer, Ph.D. (Princeton) *Assistant Professor of Mechanical Engineering and Scientist in Laser Energetics*

*†Victor L. Genberg, Ph.D. (Case Western Reserve) *Adjunct Associate Professor of Mechanical Engineering*

†Isai C. Soong, Ph.D. (Stanford) *Senior Lecturer in Mechanical Engineering*

†Thomas Blanton, M.S. (R.I.T.) *Associate Lecturer in Mechanical Engineering*

†Craig Ronald, B.S. (Rochester) *Associate Lecturer in Mechanical Engineering*

†Maurino P. Bautista, Ph.D. (Purdue) *Lecturer in Mechanical Engineering*

†George W. Daniels, M.E.E. (Delaware) *Lecturer in Mechanical Engineering*

Catherine Funk, Ph.D. (Rochester) *Lecturer in Mechanical Engineering*

†Arthur M. Gooray, Ph.D. (Howard) *Lecturer in Mechanical Engineering*

†Mool C. Gupta, Ph.D. (Washington State) *Lecturer in Mechanical Engineering*

†Mukhles Rahman, Ph.D. (Wisconsin) *Lecturer in Mechanical Engineering*

†Francesco Zirilli, Ph.D. (Clarkson) *Lecturer in Mechanical Engineering*

Leonard M. Goldman, Ph.D. (Rochester) *Senior Faculty Associate*

*Martin Lessen, Sc.D. (M.I.T.) *Yates Memorial Professor Emeritus of Engineering*

The Department of Mechanical Engineering offers an undergraduate program leading to the degree of bachelor of science in mechanical engineering and a program leading to the degree of bachelor of science in geomechanics. The program in geomechanics is described on page 185.

* Licensed professional engineer.

† Part-time.

PROGRAM IN MECHANICAL ENGINEERING

Mechanical engineers are in many ways the most versatile, flexible, and broadly based engineers in the profession. Their activities can range over such fields as energy, mechanics, manufacturing, design, transportation, materials, heat, fluids, hypersonic gases, and plasma.

The University of Rochester has offered an undergraduate degree in mechanical engineering for over 70 years. This program provides a particularly good background for graduate study in engineering and other fields, as well as effective preparation for students who enter industry immediately upon graduation. The Department strives to develop competent, creative, responsible engineers capable of assuming leadership roles in their profession.

The curriculum provides a balance of courses in the humanities and social sciences, physics, applied mathematics, and basic engineering. Emphasis is placed on the underlying fundamentals in the required engineering course work, enabling graduates to adapt throughout their careers to rapid advances in science and technology. Training in the design process gradually supplements the analytical content of the courses as the undergraduate progresses. A required senior year sequence in design acts as a capstone course in this process. Formal oral and written presentation of each team's final design is a key element of this course.

Many undergraduates in the Department assist faculty members in research projects during the academic year and the summer. This work can lead to publication in the professional archival literature. It is encouraged for those students so inclined. Recent projects involving undergraduates include experiments in controlled nuclear fusion using high-powered lasers, use of the electron microscope and testing machines to study engineering materials, studies in human microcirculation, experimental research in fluid layer buckling, and experiments on rough-surfaced air film bearings and nonlinear dynamics.

CURRICULUM

The B.S. degree requires 129* credit hours, divided among science, mathematics, engineering, humanities, and social sciences. The required engineering courses are shown below in the four-year degree program in mechanical engineering. There is an introductory course in engineering graphics; a sequence in mechanics, ME 120, 121, 226, 213; a sequence in energy and fluids, ME 123, 223, 225, 241, 251; a materials course, ME 280; and a laboratory in materials and solids, ME 242. Computational skills are absolutely necessary for modern engineering, we require a two-course sequence in computation: an introductory course in programming and data structures (EE 171 meets this requirement) and a junior-level course in modern numerical methods, ME 211. All these are capped by the senior design sequence, ME 204, 205. Students are required to take an introductory course in circuits. Either EE 172 or EE 111 will meet this requirement.**

For admission to the mechanical engineering program, the student must have completed the first two years as listed in the four-year degree program below. In addition, the student must have attained a grade-point average of 2.0 or better in all mechanical engineering courses taken, and an overall grade-point average of 2.0 or better.

For graduation, concentrators in the Department must obtain a cumulative average of 2.0 or higher for all required mechanical engineering courses.

Students are encouraged to join and be active in the student chapter of ASME, the professional society for mechanical engineers. In addition, seniors are encouraged to take Part A of the New York State Professional Engineering License examination.

*133 credit hours for those electing MTH 141-143.

**At the time of writing (January, 1991) it is likely that the Department of Electrical Engineering will offer an additional circuits course designed for mechanical engineers.

ELECTIVES

There are two free electives in the program, in addition to the five required distribution electives in the humanities and social sciences described below. These may be used to make it easier to minor in an approved field in the humanities or social sciences, acquire a language, take graduate courses in engineering, acquire some business/management skills, or generally broaden the undergraduate experience.

DISTRIBUTION REQUIREMENTS

There are five required courses, not all of which may be at an introductory level. Of these, at least two must be in the humanities and at least two in the social sciences. The remaining course may be a humanities course, a social science course, or any course in the William E. Simon Graduate School of Business Administration with one of the following designations: BSI, AEC, or LAW. Alternatively, students may complete an approved humanities or social science minor.

ACCREDITATION

Each student is assisted by a faculty advisor in planning a program of study. In making specific course selections, each student is required to satisfy not only the course requirements given below, but also the minimum professional accreditation requirements of the Accreditation Board for Engineering and Technology. Faculty advisors should be consulted to be sure that all such requirements are met.

FOUR-YEAR PROGRAM IN MECHANICAL ENGINEERING

First Year

| | |
|------------------------|----------------------|
| MTH 161 ¹ | MTH 162 ¹ |
| CHM 105/103 | PHY 121 |
| Elementary | ME 120 |
| computing ² | Distribution |
| | elective |
| | ME 110 |

¹The alternative sequence MTH 141, 142, 143 may be taken instead of 161, 162. Students electing this option will need 133 credit hours to graduate.

²EE 171 will satisfy the requirement.

³See page 176 for course options.

Second Year

| | |
|--------------------------|-----------------------|
| MTH 163 | MTH 164 |
| PHY 122 | PHY 123 |
| ME 121 | ME 123 |
| Distribution elective | Circuits ³ |

Third Year

| | |
|--------------------------|--------------------------|
| ME 280 | ME 226 |
| ME 225 | ME 241 |
| ME 211 | ME 223 |
| Distribution elective | Distribution elective |

Fourth Year

| | |
|--------------------------|---------------|
| ME 204 | ME 205 |
| ME 242 | ME 213 |
| ME 251 | Free elective |
| Distribution elective | Free elective |

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

110. Engineering Graphics. Credit—1 hour. Elements of descriptive geometry. Orthographic projections and drawing. Dimensioning and tolerancing. Manufacturing principles and techniques. Assembly drawings. Computer-aided design.

120. Engineering Mechanics I: Statics. Vector algebra of forces and moments. Free body diagrams and equilibria of particles and rigid bodies. Centroids and centers of gravity. Internal forces in trusses, frames, machines, and beams. Friction and applications to machines. Moments of inertia and the principle of virtual work for rigid bodies. Prerequisite: MTH 161.

121. Engineering Mechanics II. Kinematics and dynamics of particles and rigid bodies. Forces and accelerations. Energy and momentum methods. Introduction to vibrations. Prerequisite: ME 120.

123. Thermodynamics. Some concepts and definitions. Properties of a pure substance. Work and heat. First law and second law of thermodynamics. Entropy. Irreversibility and availability. Some power and refrigeration cycles. Thermodynamic relations. Prerequisites: MTH 162; PHY 113 or 121.

201. Boundary-Value Problems. An introduction to mathematical techniques for solving boundary-value problems with an emphasis on physical understanding. Orthogonal functions and Sturm-Liouville theory, with emphasis on Fourier series and Bessel functions. Solution of partial differential equations of mathematical physics by separation of variables. Fourier transform methods and numerical methods. Application to problems in string vibrations, fluid flow, elasticity, heat conduction, electromagnetic theory, and acoustics. Prerequisites: MTH 163, 164.

202. Engineering Analysis: Applied Complex Variables. Complex numbers, analytic functions, singularities, and branch cuts. Complex differentiation and integration, residues and poles, series expansion. Geometry of analytic functions, conformal mapping, potential theory, vibration problems. Equivalent to MTH 282. Prerequisites: MTH 163, 164.

203. Kinematics of Machinery. Geometrical kinematics. Elementary properties of plane motion with applications to linkages, cams, and gears. Analytical kinematics. Generalized coordinates, constraint equations, position and kinematic analysis of mechanisms. Numerical methods. Analytical dynamics of machines. Generalized forces, virtual work. Applications to reciprocating engines. Mechanism design project. Prerequisites: ME 120, 121.

204. Mechanical Design. The theory and application of structural mechanics to mechanical design. Topics include matrix structural analysis and finite element techniques. Students will use the NASTRAN finite element program to solve a variety of design and analysis problems. The term project consists of a team competition to design, analyze,

build, and test a lightweight structure. Prerequisites: ME 226 (ME 211 recommended).

205. Advanced Mechanical Design. This course follows ME 204 in the study of mechanical components and analysis models. There is an emphasis throughout on the use of the computer to obtain solutions and to achieve optimization. There is a semester-long team design project. Historically, design topics have been drawn from local industry and superior student designs have been built by the corporate sponsors. Prerequisite: ME 204.

211. Computational Methods in Mechanical Engineering. Introduction to FORTRAN; root finding; curve fitting; numerical differentiation; numerical integration; numerical solution of ordinary differential equations; solution of linear equations; matrix eigenvalue problems; simulation. Prerequisites: MTH 163, 164.

213. Mechanical Systems. Free and forced vibration in one, two, and many degrees-of-freedom systems. Complex representation, damping, matrix methods, applications. Continuous systems; string and beam vibration. Prerequisites: ME 121, 226; MTH 163, 164.

223. Heat Transfer. Modes of heat transfer; application of practical heat transfer devices. Engineering analysis of heat exchanger elements and design of heat exchangers. Team design project requiring synthesis of analytical and empirical elements. Prerequisites: ME 123, 225.

224. Advanced Heat Transfer. This course is a continuation of ME 223, but concentrates primarily on convective heat transfer. Topics to be covered include momentum and heat transfer over external and internal surfaces for laminar and turbulent flows. Prerequisite: ME 223.

225. Introduction to Fluid Dynamics. Dimensional analysis, kinematics, Bernoulli's theorem, potential flow, vorticity, viscous flow, boundary layers, instability and turbulence, one-dimensional compressible flow, shock waves. Prerequisites: MTH 163, 164; ME 120, 123.



226. Introduction to Solid Mechanics. Loads and displacements, stress and strain in solid medium. Laws of elasticity. Mechanical properties of materials. Thermal stresses. Axial loading. Pressure vessels. Plane stress and plane strain. Torsion and bending of beams. Energy methods. Buckling. Prerequisites: ME 120, 225.

227. Applied Fluid Dynamics. Selected topics in fluid dynamics as applied in engineering practice. Topics include pipe flow, pipe networks, open-channel flow, flow in turbines and pumps, low-speed aerodynamics, drag reduction, and hydrodynamic lubrication. Assignments include design of fluid components and systems. Individual design projects. Prerequisite: ME 225.

241. Fluid Dynamics Laboratory. Introductory lectures on lab practice and data analysis. The first part of the lab uses simple experiments to familiarize the student with different instruments used in fluid dynamics, heat transfer, and heat power. In the second part, students (working in groups of three) perform experiments designed by them. Reports will be given orally in seminars. Prerequisite: ME 225.

242. Materials and Solids Laboratory. Six short projects emphasizing the mechanical behavior of solids such as tensile, impact, and bending properties; strain gages; IVDT; and vibrations, and the instrumentation used to examine it. One independent team project is required. Prerequisites: ME 121, 226, 280.

251. Heat Power Applications. Power cycles, engines, compressors and turbines, refrigeration cycles, air conditioning, direct energy conversion, energy storage, and combustion. A design project is included. Prerequisites: ME 123, 225 (may be taken concurrently).

252. Modern Energy Conversion. Conversion of chemical and nuclear energy into mechanical and electrical energy. Energy sources and their projected use. Conventional electric power generation, thermoelectric and thermionic systems and fuel cells, fission, controlled fusion, and magnetohydrodynamic power generation. Design project. Prerequisite: ME 123.

253. Nuclear Engineering. Nuclear structure, nuclear reactions, fission, nuclear power plants, neutron diffusion, reactor theory, reactor kinetics. Team design project. Prerequisites: PHY 123, ME 123.

280. Introduction to Materials Science. A study of the relationship between the microstructure (atomic arrangements, crystal structure, defect distribution, phase composition) of engineering materials and their physical properties. Prerequisites: MTH 161, 162.

281. Mechanical Properties of Materials. Elastic behavior, plastic behavior, single crystals, critical resolved shear stress, macroscopic yield, mechanical twinning, ductility, mechanical properties in tension, compression, work hardening, effect of temperature and rate of deformation, fatigue, creep, hardness, fracture.

390. Supervised Teaching.

391. Independent Reading.

392. Special Topics Seminar.

393. Special Essay or Thesis.

394. Internship.

395. Independent Research.

401. Methods of Applied Mathematics. Advanced ordinary differential equations (ODEs), second-order linear ODEs in the complex domain, systems of linear ODEs. Nonlinear ODEs, phase plane methods, critical points, stability, Liapunov methods, limit cycles. Per-

turbation methods, singular perturbations, asymptotic expansions, asymptotic evaluation of integrals. Prerequisites: ME 201 or MTH 281; MTH 282.

402. Partial Differential Equations. Study and classification of partial differential equations as elliptic, parabolic, and hyperbolic, with physical consequences. Laplace and Poisson equations. Waves and characteristics. Green's functions and eigenfunction expansions. Integral equations and transform methods. Applications of various problems in fluid mechanics and structural mechanics. Prerequisites: ME 201; MTH 282.

403. Computational Methods for Engineering and Science. Computational solutions to coupled nonlinear partial differential equations arising in engineering and physics. Emphasis on current problems and techniques. Some Fortran experience desirable. Prerequisite: ME 402 or PHY 401 or OPT 411 or consent of instructor.

404. Perturbation and Asymptotic Analysis. Dimensional analysis; asymptotic expansions; asymptotic techniques applied to integrals and solutions to ordinary and partial differential equations; regular and singular perturbation; boundary layer theory; turning point analysis and WKB theory; geometrical optics; applications to fluid mechanics and wave propagation. Prerequisites: ME 401 and MTH 282.

406. Dynamical Systems. Lagrangian dynamics, variational principles, Hamiltonian formulation of dynamics. Nonlinear oscillations, perturbation methods, stability, bifurcations, strange attractors, chaos. Prerequisites: MTH 163, 164; ME 121, 213 (can be taken concurrently).

408. Phase Transformations. The physical, chemical, and mechanical properties of metals and alloys can be varied drastically by thermal and mechanical treatments. This course is concerned with an atomic level description of these transformations, including the importance of crystallography, kinetics, and structural defects. Prerequisite: ME 460.

- 409. Introduction to Magnetic Materials.** Definitions and units, basic laws of the magnetostatic theory, magnetism in matter, soft magnet, permanent magnet, magnetic circuits, and devices. Magnetic field: generation and measurement, memory applications.
- 411. Mechanical Properties of Polymers.** Structure of polymers, elastic behavior, finite strain elasticity, viscoelastic behavior of polymers, time-temperature superposition, free volume theory, relaxation processes, nonlinear and anisotropic behavior, dislocations and disclinations, yielding and fracture. Prerequisite: consent of the instructor.
- 416. Rheology with Application to Polymers.** Basics of rheology: stress, strain, constitutive equations. Phenomenological description of different types of rheological behavior. Molecular theories of viscosity, viscosity of suspensions. Application to polymers: structure of polymers, infinitesimal and finite strain elasticity, viscoelastic behavior, time-temperature superposition, nonlinear and anisotropic behavior, dislocations and disclinations, yielding and fracture.
- 421. Physical Rheology.** General relations between stress and strain and their time derivatives. Phenomenological description of different types of rheological behavior. Molecular theories of viscosity, viscosity of suspensions, thixotropy, viscoelasticity, and rubber elasticity. Prerequisite: consent of the instructor.
- 428. Geophysical Fluid Dynamics.** Fluid motions in oceans and atmospheres. Static structure; Boussinesq approximation; internal gravity waves; waves in a compressible, stratified fluid; geostrophic flow; inertial waves; Ekman layers; Rossby waves; convection. Prerequisites: ME 225, MTH 281 (or equivalent).
- 434. Introduction to Plasma Physics I.** Single-particle orbit theory and adiabatic invariants. Fundamental plasma properties. The two-fluid equations and small-amplitude waves in plasmas. The Vlasov, double-adiabatic, and MHD equations. Prerequisite: EE 231 or PHY 217 or equivalent.
- 435. Introduction to Plasma Physics II.** Vlasov equation, Landau damping. VanKampen modes, shield clouds, two-stream instability, micro-instabilities, drift instability, nonlinear instability theory, radiation from plasmas. Prerequisite: ME 434.
- 436. Compressible Flow.** Acoustics, one-dimensional steady flow, shock waves, one-dimensional unsteady flow and the theory of characteristics, steady supersonic flow, radiative transfer in gases. Prerequisites: ME 225, MTH 281 (or equivalent).
- 437. Viscous Flow.** Viscous flow; exact solutions, small and large Reynolds number approximations, asymptotics, singular perturbation theory, examples of current interest. Prerequisites: ME 225, MTH 281 (or equivalent).
- 440. Mechanics of Structures.** Tension, compression, and shear stress; equilibrium; deformation; beams; plates and torsion; combined loading and multiaxial stresses in frames; transfer matrices and state vectors; variational and strain energy methods; mechanical and elastic stability; viscoelastic behavior. Prerequisite: ME 226.
- 441. Finite Elements.** The theory and application of finite element analysis in structural mechanics and other disciplines. Topics: matrix analysis concepts; element formulation methods; element behavior and geometry; global analysis aspects; isoparametric elements; elements for C; continuity problems; boundary element analysis. Term project requires the implementation of a finite element program.
- 442. Introduction to Dislocation Plasticity.** Some elementary concepts in the physics of plasticity, imperfect crystals, and point, line, and surface defects. Burgers circuit and vector, Frank-Read source, partial and super dislocations, force on a dislocation, dislocation mobility, and plastic deformation. Prerequisites: ME 226, 280.
- 443. Applied Vibrations Analysis.** Vibrations of discrete and continuous, damped and undamped dynamical systems. Free vibration and response to harmonic and arbitrary time-dependent loads. Energy methods. Solutions of matrix equations and partial differential equations. Eigenvalues, eigenfunctions, and orthogonality. Prerequisite: ME 213 or an introductory course on vibrations, or consent of the instructor.
- 444. Continuum Mechanics.** The mechanics of continuous media. Applied tensor analysis. Study of stress and strain. Constitutive laws for solids and fluids. Balance of mass, momentum, angular momentum and energy. Entropy production. Application to boundary value problems. Prerequisites: MTH 164; ME 201, 225, 226.
- 445. Plates and Shells.** Analysis of stress and deformation in rectangular and circular plates bent by transverse loads. Axisymmetric deformation of shells of revolution. Asymptotic expansions; membrane and bending stress. Application to pressure vessels, tanks, and domes with various support and load conditions. Prerequisites: ME 226; ME 201 or MTH 281.
- 446. Wave Propagation in Elastic Media.** Physical phenomena (reflection, dispersion) and mathematical techniques (Green's functions, Fourier analysis, stationary phase) are studied for waves on strings. Concepts are then used to study waves in infinite, semi-infinite and layered structures, and waves in layers and cylinders. Prerequisites: ME 121, 226, MTH 281 (or equivalent).
- 447. Mechanics of Composite Materials.** Physical and mechanical properties of fiber reinforced and laminated engineering materials. Micro- and macro-mechanics, lamination theory, physical and mechanical response under static and dynamic loading and engineering applications. Prerequisite: ME 226.
- 448. Structural Stability.** Concepts of equilibrium and stability of deformable solid structures. Applications to elastic columns, plates, and shells. Interactions with fluids. Static and dynamic systems. Prerequisite: ME 226. Strongly recommended: MTH 281, 282 (or equivalent).
- 449. Theory of Elasticity.** Analysis of stress and strain; equilibrium; compatibility; stress-strain relations. Torsion and bending of bars. Plane stress and plane strain; stress functions. Prerequisites: ME 226; MTH 163 (or equivalent).

450. Optimum Design. Nonlinear programming techniques are applied to optimize the mechanical design problem. Both constrained and unconstrained techniques are discussed. Student projects include writing a general purpose optimization program to obtain minimum weight structures. Prerequisite: ME 226 and some programming experience.

451. Crystallography and X-Ray Diffraction. Crystallography, symmetry elements, space groups, X-ray diffraction, single crystal diffraction, powder patterns, Fourier transforms, Patterson functions, grain size effects, residual stress and cold work, diffuse and small angle scattering, Bragg and Laue, X-ray topography. Weekly laboratory. Prerequisite: consent of the instructor.

452. Electron Microscopy. Kinematical theory of diffraction; reciprocal space, single crystal diffraction patterns; dynamical theory of diffraction; direct observations of dislocations, stacking faults. Weekly laboratory involving use of the electron microscope. Prerequisite: ME 451 and consent of the instructor.

459. Advanced Finite Elements. Advanced topics in finite elements including vibrations, buckling, nonlinear geometry, inelastic materials and fracture mechanics. Modeling techniques and applications to problem solving will be stressed. Prerequisite: ME 441 or consent of the instructor.

460. Thermodynamics of Solids. Review of basic thermodynamic quantities and laws, equations of state; statistical mechanics; heat capacity; relations between physical properties; phase transformations, phase diagrams, and chemical reactions; partial molal and excess quantities, phases of variable composition; free energy of binary systems; surfaces and interfaces. The emphasis is on the physical and chemical properties of solids including stress and strain variables. Prerequisite: ME 123 or CHE 225.

461. Fracture and Fatigue. Linear Elastic Fracture Mechanics. Griffith theory. K and J approaches to toughness measurements. Low-cycle fatigue. Crack nucleation and fatigue crack growth. Failure analysis. Emphasis on the role of microstructure in determining fatigue and fracture behavior. Prerequisites: ME 226, 280, 442.

462. Experimental Material Science. Six short projects emphasizing the mechanical behavior of solids such as tensile, impact and bending properties, strain gages, LVDT, and vibrations, and the instrumentation used to examine it. Required independent project in teams of three. Prerequisites: ME 121, 226, 280.

463. Microstructure and Mechanical Properties. Tensile test and stability. Lüders band propagation. Load relaxation. Crystal structure and Miller indices. Deformation of single crystals and Schmid law. Theoretical strength and dislocations. Burgers circuit and vector. Cross slip. Hall-Petch relation. Annealing and creep. Grain boundaries. Solid solutions. Point defects. Inclusions. Composite materials. Prerequisite: ME 280.

465. Laser Systems. The design and use of laser systems, emphasizing visible and near infrared lasers. The course is engineering oriented and covers techniques for measuring laser characteristics as well as a variety of laser applications. An introduction to nonlinear optics is included. Prerequisites: OPT 441, 442 or equivalent; OPT 461, 462 or equivalent (may be taken concurrently). Same as OPT 465.

471. Geometric Modeling and Engineering Graphics. Modeling and representation of solid objects and automated engineering graphics. A theory based on geometry, set theory, and topology is

developed to model and represent rigid solids. Useful algorithms which operate on the representations are studied. Prerequisite: EE 203 or equivalent.

481. Mechanical Behavior of Solid Materials. Isotropic and anisotropic elasticity. Yield criteria and yield surfaces. Plasticity, dislocation theory, strengthening mechanisms, creep, fracture, and fatigue. Forging, rolling, extrusion, drawing, forming, and machining. Friction and wear. Prerequisites: ME 280, MTH 163, or equivalent.

482. Biofluid Mechanics. Blood; heart; arterial flow; microcirculation; venous flow; blood flow in lungs. Transcapillary exchange (particularly oxygen); compartment models. Air flow in lungs. Thermal regulation in physiology. Life at low Reynolds numbers. Prerequisite: ME 225 or equivalent.

483. Biosolid Mechanics. Application of engineering mechanics to biological tissues including muscle, soft tissue, cell membranes, and bone. Realistic modeling of biological structures, including the heart, blood vessels, and the ear. Experimental methods and material models. Prerequisite: ME 226 or equivalent.

484. Topics in Microcirculation. Flow, transport, and control in the microcirculation. Network architecture; hemodynamics; oxygen delivery; coupling between blood flow and metabolism. Same as BPH 440.

OPTICS

Robert W. Boyd, Ph.D. (California, Berkeley) *Professor of Optics*

*L. Nevil Davy, M.A. (Tennessee) *Professor of Optics*

Joseph H. Eberly, Ph.D. (Stanford) *Professor of Physics and of Optics*

Nicholas George, Ph.D. (California Institute of Technology) *Professor of Optics and Associate Dean for Research*

Dennis G. Hall, Ph.D. (Tennessee) *Professor of Optics*

*Erwin Loewen, Sc.D. (M.I.T.) *Professor of Optics*

*David L. MacAdam, Ph.D. (M.I.T.) *Professor of Optics*

*Erich W. Marchand, Ph.D. (Rochester) *Professor of Optics*

Duncan T. Moore, Ph.D. (Rochester) *Professor of Optics and Director, The Institute of Optics*

Carlos R. Stroud, Jr., Ph.D. (Washington) *Professor of Optics*

Kenneth J. Teegarden, Ph.D. (Illinois) *Professor of Optics*

Brian J. Thompson, Ph.D. (Manchester) *Professor of Optics and Provost of the University*

David R. Williams, Ph.D. (California) *Professor of Psychology, in the Center for Visual Science, and of Optics*

Emil Wolf, Ph.D. (Bristol), D.Sc. (Edinburgh) *Professor of Physics and of Optics*

Govind P. Agrawal, Ph.D. (Indian Institute of Technology, Delhi) *Associate Professor of Optics*

*Jay M. Eastman, Ph.D. (Rochester) *Associate Professor of Optics*

Stephen D. Jacobs, Ph.D. (Rochester) *Senior Scientist in Laser Energetics and Associate Professor of Optics*

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Gregory W. Forbes, Ph.D. (Australian National University) *Assistant Professor of Optics*

Susan Houde-Walter, Ph.D. (Rochester) *Assistant Professor of Optics*

R. J. Dwayne Miller, Ph.D. (Stanford) *Assistant Professor of Chemistry and of Optics and Scientist in Laser Energetics*

Warren E. Smith, Ph.D. (Arizona) *Assistant Professor of Optics*

Ian A. Walmsley, Ph.D. (Rochester) *Assistant Professor of Optics*

M. Parker Givens, Ph.D. (Cornell) *Professor Emeritus of Optics*

Robert E. Hopkins, Ph.D. (Rochester) *Professor Emeritus of Optics*

Rudolf Kingslake, D.Sc. (London) *Professor Emeritus of Optics*

The Institute of Optics at the University of Rochester is an internationally known center for teaching and research in optics. The B.S. in optics provides fundamental courses in physical optics, geometrical optics, radiation and detectors, and numerous electives in specialized areas of optics and related fields. Optics majors who plan to do graduate work may apply in their junior year for admission to the five-year B.S.-M.S. program, described in detail on page 182, and may begin master's-level independent research in their senior year. The B.S. in optics also provides suitable background for students wishing to work toward a Ph.D. degree in pure or applied optics and a career in research.

Interested and qualified undergraduates are sometimes able to participate in faculty research projects during the school year or in the summer. Current projects include studies involving lasers, holography, image processing and information handling, experimental studies of optical and electronic properties of matter, computer-aided lens design and evaluation, guided-wave optics, and the interaction of intense optical radiation with matter, including studies of laser-induced nuclear fusion, a potential energy source for the future.

ADMISSION REQUIREMENTS

Students normally apply for admission to The Institute of Optics at the end of the sophomore year by submitting a concentration approval form to their advisor or to the chairman of the Undergraduate Committee. Admission requirements are as follows: (1) an overall grade-point average of at least 2.0; (2) a grade-point average of at least 2.0 in PHY 121, 122, or 142, and 123 or 143, or in those courses taken to fulfill the physics requirement; (3) a grade-point average of at least 2.0 in MTH 161, 162, 163, and 164, or in those courses taken to fulfill the math requirement; and (4) a grade of C or better in each of OPT 241 and 261. For graduation, a minimum cumulative point average of 2.0 is necessary for all courses taken in The Institute of Optics, as well as an overall average of 2.0. Additionally, a student must have at least 128 credit hours completed upon graduation.

Prospective students and undergraduates considering optics as a major are encouraged to write or to visit The Institute of Optics for further information and individual counseling.

FOUR-YEAR PROGRAM

First Year

| | |
|----------------------|------------------------------|
| MTH 161 ¹ | MTH 162 ¹ |
| CHM 103 or 105 | PHY 121 ³ |
| English | Elective ³ |
| EE 171 ² | Elective (hum. or soc. sci.) |

Second Year

| | |
|------------------------------|----------------------------------|
| MTH 164 ¹ | MTH 163 ¹ |
| PHY 122 or 142 | PHY 123 or 143, 182 ⁴ |
| OPT 241 | OPT 261 |
| Elective (hum. or soc. sci.) | Elective (hum. or soc. sci.) |

¹ An alternative approved sequence is MTH 171, 172, 173, 174 for those considered eligible by the Department of Mathematics or MTH 141, 142, 143, 163, 164.

² EE 171 or any other one-semester high-level computer course in FORTRAN or Pascal.

³ OPT 100 is recommended.

⁴ PHY 182 is not required for students who take EE 111 as an elective.

Third Year

| | |
|------------------------------|------------------------------|
| OPT 242 | OPT 262 |
| MTH 281 or ME 201 | MTH 282 |
| Elective (tech. or free) | OPT 221 or PHY 238 |
| Elective (hum. or soc. sci.) | Elective (hum. or soc. sci.) |

Fourth Year

| | |
|------------------------------|--------------------------|
| OPT 224 | OPT 225 |
| OPT 256 | Elective (tech. or free) |
| Elective (tech. or free) | Elective (tech. or free) |
| Elective (hum. or soc. sci.) | Elective (tech. or free) |

Outstanding students are encouraged to take the physics sequence recommended for physics majors—first year: PHY 121 (fall), PHY 142 (spring); second year: PHY 143 (fall), physics elective (spring). Students choosing this sequence should also take CHM 103 before the end of the second year.

Mastery of prerequisite courses is essential to ensure successful performance in subsequent courses. For cases in which the student has not achieved a "C-" or better in the prerequisite course(s) for a given optics course, special permission of the Optics Undergraduate Committee is required before the student is allowed to register. Optics courses may be retaken only once (without special permission). Students so advised are asked to seek guidance in planning their future program from their faculty advisors.

DISTRIBUTION REQUIREMENTS

Students have two options to satisfy distribution requirements for the Bachelor of Science degree in optics. In the first option, students must elect six courses in the humanities and social sciences. These requirements are satisfied by taking two courses from the humanities, two courses from the social sciences, and the remaining two courses from either field. In the second option, students may elect to minor in a humanities or social science (which generally requires a total of five or six courses from these areas). In either option, at least one course *must* be above the introductory level.

TECHNICAL ELECTIVES

Two electives must be technical electives, at least one of which must be from the College of Engineering and Applied Science (CEAS).

The following courses are approved as technical electives for optics majors:

1. Any course with a 200 number or higher from CEAS, physics and astronomy, mathematics, chemistry, or the biological sciences, with the exception of ME 201, ME 202, or any required course.
2. A computer course with a 200 number or higher.
3. EE 111. Circuits.
4. Any other technical course as approved by petition to The Institute of Optics.

NOTE: STT 211 and STT 212 (statistics) cannot be counted as technical electives.

OPTICS HONORS PROGRAM

The aim of this program is to allow our top students increased exposure to the research being conducted at the Institute, increased interaction with faculty, and a chance to apply creativity to a research project. The program consists of 8 semester hours (which may be counted as technical electives). These hours include reading and research under the supervision of a faculty member. Students having a cumulative grade-point average of 3.6 or better are automatically eligible for this program. However, a 3.4 (overall) GPA is needed to maintain honors status. Students will be notified of their eligibility for the Honors Program in the spring semester of their junior year.

B.S.-M.S. PROGRAM IN OPTICS

Undergraduate juniors majoring in optics may apply for admission into a five-year program leading to both a B.S. and an M.S. degree in optics. Students learn of acceptance into this program in the spring of their junior year and can begin master's-level independent work during the senior year. The B.S. is awarded at the end of the fourth year. Work or study for credit in the summer between the fourth and fifth years can be arranged, if

desired. The fifth year of this program contains more advanced course work, reading, and research than the normal curriculum. The student must meet all the requirements for the B.S. degree, as well as those for the M.S. degree, with the exception that OPT 453 may be substituted for OPT 225 in satisfying the B.S. requirements. Students may follow the master's thesis (Plan A) or the non-thesis (Plan B) route. The thesis route is particularly recommended as it allows the student to develop a very high level of expertise in a specialized field of optics.

The normal fourth- and fifth-year programs for students in this program area are as follows:

Fourth Year

| | |
|----------------|----------------|
| OPT 221 | OPT 224 |
| OPT 461 or 441 | OPT 462 or 442 |
| OPT 453 | OPT 256 |
| Elective | Elective |

Summer Work or Study (optional)

OPT 491, 493, or 495 (up to 6 credits)

Fifth-Year Thesis Route—Plan A

| | |
|-------------------|-------------------|
| OPT 461 or 441 | OPT 442 or 462 |
| OPT 491 | OPT 491 |
| OPT 495 | OPT 495 |
| Elective (Optics) | Elective (Optics) |

Fifth-Year Thesis Route—Plan B

| | |
|----------------------|----------------------|
| OPT 461 or 441 | OPT 462 or 442 |
| 3 Electives (Optics) | 3 Electives (Optics) |

The elective courses in the fifth year may be any of the 400-level courses in optics. It is also recommended that the student take a sequence of courses in a particular area to develop a specialty. Certain courses in other departments are also acceptable, but such courses should be approved in advance by a faculty advisor.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

100. Introduction to Modern Optics.

A discussion of the properties of light: refraction, imaging, diffraction, interference, principles and applications of optical instruments, including the microscope, telescope, and laser. Demonstrations.

221. Quantum Mechanics for Optics.

Schrödinger equation, potential wells, barriers. Metals, semiconductors, insulators. Electron in a periodic potential, energy bands, Fermi statistics; hydrogen atom, periodic table, absorption, emission. Prerequisites: PHY 123 or 143; MTH 281 or ME 201, MTH 282 (may be taken concurrently).

224. Laser Systems. Optical devices including lasers, modulators, and optical wave guides. Emphasis is placed on developing the basic principles needed to design new devices, as well as an understanding of the operation of those currently in use. Prerequisite: OPT 262.

225. Optical Radiation and Detectors.

Detectors of optical radiation including quantum detectors and thermal detectors. Sources of noise in detectors and the limits of detectivity. Optical heterodyning and video detection. Applications to communications, optical radar. Prerequisite: OPT 262.

232. Optomechanical Design.

Concepts required to achieve goals of optical system performance, combining of glass with metal or plastic, kinematic design, material limitations, effects of gravity and temperature. Applications to optical metrology, alignment, geometry 2-D and 3-D, and generation of precision diffraction gratings. Standards for straightness, flatness, roundness, and length.

241. Geometrical Optics. Optical instruments and their use. First-order Gaussian optics and thin-lens system layout. Photometric theory applied to optical systems. The eye, magnifier, microscope, matrix optics, nature of Seidel aberrations. Laboratory. Prerequisites: MTH 161; optics computing requirement.

242. Aberrations, Interferometers, and Testing. Radiometry and photometry; testing of optical systems, star tests, interferometric tests; Twyman Green, Michelson and Fabry Perot interferometers; the microscope; spectroscopic instruments, prisms, grating, Fourier transform spectroscopy; synthetic aperture systems. Prerequisites: OPT 241, 261.

246. Optical Interference Coating Technology. Optical interference in a multilayer stack and its application to anti-reflection coatings, beamsplitters, laser mirrors, polarizers, and bandpass filters. Prerequisite: OPT 262.

252. Colorimetry. Principles and uses of CIE system of colorimetry, additive and subtractive color-mixture calculations, color-difference evaluation, uniform color scales, chromatic adaptation, computer colorant formulation, metameric colors, color-rendering properties of light sources.

256. Optics Laboratory. Intensive laboratory course with experiments on optical imaging systems, testing of optical instruments, diffraction, interference, holography, lasers, detectors, spectroscopic instruments. Prerequisites: OPT 242 and 261.

257. Photographic Sensitometry and Image Structure. The properties and performance of the developed photographic image; density, sensitometry, tone reproduction, granularity, and sharpness; exposure and development effects; color-forming systems, light scatter, and modulation transfer function; effects of nonlinearity; Wiener spectrum, the emulsion as a noisy detector of radiation; emulsion efficiency; and methods of image-quality evaluation.

261. Interference and Diffraction. Complex representation of waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; diffraction and image formation; optical transfer function; coherent optical systems, optical data processing, and holography. Prerequisites: MTH 164 and PHY 122 or 142.

262. Electromagnetic Theory. Vector analysis, Maxwell's equations, energy flow in electromagnetic fields, dipole radiation from Lorentz atoms, partially polarized radiation, spectral line broadening, dispersion, reflection and transmission, crystal optics, electro-optics, quantum optics. Prerequisites: MTH 163, 164, and PHY 122 or 142.

391. Independent Reading.**392. Special Topics.**

392-02. Optical Fabrication and Testing. Two laboratory projects are assigned. One involves melting, annealing, and characterizing a phosphate glass, whose color is chosen by the student. The second project involves the fabrication of an optical component (lens, flat, or prism) from a glass type chosen by the instructor. This class is a 2-credit course.

393. Special Essay.**395. Independent Research.**

396. Honors Project. Reading or research course open by special permission to seniors in optics.

The following graduate courses are open to advanced undergraduates with permission of the instructor.

411. Mathematical Methods for Optics.**412. Quantum Mechanics for Optics.****425. Radiation Detectors.****441. Geometrical Optics.****442. Instrumental Optics.****443. Optical Fabrication and Testing.****444. Lens Design.****455. Electronic Imaging.****456. Systems Lab.****461. Physical Optics I.****462. Physical Optics II.****465. Laser Systems.****467. Electro-Optical Systems.****468. Guided Wave Optics.****491. Reading Course in Optics (M.S.)*****492. Special Topics in Optics.****495. Research in Optics (M.S.)***

* Admission normally limited to those students enrolled in the five-year optics B.S.-M.S. program.

INTERDISCIPLINARY PROGRAMS

BIOMEDICAL ENGINEERING PROGRAM

PROGRAM COMMITTEE

Robert H. Notter, M.D., Ph.D.

(Rochester; Washington) *Professor of Pediatrics, of Chemical Engineering, and of Toxicology and Director, Biomedical Engineering Program*

Nicholas George, Ph.D. (California Institute of Technology) *Professor of Optics*

Kevin J. Parker, Ph.D. (M.I.T.)

Associate Professor of Electrical Engineering and of Radiology

Larry A. Taber, Ph.D. (Stanford)

Associate Professor of Mechanical Engineering

J. H. David Wu, Ph.D. (M.I.T.)

Assistant Professor of Chemical Engineering

Biomedical engineering (BME) involves the application of engineering science and methods to investigate and solve problems in living systems. In terms of subject matter, biomedical engineering potentially includes all interdisciplinary combinations which couple engineering with biology or medicine. As a result, BME provides innumerable career opportunities ranging in scope from advanced research to engineering practice in a clinical setting. By combining strong academic programs in engineering and biology with a wide variety of ongoing biomedical research activities, the College of Engineering and Applied Science has produced B.S. graduates able to undertake careers with a varying BME-component, or to go on to higher level BME study and research at the M.S. or Ph.D. level.

One of the most important advantages of the University of Rochester for BME training at all levels is the location of the College of Engineering and Applied Science (CEAS), on the River Campus, within walking distance of the Medical Center. Courses in the School of Medicine and Dentistry can be included in engineering curricula, and the converse is also true. For example, complementary courses on blood flow, tissue oxygenation, and the microcirculation are taught in the Medical Center and the CEAS. Similarly, interactive courses in microbiology and chemical engineering are offered for students interested in biochemical engineering, and courses covering bioultrasound and medical imaging involve interactions between the Departments of Electrical Engineering, Optics, and Radiology. In addition to teaching, strong BME-related research programs are also active throughout CEAS and Medical Center departments. Essentially all BME Program faculty are involved in basic or applied research, over and above any teaching responsibilities. This rich environment allows for extensive undergraduate research electives in BME (aside from graduate-level M.S. or Ph.D. thesis research).

Undergraduates may pursue biomedical engineering options by two pathways: by seeking a B.S. degree in one of the four CEAS departments (chemical, electrical, mechanical engineering, or optics) but with a cluster of BME elective courses; or by seeking a B.S. in engineering and applied science through the Interdepartmental Engineering (IDE) Program with an individual curriculum defined by the student and an IDE Program advisor. A majority of undergraduates choose the

first of these options because of its more flexible career choices (traditional engineering B.S. plus a BME emphasis). In general, both mechanisms for undergraduate study of biomedical engineering (i.e., through a specific department or through the IDE Program) can be structured to satisfy premedical or pre-dental requirements.

For either of the above pathways, formal recognition of meaningful course work and research is recognized by a Biomedical Engineering Certificate which is issued at graduation in conjunction with a departmental (or IDE Program) B.S. degree. Certificate requirements involve taking two introductory biological science courses, together with three upper-level BME elective courses in CEAS departments. It is recommended that one of these be an independent research elective in the laboratory of a faculty member doing BME-related research. Detailed requirements for the BME Certificate are available in the program office in Dewey Hall.

An introductory course, EAS 92, Options in Biomedical Engineering, is offered during the spring semester to help students decide how to develop their interest in this area.

INTERDISCIPLINARY PROGRAMS GEOMECHANICS

PROGRAM ADVISORS

*Roger F. Gans, Ph.D. (California, Los Angeles) *Professor of Mechanical Engineering and Chair of the Department of Mechanical Engineering*
Udo Fehn, Ph.D. (Munich) *Associate Professor of Geology*

The program in geomechanics is a joint offering of the Department of Geological Sciences and the Department of Mechanical Engineering, and leads to the degree of bachelor of science in geomechanics. The program provides an unusual opportunity for students interested in the quantitative aspects of the earth sciences.

The curriculum emphasizes the application of the principles of mechanics to problems associated with the atmosphere, the oceans, and the solid earth. The program is a natural blend between the two departments and builds on several areas common to engineering and to quantitative earth sciences: the mechanics of fluids, the mechanics of solids, and the properties of materials.

Students who successfully complete this program should be well equipped for employment or graduate studies in a number of fields, such as geophysics, hydrology, structural geology and rock mechanics, engineering geology, limnology, coastal and marine geology, theoretical geomorphology, and related fields. Career opportunities include work with the U.S. Geological Survey and with departments of natural resources or environmental protection at the federal, state, and county levels, with the oil and mineral resources industries, and in multidisciplinary private consulting firms engaged in geological engineering.

CURRICULUM

The geomechanics curriculum is built around basic mathematics, physics, chemistry, geology, and engineering courses. The required geology courses cover geologic processes, the evolution of the earth, mineralogy, and structural geology. Required engineering courses deal with basic mechanics, thermodynamics, fluid mechanics, and solid mechanics.

Technical electives, chosen from a number of geology and engineering offerings, include courses in geophysical fluid dynamics, optical mineralogy, materials science, advanced mechanics, heat transfer, rheology, rock mechanics, geophysics, sedimentary processes, and laboratory studies. In addition, the curriculum provides a balance of elective courses in the humanities and social sciences.

The program also allows three free electives, which each student may choose to suit his or her special interests. For example, a student can elect to study environmental problems by taking courses in air and water pollution and in ecology. Training in environmental planning and policy work may be obtained by taking courses in geology and public policy, environmental decisions and operations research. Many other special programs can be developed in such areas as water resources problems, advanced fluid dynamics of atmospheres and oceans, or advanced rock mechanics and structural geology.

As part of their studies, many undergraduates investigate problems, often of local interest, in the area of geomechanics. Recent projects include: flooding and level regulation on Lake Ontario; analysis of a proposed flood-control project on a tributary of the Genesee River; hydrologic studies of local communities; water quality problems of the Finger Lakes; experimental studies of microfracturing in granite; and laboratory modeling of the dynamics of the earth's crust and upper mantle.

For preparation in mathematics, the program requires MTH 161, 162, 163, and 164 (or the equivalent five course sequence: MTH 141, 142, 143, 163, 164¹). The required physics courses are PHY 121, 122, and 123; and the required chemistry course is CHM 105 or 103, depending on the recommendation of the Department of Chemistry. In geology, GEO 101, 201, 224, and 283 are required; and in mechanical engineering, the requirements are ME 120, 123, 225, 226, and either 241 or 242.

In addition to the above courses, there are four technical electives, which may be any of the geology or mechanical engineering courses at the 200 level or higher, and one technical elective from any discipline, as agreed upon with the faculty advisor.

The program includes three free electives to allow a strong minor in an area of particular interest to the student, or to broaden the scope of the curriculum. Other general degree requirements are those listed on page 163.

ADMINISTRATION

The geomechanics degree is awarded by either the College of Arts and Science or the College of Engineering and Applied Science—the choice is made by the student. If the student chooses Arts and Science, his or her major advisor will be in the Department of Geological Sciences; if the college chosen is Engineering and Applied Science, the major advisor will be in the Department of Mechanical Engineering. In each case, the student will also have a minor advisor in the other department.

Listed below is a sample arrangement of courses. Considerable variations on this ordering are possible to accommodate transfers and special needs.

*Licensed professional engineer.

¹ Students electing this sequence must complete four additional credit hours to graduate.

FOUR-YEAR PROGRAM IN GEOMECHANICS

First Year

| | |
|----------------------|------------------------------|
| MTH 161 ¹ | MTH 162 ¹ |
| GEO 101 | PHY 121 |
| English | ME 120 |
| Elective | Elective (hum. or soc. sci.) |

Second Year

| | |
|------------------------------|---------|
| MTH 163 | MTH 164 |
| PHY 122, 181 | PHY 123 |
| Elective (hum. or soc. sci.) | ME 123 |
| Elective | GEO 201 |

Third Year

| | |
|-----------------------------------|------------------------------|
| CHM 103 ² | Elective (technical) |
| ME 225 | ME 226 |
| Elective (technical) ³ | PHY 183 |
| Elective (technical) ³ | Elective (hum. or soc. sci.) |
| | Elective (hum. or soc. sci.) |

Fourth Year

| | |
|-----------------------------------|-----------------------------------|
| GEO 283 | GEO 224 |
| Elective (technical) ³ | Elective (technical) ³ |
| Elective (hum. or soc. sci.) | Elective (technical) ³ |
| Elective | Elective (hum. or soc. sci.) |

INTERDEPARTMENTAL PROGRAM

PROGRAM COMMITTEE

Sidney Shapiro, Ph.D. (Harvard)
Professor of Electrical Engineering and Chair of the Committee

*Roger F. Gans, Ph.D. (California, Los Angeles) *Professor of Mechanical Engineering and Chair of the Department of Mechanical Engineering*

Miles Parker Givens, Ph.D. (Cornell)
Professor Emeritus of Optics

Howard Saltsburg, Ph.D. (Boston)
Professor of Chemical Engineering

Michael J. Wengler, Ph.D. (California Institute of Technology) *Assistant Professor of Electrical Engineering*

The Interdepartmental Program (IDE) is intended for students who have specific technical objectives not adequately addressed by the other B.S. degree programs offered by the College of Engineering and Applied Science (CEAS). For example, students with interests in computer engineering or in biomedical engineering have crafted programs of study through the Interdepartmental Program well suited to their specific educational objectives.

Within the total of 32 courses (128 credit hours) required to earn the B.S. degree (see the note on page 163), a minimum of 18 are devoted to mathematics, other natural sciences, and engineering. (Of these, at least eight must be courses offered by CEAS.) A further seven courses, at a minimum, are devoted to satisfying

the College requirements in English and in humanities and social sciences. (See page 164.) The remaining courses may be free electives. Students frequently use these courses to pursue one of the many *certificates* offered by the University, such as the Certificate in Biomedical Engineering (page 184) or the Certificate in Management Studies (page 115). They may also be used, in conjunction with some of the courses taken to satisfy the CEAS humanities and social sciences distribution requirement, to pursue a *minor* in one of the disciplines in the humanities or social sciences, such as economics, philosophy, political science, or art history.

Each degree program under IDE must include three *sequences* of technical or scientific courses. Each sequence must include at least three courses, only one of which may be at the 100-level. A sequence of courses is defined as "a logical progression of study, confined to an acceptably identifiable area, in which later material builds upon and extends earlier material." (In rare cases, the Committee has approved the use of a nontechnical or nonscientific sequence to strengthen the focus of a program when a student wishes to study such a discipline in depth.)

A final degree requirement under IDE is a senior thesis. The thesis is a coherent, written summary of independent study, in the focus area of the program, undertaken under the supervision of an appropriate member of the CEAS faculty during a student's junior and senior years. Up to 8 credit hours of indepen-

¹ An alternative approved sequence is MTH 171, 172 for those considered eligible by the Department of Mathematics. An acceptable alternative sequence to MTH 161, 162 is MTH 141, 142, 143. Students electing this sequence must complete four additional credit hours to graduate.

² An alternative approved course is CHM 105 for those considered eligible by the Department of Chemistry.

³ One of these must be ME 241 or ME 242. Four shall be taken from geology or mechanical engineering. The sixth may be any technical course approved by your faculty advisor.

*Licensed professional engineer.

ENGINEERING SCIENCE PROGRAM

dent study may be included in a student's program. During the second semester of the sophomore year, a prospective IDE student is expected to seek out and to work with an appropriate faculty member to define an area of independent study. A brief description of the topic along with the supervising faculty member's signature is submitted by the end of the sophomore year as part of the application for admission to IDE.

Students are expected to enter with and to maintain strong academic records. All students in the program must earn a minimum cumulative grade-point average of 2.0 for all courses taken in their fields of specialization. This includes all courses in their sequences as well as the eight required engineering courses. In addition, each student entering the program must have completed the following subjects with a grade-point average of at least 2.7 (equivalent to a "B-"): *English*, one course; *mathematics*, three courses; including one in differential equations (usually MTH 163); *chemistry* and *physics*, four courses, at least one in chemistry. Full details of both *admissions* and *degree* requirements under IDE are provided in documents available from the dean's office.

Students who are attracted to engineering and who are either unsure of specialization within the field or who have specific interests not obviously addressed by the standard programs are strongly encouraged to visit, telephone, or write the chair of the Program Committee.

The College of Engineering and Applied Science (CEAS) intends to offer a program of study leading to the degree Bachelor of Arts in Engineering Science, once the program has been registered by the Department of Education of the State of New York. This is expected before the publication date of this bulletin. Please contact the dean's office for up-to-date information.

The B.A. in engineering science is intended for students who, while not necessarily planning careers in the practice of engineering, may benefit from an enhanced *technical* content in their education. Technology and corresponding modes of thought are becoming ever more important in issues affecting everyone. Examples include environmental issues, such as acid rain and the greenhouse effect; issues broadly related to medicine, such as gene splicing and the proper use of life support systems; legal issues, such as privacy of records in the computer age; and new regulative and ethical issues raised by developing technology.

The B.A. in engineering science emphasizes breadth across engineering disciplines and as such offers an exposure to technology not available via other degree programs. Thus, students considering careers in business, law, or medicine may find the B.A. program excellent preparation. The technological focus of the program may offer advantages in dealing with issues such as those listed above, when they are encountered in the role of corporate manager, lawyer, or physician. Alternatively, the program could be followed by more intense specialization in a specific engineering discipline at the master's degree level.

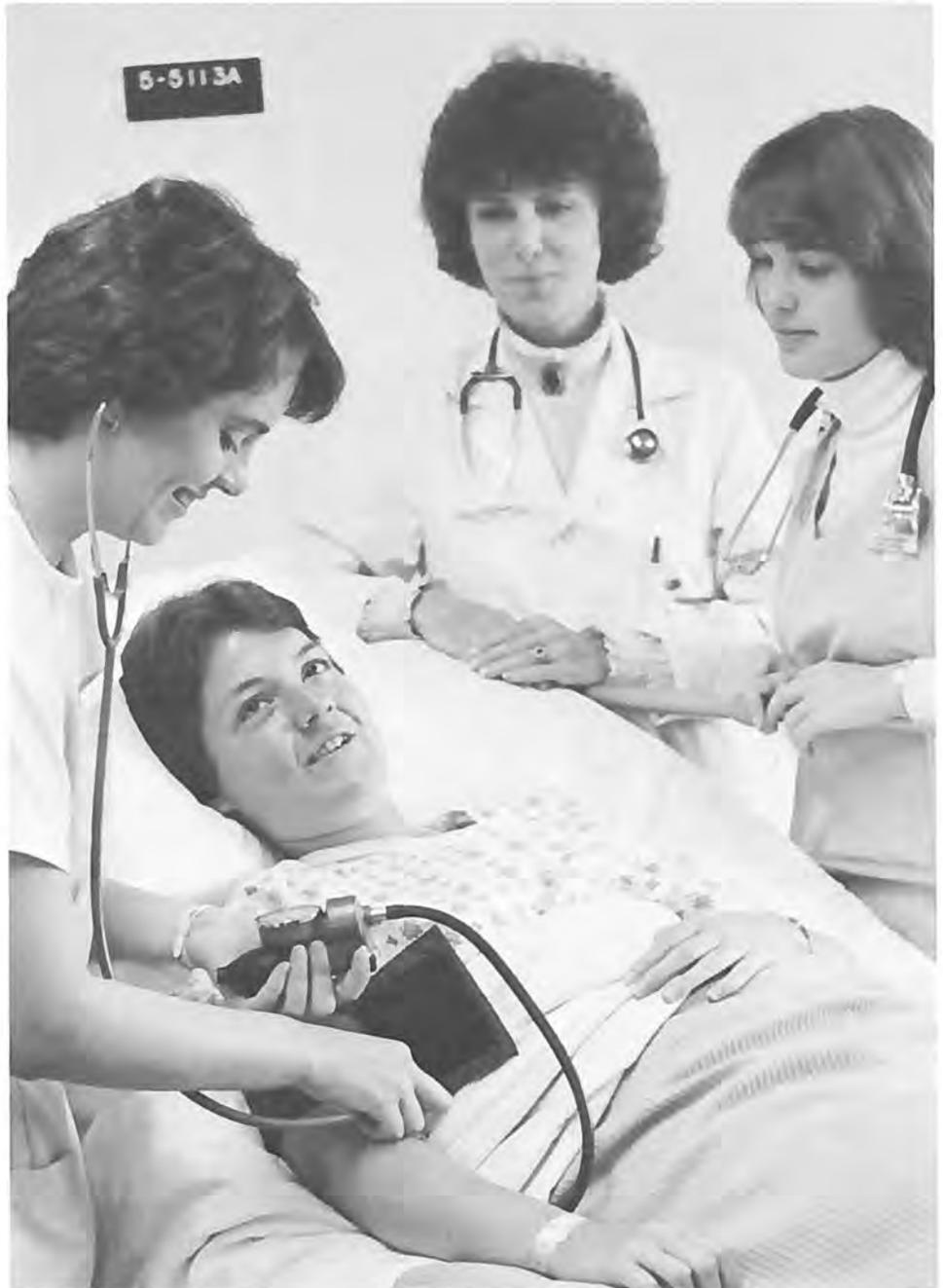
Within the total of 32 courses (128 credit hours) required to earn the B.A. in engineering science (see the note on page 164), a minimum of eight courses must be in the natural sciences, including at least one course in chemistry, two in physics, and three in mathematics. The latter must include a course in differential equations (typically MTH 163). Two additional courses forming an allied field in these or other natural sciences are also required. Additional course requirements include one course in computing (EE 171 or CSC 181 or equivalent), and at least eight courses in engineering, including at least one laboratory-intensive course. The opportunity to take courses in depth from several engineering disciplines is a unique aspect of this program.

In common with B.A. degrees offered by the College of Arts and Science, to earn the B.A. in engineering science students must satisfy both the primary and upper-level writing requirements (a total of three courses) and also the foreign language requirement (see page 32). An additional four courses must be taken outside engineering and the natural sciences. Of these four courses, two must be in the humanities and two must be in the social sciences, as defined by the CEAS classification given on page 164. (Students who earn a minor in one of the disciplines in the humanities or social sciences are exempt from this "2 plus 2" rule.)

Totalling the above course requirements leaves from five to eight courses available as free electives. (Students taking three courses to satisfy the foreign language requirement have five free electives; those taking *no* foreign language courses, but satisfying the requirement by examination, have eight free electives.) This permits a student considerable flexibility in shaping programs that reflect personal interests.

The B.A. program is administered by the Committee on the Interdepartmental Program. Approval of the Committee is required for each proposed program of study. Admission to the program at the end of the sophomore year requires an overall grade-point average of at least 2.0, together with completion of the following nine courses with a GPA in those nine courses of at least 2.3: one English course; three math courses, including a course in differential equations; three physics and chemistry courses, including at least one course in chemistry; and at least two engineering courses.

Programs meeting degree requirements are to be worked out in consultation with an appropriate member of the Program Committee. Interested students—including potential transfer students—are urged to visit, telephone, or write the chair of the Program Committee.



School of Nursing

ADMINISTRATIVE FACULTY

- Sheila A. Ryan, Ph.D., R.N. (Arizona)
*Dean, School of Nursing; Director
Medical Center Nursing; Professor of
Nursing*
- Ann Marie Brooks, R.N., D.N.Sc. (The
Catholic University) *Senior Director
and Director of Nursing, Strong
Memorial Hospital; Associate Dean
for Nursing Practice and Associate
Professor of Clinical Nursing, School
of Nursing*
- Patricia Hinton Walker, Ph.D., R.N.
(Mississippi) *Associate Dean and
Director of Community Centered
Practice; Associate Professor of
Clinical Nursing*
- Jean Johnson, Ph.D., R.N. (Wisconsin)
*Interim Associate Dean for Academic
Affairs; Professor of Nursing and Site
Director of Robert Wood Johnson
Clinical Nurse Scholars Program,
School of Nursing; Associate Director
of Oncology Nursing, Cancer Center;
Clinical Chief of Oncology Nursing,
Strong Memorial Hospital*
- Carol Henretta, M.S., R.N. (Rochester)
*Assistant Dean for Recruitment;
Director of Admissions; Assistant
Professor of Clinical Nursing*

ACADEMIC FACULTY

- Robert Hoekelman, M.D. (Columbia)
*Professor of Pediatrics, of Health
Services, and of Nursing*
- Jean E. Johnson, Ph.D., R.N. (Wisconsin)
*Professor of Nursing and Site Director
of Robert Wood Johnson Clinical
Nurse Scholars Program, School of
Nursing; Associate Director of
Oncology Nursing, Cancer Center;
Clinical Chief of Oncology Nursing,
Strong Memorial Hospital*

- Jerome Lysaught, Ph.D. (Rochester)
*Professor Emeritus of Education and
Human Development; Professor of
Pediatrics; Professor of Nursing;
Senior Research Associate Provost's
Office*
- Klaus Roghmann, Ph.D. (Cologne)
*Professor of Sociology, of Pediatrics, of
Community and Preventive Medicine,
and of Nursing*
- Sheila A. Ryan, Ph.D., R.N. (Arizona)
*Dean, School of Nursing; Director,
Medical Center Nursing; Professor of
Nursing*
- Thelma J. Wells, Ph.D. R.N.
(Manchester, England) *Professor of
Nursing*
- Marilyn Aten, Ph.D. R.N. (Cornell)
*Associate Professor of Nursing; and
Assistant Professor of Pediatrics;
Director of Doctoral Program*
- June Helberg, Ed.D., R.N., P.N.P., C.
(Rochester) *Associate Professor of
Nursing; Nurse Practitioner*
- Harriet Kitzman, Ph.D., R.N.
(Rochester) *Associate Professor of
Nursing, and of Pediatrics*
- Phyllis Leppert, M.D., Ph.D., F.A.C.O.G.
(Duke) *Associate Professor OB/
GYN; and of Nursing*
- Elizabeth McAnarney, M.D. (Syracuse)
*Associate Professor of Pediatrics, of
Psychiatry, of Medicine, and of
Nursing*
- Darlene E. McCown, Ph.D., R.N.
(Oregon) *Associate Professor of
Nursing*
- Bethel Powers, Ph.D., R.N. (Rochester)
*Associate Professor of Nursing; Chair,
Health Promotion and Maintenance*
- Karen Radke, Ph.D., R.N. (Indiana)
*Associate Professor of Nursing;
Assistant Professor of Physiology*
- Madeline H. Schmitt, Ph.D., R.N.
(SUNY, Buffalo) *Associate Professor
of Nursing*

- Sharon Bidwell-Cerone, Ph.D., R.N.
(Rochester) *Assistant Professor of
Nursing*
- Mary Dombeck, Ph.D., D.Min., R.N.
(Rochester) *Assistant Professor of
Nursing*
- Jeanne Grace, Ph.D., R.N. (Rochester)
Assistant Professor of Nursing
- Carol Hanks, Ph.D., R.N. (Texas)
*Assistant Professor of Nursing; and of
Pediatrics*
- Patricia Hollen, Ph.D., R.N. (Rochester)
Assistant Professor of Nursing
- Gail Ingersoll, Ed.D., R.N. (Rochester)
*Assistant Professor of Nursing; Chair,
Health Restoration; Clinical Nurse
Specialist*
- Mary Sue Jack, Ph.D., R.N. (Rochester)
Assistant Professor of Nursing
- Catherine Kane, Ph.D., R.N. (Rochester)
*Assistant Professor of Nursing;
Clinical Nurse Specialist*
- Kathleen King, Ph.D., R.N. (Rochester)
*Assistant Professor of Nursing;
Clinical Nurse Specialist*
- Kay Melnyk, Ph.D., R.N. (Rochester)
Assistant Professor of Nursing
- JoEllen Murata, Ph.D., R.N. (UCLA)
Assistant Professor of Nursing
- Elizabeth Kellogg Walker, Ph.D., R.N.
(Rochester) *Assistant Professor of
Nursing; Chair, Health Care Systems*
- Lindsay Holmes, M.S., R.N. (Rochester)
Instructor of Nursing

CLINICAL FACULTY

- Carol Brink, M.S.P.H., R.N., C. (North
Carolina) *Associate Professor of
Clinical Nursing; Clinical Chief
Gerontological Nursing; Nurse
Practitioner*
- Margaret Briody, M.S.N., R.N. (The
Catholic University) *Associate
Professor of Clinical Nursing; Clinical
Nurse Specialist*

- Ann Marie Brooks, R.N., D.N.Sc. (The Catholic University) *Senior Director and Director of Nursing, SMH; Associate Dean for Nursing Practice, SON; Associate Professor of Clinical Nursing*
- Patricia Hinton Walker, Ph.D., R.N. (Mississippi) *Associate Professor of Clinical Nursing; Associate Dean and Director of Community Centered Practice*
- Nancy Kent, Ed.D., R.N. (Rochester) *Associate Professor of Clinical Nursing*
- Janet Anderson, M.S., R.N. (Missouri) *Assistant Professor of Clinical Nursing; Director, Teaching Learning Center*
- Judith Baggs, Ph.D., R.N. (Rochester) *Clinical Nurse Researcher, Strong Memorial Hospital; Assistant Professor of Clinical Nursing*
- Doris Brownlow, M.S., R.N., C. (Oregon) *Nurse Practitioner; Assistant Professor of Clinical Nursing*
- Patricia Chiverton, M.S., R.N. (Rochester) *Clinical Chief Psychiatric Mental Health Nursing; Assistant Professor of Clinical Nursing*
- Jessie Drew-Cates, Ph.D., R.N. (Rochester) *Assistant Professor of Clinical Nursing; Clinical Nurse Specialist*
- Beverly Faro, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Assistant Professor of Clinical Nursing*
- Mary Farren, M.S., R.N. (Rochester) *Clinical Chief Community Health Nursing; Assistant Professor Clinical Nursing*
- Joanne Fioravanti, M.S., R.N. (Rochester) *Clinical Chief Pediatric Nursing; Assistant Professor of Clinical Nursing*
- Jean Garling, Ed.D., R.N. (Rochester) *Nursing Chief, University Health Service; Assistant Professor of Clinical Nursing*
- Carol Henretta, M.S., R.N. (Rochester) *Assistant Professor of Clinical Nursing; Assistant Dean for Recruitment; Director of Admissions*
- Wendy Hobbie, M.S.N., R.N. (Rochester) *Nurse Practitioner; Assistant Professor of Clinical Nursing*
- Patricia Hytzak Lind, M.S., R.N., C. (Rochester) *Director of Nursing Education/Resource Development, SMH; Assistant Professor of Clinical Nursing*
- Linda Jones, M.S., R.N. (Rochester) *Assistant to Associate Director of Oncology Nursing; Assistant Professor of Clinical Nursing*
- Anne Klijanowicz, M.S., R.N. (Boston) *Assistant Professor of Clinical Nursing; Clinical Nurse Specialist*
- Marilyn McClellan, Ed.D., R.N. (Columbia) *Assistant Professor of Clinical Nursing*
- Ann McMullen, M.S., R.N. (Rochester) *Assistant Professor of Clinical Nursing; Nurse Practitioner*
- Suanne Miller, M.S., R.N. (Rochester) *Nurse Practitioner; Assistant Professor of Clinical Nursing*
- Kathleen Parrinello, Ph.D., R.N. (Rochester) *Clinical Chief of Surgical Nursing; Assistant Professor of Clinical Nursing*
- Gail Revell, M.S., R.N. (Rochester) *Nurse Practitioner; Assistant Professor of Clinical Nursing*
- Alison Schultz, M.S., R.N. (Rochester) *Assistant Professor of Clinical Nursing; Clinical Nurse Specialist*
- Julie Shattuck, M.S., R.N. (Rochester) *Nurse Practitioner; Assistant Professor of Clinical Nursing*
- Mary Sprik, Ph.D., R.N., C. (Rochester) *Assistant Professor of Clinical Nursing; Nurse Practitioner*
- Hope Titlebaum, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Assistant Professor of Clinical Nursing*
- Nancy Wells, D.N.Sc., R.N. (Boston) *Clinical Nurse Researcher, SMH; Assistant Professor of Clinical Nursing*
- Patricia Witzel, M.S., M.B.A., R.N. (Rochester) *Director, Nursing Operations Analysis and Evaluation; Assistant Professor of Clinical Nursing*
- Diane Breton, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Joanne Clements, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Peter Coggiola, M.S., R.N., P.N.P., C. (Rochester) *Instructor of Clinical Nursing*
- Mary Collins, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Patricia Corbett-Dick, M.S., R.N. (Rochester) *Nurse Practitioner; Instructor of Clinical Nursing*
- Philene Cromwell, M.S., R.N. (Rochester) *Nurse Manager; Instructor of Clinical Nursing*
- Rita D'Aoust, M.S., R.N. (Rochester) *Instructor of Clinical Nursing*
- Laurie Ernest, M.S., R.N. (Rochester) *Nurse Practitioner; Instructor of Clinical Nursing*
- Marie Flannery, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Dori Green, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Linda Leoni, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Eileen Westlake Lumb, M.S., R.N. (Rochester) *Nurse Practitioner; Instructor of Clinical Nursing*
- Theresa Madonna, M.S., R.N. (Michigan) *Associate Clinical Chief Medical Nursing; Instructor of Clinical Nursing*
- Bernadette Malaret, M.S., R.N. (Rochester) *Nurse Practitioner; Instructor of Clinical Nursing*
- Karen Malone, M.S., R.N. (Ohio State) *Coordinator of Nurse Recruitment; Instructor of Clinical Nursing*
- Maria Marconi, M.S., R.N. (Georgetown) *Associate Clinical Chief Medical Nursing; Instructor of Clinical Nursing*
- Charlyne Miller, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Noreen Pearsall, M.S., R.N. (Georgetown) *Clinical Nurse Specialist; Instructor of Clinical Nursing*
- Jill Quinn, M.S., R.N. (Rochester) *Nurse Practitioner; Instructor of Clinical Nursing*

Elizabeth Slavinskas, M.S.N., R.N.
(Buffalo) *Clinical Chief Emergency
and Ambulatory Nursing; Instructor
of Clinical Nursing*
Margaret Waterman, M.S., R.N. (Rochester)
*Clinical Nurse Specialist;
Instructor of Clinical Nursing*

ASSOCIATE FACULTY

Patricia Allen, M.S., R.N. (Rochester)
Nurse Practitioner; Clinical Associate
Barbara Aughenbaugh, M.S., R.N.
(Rochester) *Clinical Nurse
Specialist; Clinical Associate*
Linda Boccardo, M.S., R.N. (Rochester)
Nurse Practitioner; Clinical Associate
Bonnie Bambara, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Mary Bazar, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
JoAnn Belle-Isle, M.S.N., R.N. (Pitts-
burgh) *Clinical Nurse Specialist;
Clinical Associate*
Marie Biancuzzo, M.S., R.N. (Syracuse)
*Clinical Nurse Specialist; Clinical
Associate*
Karen Bonhote, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Darlene Brezinsky, M.S.N., R.N.
(Syracuse) *Clinical Nurse Specialist;
Clinical Associate*
Theresa Caffery, M.S., R.N. (Rochester)
Nurse Practitioner; Clinical Associate
Karen Chalanick, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Christine Charbonneau, M.S.P.H.
(UCLA) *Clinical Associate, Family
Medicine; and of Nursing*
Marianne Chiafery, M.S., R.N. (Roch-
ester) *Clinical Nurse Specialist;
Clinical Associate*
Lisa Chormann, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Wendy Cornell, M.S., R.N., C. (Roch-
ester) *Associate Clinical Chief
Pediatric Nursing; Clinical Associate*

Carol Crane, M.S., M.B.A., R.N. (Roch-
ester) *Clinical Nurse Specialist;
Clinical Associate*
Marietta Cutrone, M.S., R.N.
(Rochester) *Nurse Practitioner;
Clinical Associate*
Mary Delaney, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Bonnie Doell, M.S., R.N. (Rochester)
*Associate Clinical Chief Psychiatric
Nursing; Clinical Associate*
JoAnn Egan, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Tamara Eis, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Karen Ekstrom, M.S., R.N., C. (Roch-
ester) *Nurse Practitioner, UHS;
Clinical Associate*
Dawn Fasone, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Meriel Friedman-Campbell, M.S., R.N.
(Rochester) *Clinical Nurse
Specialist; Clinical Associate*
Janet Gelein, M.S., R.N. (Duke)
*Clinical Nurse Specialist; Clinical
Associate*
Leigh Griffiths, M.S., R.N., C. (Roch-
ester) *Nurse Practitioner; Clinical
Associate*
Susan Guild, B.S.N., R.N. (Rochester)
*Associate Clinical Chief OB/GYN
Nursing; Clinical Associate*
Michelle Gullace, M.S.N., R.N. (Pitts-
burgh) *Clinical Nurse Specialist;
Clinical Associate*
Sharon Gullo, M.S., R.N. (Buffalo)
*Clinical Nurse Specialist; Clinical
Associate*
Jennifer Harris, M.S., R.N. (Rochester)
*Associate Clinical Chief Surgical
Nursing; Clinical Associate*
Denise Hartung, M.S., R.N. (Rochester)
*Interim Associate Clinical Chief
Medical Nursing; Clinical Associate*
Susan Hauptfleisch, M.S., R.N. (Roch-
ester) *Clinical Nurse Specialist;
Clinical Associate*
Carol Hondorf, M.S., R.N. (Rochester)
Nurse Practitioner; Clinical Associate

Karen Kedley, M.S., R.N., C.N.M.
(Illinois) *Certified Nurse Midwife;
Clinical Associate*
Elaine Klajbor, M.S., R.N. (Rochester)
Nurse Practitioner; Clinical Associate
Rita Knight, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Mary Ellen Kunz, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Susan Lander, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Rebecca Ledwin, M.S., R.N. (Michigan)
*Clinical Nurse Specialist; Clinical
Associate*
Christine LeMoine, M.S., R.N.
(Rochester) *Nurse Practitioner;
Clinical Associate*
Sonia Liberatore, M.S., R.N. (Buffalo)
Nurse Manager; Clinical Associate
Johana Lindblom, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Linda Lord, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Barbara Lum, M.S., R.N., C. (Rochester
and Pittsburgh) *Nurse Practitioner;
Clinical Associate*
Lynne MacConnell, M.S., R.N. (Roch-
ester) *Clinical Nurse Specialist;
Clinical Associate*
Jean Mack-Fogg, M.S., R.N., C.
(Rochester) *Nurse Practitioner;
Clinical Associate*
Lauren Martinez, M.S., R.N., C. (Roch-
ester) *Nurse Practitioner; Clinical
Associate*
Barbara Masiulis, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*
Patricia McCabe, M.S., R.N., C. (Roch-
ester) *Nurse Practitioner; Clinical
Associate*
Kathleen McGrath, M.S.N., R.N. (Roch-
ester) *Clinical Nurse Specialist;
Clinical Associate*
Darce Metzler, M.S., R.N. (Rochester)
*Clinical Nurse Specialist; Clinical
Associate*

- Donna Mueller, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Clinical Associate
- Susan Mulvehill, M.S.N., R.N. (Case Western Reserve) *Nurse Manager; Clinical Associate*
- Margaret Murray, M.S., R.N. (Rochester)
Nurse Practitioner; Clinical Associate
- Carrie Magee Nolan, M.S., R.N., C. (Rochester) *Nurse Practitioner, UHS; Clinical Associate*
- Deborah Osterberg, M.S.N., R.N. (Bloomburg) *Clinical Nurse Specialist; Clinical Associate*
- Cynthia Palenski, M.S., R.N., C. (Rochester) *Nurse Practitioner; Clinical Associate*
- Susan Petrakis, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Clinical Associate
- Charlene Pope, M.S., R.N., C.N.M., M.P.M. (Maryland) *Certified Nurse Midwife; Clinical Associate*
- Marsha Pulhamus, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Clinical Associate*
- Julie Salo, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Clinical Associate
- Susan Saunders, M.S.W. (Missouri)
Director of Social Work, SMH; Assistant Professor of Psychiatry; Clinical Associate
- Jaclyn Schultz, M.S., R.N. (Wisconsin)
Nurse Practitioner; Clinical Associate
- Margaret Ann Schwalm, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Clinical Associate*
- Leslie Schwartz, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Clinical Associate
- Melinda Sciera, M.S., R.N. (Rochester)
Nurse Manager; Clinical Associate
- Jeannette Shatraw, M.S., R.N. (Syracuse)
Clinical Nurse Specialist; Clinical Associate
- Joanne B. Stevens, M.S., R.N., C. (Rochester) *Nurse Practitioner; Clinical Associate*
- Honora Tabone, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Clinical Associate
- Mary Tantillo-Pearson, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Clinical Associate*
- Elizabeth Treiber, M.S., R.N. (Rochester)
Nurse Manager; Clinical Associate
- Mary Turner, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Clinical Associate
- Elizabeth Vaczy, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Clinical Associate
- Roxanne Walther, M.S., R.N. (Rochester)
Nurse Manager; Clinical Associate
- Mary Ellen Webb, M.S., R.N. (Rochester)
Nurse Manager; Clinical Associate
- Susan Weidner, M.S., R.N., C. (Rochester) *Nurse Practitioner; Clinical Associate*
- Pamela White, M.S., R.N., C.C.R.N. (SUNY, Buffalo) *Nurse Educator, SMH; Clinical Nurse Specialist; Clinical Associate*
- Kathy White-Ryan, M.S., R.N. (Rochester) *Clinical Nurse Specialist; Clinical Associate*
- Pamela Wigent, M.S., R.N., C. (Rochester) *Nurse Practitioner; Clinical Associate*
- Carroll Bouman, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Senior Associate
- Carol Cornwell, M.S., R.N., C.S. (Rochester) *Clinical Nurse Specialist; Senior Associate*
- Ann Marie Dozier, M.S., R.N. (Rochester) *Clinical Chief of Medical Nursing; Senior Associate*
- Virginia Duffy, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Senior Associate
- Irene Dutko, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Senior Associate
- Vickie Fieler, M.S., R.N. (Boston)
Clinical Nurse Specialist; Senior Associate
- Lisa Norsen, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Senior Associate
- Janice Opladen, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Senior Associate
- Marlene Ortiz, M.S., R.N. (SUNY, Buffalo) *Nurse Educator, SMH*
- Kathy Plum, M.S., R.N. (Rochester)
Director, Strong Ties; Senior Associate
- JoAnne Popovich, M.S., R.N. (Florida)
Clinical Nurse Specialist; Senior Associate
- Kathy Rideout, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Senior Associate
- Carolyn Sammann, M.S., R.N., C.E.N. (Rochester) *Clinical Nurse Specialist; Senior Associate*
- Charlotte Torres, M.S., R.N. (Rochester)
Clinical Nurse Specialist; Senior Associate
- Bernadette Vulcan, M.S., R.N., C. (Pittsburgh) *Senior Associate*
- Hannilore Yoos, M.S., R.N., (Rochester)
Nurse Practitioner; Senior Associate in Nursing
- Suzanne Zigrossi, M.S., R.N. (Texas)
Clinical Chief OB/GYN Nursing; Senior Associate

EMERITUS FACULTY

- Rita Chisholm, M.A., R.N. (Teachers College, Columbia) *Professor Emeritus of Nursing*
- Josephine Craytor, M.S., R.N. (Rochester) *Professor Emeritus of Nursing*
- Loretta C. Ford, Ed.D., R.N. (Colorado)
Dean Emeritus of Nursing
- Eleanor H. Hall, M.A., R.N. (Columbia)
Professor Emeritus of Nursing
- Elaine C. Hubbard, Ph.D., R.N., C. (Boston) *Professor Emeritus of Nursing*
- Helen McNerney, M.S., R.N. (Rochester)
Professor Emeritus of Nursing
- Edith Olson, M.S., R.N. (Hunter)
Professor Emeritus of Nursing
- Marjorie Pfaudler, M.A., R.N. (Columbia) *Professor Emeritus of Nursing*
- Rose Pinneo, M.S., R.N. (Pennsylvania)
Professor Emeritus of Nursing
- Mary Wemett, M.S., R.N. (Rochester)
Professor Emeritus of Nursing

The mission of the School of Nursing is to prepare nurses to meet the challenges of health care today and into the twenty-first century. Our philosophy includes beliefs about nursing, nurses, consumers, environments, health, unification, and the educational process.

We believe the profession of nursing has as its essence assisting people to attain and maintain optimal health and to cope with illness and disability. Nursing derives its rights and responsibilities from society and is, therefore, accountable to society as well as to the individuals who comprise it. The nurse functions as a caring professional in both autonomous and collaborative professional roles, using critical thinking, ethical principles, effective communication and deliberative action to render holistic care, facilitate access to health care, and aid consumers in making decisions about their health.

The consumer of nursing care may be an individual, family, group, community, or society, who all have diverse and changing needs. We believe the consumer is self-determining and has the right to informed choice about health. All actual consumers and potential consumers, including those who are disenfranchised from the health care system, have the right of access to health care.

Environment has a significant impact on health. Any setting in which consumers function is an appropriate environment for nursing practice. Nurses must be active in social, political, and economic arenas to shape policy that creates optimal environments for maximizing health.

Health is a subjective state which includes well-being; optimal functioning in all dimensions of life: biological, psychological, social, cultural, and spiritual; effective response to a continually changing environment; and achievement of personal potential. Health is affected by illness, disability, and dysfunction. Consumers ultimately define health for themselves and make decisions regarding it.

At the School of Nursing, faculty and learners function from the perspective of the Unification Model. Nursing practice, education, and research are the three interdependent elements of this model, each element enhancing the others. Uni-

fication embodies both a philosophical approach and an organizational structure which promotes and facilitates faculty practice and strengthens operational interdependence among practice, education, and research. Research strengthens education and practice through development of the nursing knowledge base. Practice enriches both research, through generation of questions, and education, through continual application of scientific knowledge. Education empowers nurses for leadership in professional practice and research. The interaction of these elements benefits the consumer through enhancement of the quality of nursing care.

The educational climate of the School of Nursing enhances respect, collaboration, and support among learners and faculty. Learners in the School of Nursing study the scientific and theoretical dimensions of their discipline in the context of a strong liberal arts background. A rigorous professional education with the breadth and perspective of the arts and sciences prepares leaders in nursing who shape current and future responses to ethical, political, economic, health, and nursing issues. Critical thinking and decision making are basic to the delivery of health care. Consistent with the University's mission, the School of Nursing fosters individuality, self-direction, scholarship, and commitment to life-long learning. Continued professional learning opportunities assist nurses in developing professional expertise. Creative, flexible programming in education is essential to meet the diverse and changing needs of both the learners and the nursing profession.

Programs of the School of Nursing are registered with the State Education Department of the University of the State of New York. All programs are accredited by the National League for Nursing. Graduates are eligible to take the licensing examination for Registered Nurse in New York State or any of the 50 states; likewise, they also are eligible for mem-

bership in nursing organizations such as the American Nurses' Association, the National League for Nursing, Sigma Theta Tau (the nursing honor society), and others, including specialty groups.

REQUIREMENTS FOR THE DEGREE BACHELOR OF SCIENCE

Freshmen declaring an intended major in nursing complete a pre-nursing program in the College of Arts and Science during their first two years. They enroll in the School of Nursing for the professional nursing program during their junior and senior years.

Students may declare a concentration in nursing at any time. Students desiring to transfer to the School of Nursing at the junior level must have completed a minimum of two years of specified liberal arts and science education at either the University of Rochester or another college or university. Students interested in transferring into the School of Nursing, see page 230 of this bulletin.

Students are assigned nursing faculty advisors when they are admitted to the University or as soon as they declare nursing as a major concentration. The advisors assist students in planning an academic program to fulfill graduation requirements; counsel students concerning course work, clinical experiences, and progression in the program; and provide resource information as needed by the individual student.

In addition to the specific courses stipulated in the degree program, students must satisfactorily complete the following:

1. A minimum total of 128 semester hours, or equivalent, of acceptable and satisfactory academic work.
2. A cumulative grade-point average of at least 2.0 for all courses taken for credit at the University of Rochester.
3. A minimum of 32 hours of course work at the School of Nursing.

For registered nurses, a minimum of 32 hours of specified nursing course work must be completed in the School of Nursing to fulfill the residency requirement. This requirement, as well as other degree requirements outlined above, may be completed on a full- or part-time basis within a six-year period, for a minimum total of 128 credits overall.

Additional information about the nursing curriculum may be obtained by contacting: Office of Admissions, University of Rochester School of Nursing, Box HWH, 601 Elmwood Avenue, Rochester, N.Y. 14642, (716) 275-2375.

Bachelor's Degree cum Laude, Magna cum Laude, and Summa cum Laude

The School of Nursing recognizes outstanding achievement of its students by awarding these degrees.

The GPA levels used in determining honors are:

| | |
|-----------------|-----------------|
| Summa cum laude | — 3.8 and above |
| Magna cum laude | — 3.5–3.79 |
| Cum laude | — 3.3–3.49 |

Pre-Nursing Program

| | Hours | |
|--|-------|--------|
| | Fall | Spring |
| Freshman Year | | |
| CHM 103. General Chemistry I | 4 | |
| ENG 103. Writing and Thinking | 4 | |
| Free Elective | 4 | |
| SOC 101. Introduction to Sociology | 4 | |
| CHM 104. General Chemistry II | | 4 |
| PSY 101. Introduction to Psychology | | 4 |
| Humanities Elective | | 4 |
| NUR 101. Health in the Twenty-first Century (elective) | | 4 |
| | 16 | 16 |

| | Hours | |
|---|-------|--------|
| | Fall | Spring |
| Sophomore Year | | |
| NUR 212. Anatomy and Physiology I | 4 | |
| NUR 220. Human Growth and Development Through the Life Span STT 145 or 211. | | 4 |
| Humanities Elective | 4 | |
| NUR 213. Anatomy and Physiology II | | 4 |
| NUR 209. Microbiology Sociology or Anthropology Elective | 4 | |
| Free Elective | | 4 |
| | 16 | 16 |

Professional Nursing

| | Hours | |
|--|-------|--------|
| | Fall | Spring |
| Junior Year | | |
| NUR 200. Introduction to Nursing | 6 | |
| NUR 205. Basic Nursing Skills | 4 | |
| NUR 210. Nutrition | 2 | |
| Free Elective | 4 | |
| NUR 214. Pharmacology | | 4 |
| NUR 216. Nursing Care of Adults & Children | | 8 |
| NUR 218. Pathophysiology | | 4 |
| | 16 | 16 |

| | Hours | |
|--|-------|--------|
| | Fall | Spring |
| Senior Year* | | |
| NUR 252.** Community Health Nursing | 6 | |
| NUR 253.** Psychiatric Nursing | 6 | |
| NUR 217.*** Nursing Care of Adults and Children II | 6 | |
| NUR 255.*** Clinical Nursing Leadership | 4 | |
| NUR 390. Research | 3 | |
| NUR 305. Professional Issues | 3 | |
| Electives | 4 | |
| | 32 | |

*Seniors will take one curriculum plan in fall and the other plan in spring, depending on how the class members are grouped and on the number of students.

**These courses are taken concurrently during the first or second semester.

***These courses are taken concurrently during the first or second semester.

| | Hours |
|--------------------------|----------------------|
| | Fall, Spring, Summer |
| Offered 2 of 3 semesters | |

Nursing Courses for Registered Nurses Enrolled in the Baccalaureate Program:

| | |
|---|------------|
| NUR 360. Concepts and Process of Professional Nursing | 3 |
| NUR 361. Delivery of Professional Care | 3 |
| NUR 362. Comprehensive Nursing Assessment | 4 |
| NUR 252. Community Health Nursing | 6 |
| NUR 255. Clinical Nursing Leadership | 4 |
| NUR 305. Professional Issues | 3 |
| NUR 390. Research | 3 |
| NUR 000. Electives | 6 |
| | 32 credits |

These courses may be taken on a full- or part-time basis.

The undergraduate nursing curriculum continues to be revised. The School of Nursing reserves the right to alter programs, offerings, and requirements to enhance educational experiences for all students, based on enrollments and resources.

Registered nurses have the option to earn up to 30 credits by successfully completing the New York State Regents College Examinations in:

1. Fundamentals of Nursing
2. Maternal/Child Nursing (Baccalaureate Level)
3. Adult Nursing
4. Psychiatric Nursing

Registered nurses are encouraged to take NUR 360 or 362 as their first course in the nursing program. Information may be obtained by contacting the School of Nursing Admissions Office.

A combined baccalaureate-master's degree program in nursing is available for select registered nurses with defined career goals. NUR 360, 361, 362, 252, and 6 credits of electives constitute the 22 credits required in undergraduate nursing courses for the students admitted to the RN/BS/MS program.

COURSES OF INSTRUCTION

The following list gives a general indication of the courses that have been offered in the past academic year. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

101. Choices and Changes: Health in the Twenty-first Century. Credit—4 hours. This beginning-level course focuses on four determinants of health: lifestyles, environmental factors, genetic endowment, and health services. Emphasis is on individual choices and their health consequences. Topics such as genetic counseling, passive smoking, sexual practices, dietary preferences, stress factors, and exercise habits are explored. (Spring)

200. Introduction to Nursing. Credit—6 hours (3 credits theory and 3 credits clinical—12 hours per week). The course begins socialization to the role of the baccalaureate nurse and introduces the concepts of person, environment, nursing, change, health, and illness, as well as the subconcepts of nurse-patient relationships, nursing process, professional role development, patient education, health-care delivery systems, and the empirical base for nursing practice. The course builds on content from the social, behavioral, and physical sciences of the prerequisite courses. Students are provided with opportunities to apply these concepts by working with individuals and families in a variety of settings. Emphasis is placed on acquiring information and nursing techniques that can be used to help clients meet their basic self-care needs. (Fall)

205. Basic Nursing Skills. Credit—4 hours (2 credits theory, 2 credits clinical lab). The course focuses on those skills required for physical and psychosocial assessment of an individual and basic nursing interventions. A foundational nursing course offered to students enrolled in the School of Nursing the first semester of their junior year. Prerequisites: meet course requirements for entry into the School of Nursing. Independent study plus student-selected mastery time required. (Fall)

209. Microbiology. Credit—4 hours. This course introduces principles of general microbiology with major emphasis on control of microorganisms by physical and chemical processes. Medical microbiology focusing on pathogenicity; epidemiology of infectious diseases and immunology is included. (Spring)

210. Nutrition. Credit—2 hours. Course content includes study of the nutritional requirements of the normal human being. (Fall)

212–213. Human Anatomy and Physiology I & II. Credit—8 hours. A two-semester, sequenced offering which provides a broad examination of human anatomy and physiology. Intended as a basis for further study in the basic sciences or health care fields; appropriate for students with a variety of interests. (Fall and spring)

214. Pharmacology. Credit—4 hours. This course presents an introduction to drugs and their clinical implications for nursing. Mechanisms of drug action and pharmacologic effects are discussed. Classes of drugs, therapeutic uses, adverse effects, and drug interactions are emphasized. Prerequisites: CHM 103, 104, NUR 212, 213. (Spring)

216. Nursing Care of Adults and Children I. Credit—8 hours (4 hours lecture; 4 hours laboratory; 12 hours clinical per week). Integrates the concepts of person, environment, nursing, change, health, and illness into the care of individuals and families. Professional role development, nurse-patient relationship, nursing process, and patient education are important components of the course.

Primary clinical experience is in the nursing care of individuals and families in the acute care setting, with selected opportunities for home visits and experiences in outpatient settings. Builds upon knowledge gained in NUR 200 and in the social, behavioral, and biological sciences. Prerequisites: NUR 200, 205, 210, 213. (NUR 214 and 218 are pre- or co-requisites.) (Spring)

217. Nursing Care of Adults and Children II. Credit—6 hours (3 hours lecture; 16 hours clinical for 6 weeks). This is a theoretical and clinical course that inte-

grates the concepts of critical thinking, nursing process, health promotion, and restoration into the care of acutely ill individuals and families. It is designed to provide students with opportunities to deliver comprehensive nursing care in acute care settings. This course builds upon knowledge gained in prior social, behavioral, and nursing courses. Prerequisites: NUR 200, 216, 218. (Fall)

218. Pathophysiology. Credit—4 hours. Pathophysiology includes a study of the physiological changes that occur as a result of disease processes. It focuses on the disturbance of normal physiology and how such disruption is manifested. Knowledge gained in anatomy and physiology, microbiology, and chemistry is applied to the clinical setting. Prerequisite: NUR 213. (Spring)

220. Growth and Development through the Life Span. Credit—4 hours. This course focuses on selected psychologic, biologic, and sociologic bases of human development. Content includes conceptual frameworks and issues basic to the understanding of developmental needs beginning with conception and continuing through old age. Prerequisite: PSY 101 or equivalent. (Spring)

252. Community Health Nursing. Credit—6 hours (10–16 clinical hours per week). Using a nursing model, social support, and epidemiology as organizing themes, the students analyze individuals and families with health deviations. Students examine the dynamic interactions within the environment and the reciprocal adaptations involved while applying the nursing process. The health status of the community is studied with its current and changing needs and services. Levels of prevention are emphasized in the promotion of health for individuals, families, and the community. Prerequisites: NUR 200–216, 218. (Fall, spring, and summer)

253. Psychiatric Nursing. Credit—6 hours (12–16 clinical hours per week). This course continues the development of the major curriculum concepts of person, environment, nursing, change, health, and illness. Individuals, families, and groups are studied as target systems for nursing assessments and interventions

which are directed toward the promotion of mental health, the treatment and rehabilitation of mental illness, and the prevention of exacerbation or further development of mental illness. Prerequisites: NUR 200–216, 218. (Spring)

255. Clinical Nursing Leadership.

Credit—4 hours. In this course fundamental principles of complex organization, leadership, and management pertinent to the delivery of nursing care are analyzed. Direct application of content is achieved through clinical experiences in health care settings. Prerequisites: NUR 200–216, 218. (Fall and spring)

305. Professional Issues in Nursing.

Credit—3 hours. As part of society and one of the health professions, nursing is affected by the problems of society in general as well as by those that specifically affect the health care systems. Course emphasis is placed on a critical analysis of some of the issues, trends, and problems that impact the neophyte professional. It is expected that students will formulate and articulate their own position on divergent issues. A historical overview of nursing is presented for perspective on the present and future state of the profession. (Fall and summer)

360. Concepts and Process of Professional Nursing. Credit—3 hours. This course introduces the R.N. student to an examination of concepts, theories, and philosophies integral to nursing. Lecture/seminar format provides a forum for presentation and discussion of topics including professional role development, motivation for pursuing advanced nursing education, nursing as a science, and frameworks for nursing practice. (Fall and spring)

361. Delivery of Professional Nursing.

Credit—3 hours (8 clinical hours per week). This is a clinical course for R.N.s that focuses on the application of theories and conceptual models in the delivery of professional nursing. Students are expected to demonstrate use of critical thinking as they provide comprehensive nursing care to patients and their families directed to the promotion, restoration, and retention of health and/or comfortable, dignified death. Prerequisite: NUR 360. (Spring)



362. Nursing Assessment of the Individual. Credit—4 hours. Course content focuses on physical assessment, psychosocial assessment, interviewing, and history taking. It is designed as self-study modules to allow the student to develop knowledge and skills at the student's own pace in the Teaching Learning Center (TLC). Computer-assisted instruction, teaching modules, and a TLC are used to teach comprehensive assessment skills. The student will develop problem-solving skills through analysis of the assessment data. Individual study is supplemented with hands-on practice in the college laboratory under faculty supervision. (Fall and summer)

390. Nursing Research. Credit—3 hours. This introductory course is designed to provide the student with an appreciation of and a foundation for the development of research skills in nursing.

A major emphasis is on the preparation of students as users of knowledge from research in clinical practice. Emphasis is also placed on developing an appreciation for the role of scientific inquiry in the development of nursing knowledge and evaluation of practice. Prepares students for graduate-level courses in principles of nursing research. Prerequisite: statistics. (Fall)

Nursing Electives. Credit—2 hours.

Opportunity to gain indepth study of selected content areas related to patient/family care and health care delivery. Students select from several modules available in fall and spring semesters. Examples of topics available include: women's issues and nursing, cross-cultural nursing, ethical and moral dilemmas.

Non-nursing students need the written permission of the instructor and the Associate Dean for Academic Affairs to register for nursing courses.

Graduate School of *Education & Human Development*

Philip Wexler, Ph.D. (Princeton) *Dean*

PERSPECTIVES ON EDUCATION

Undergraduates who would like to know more about education and schooling are encouraged to study in the Graduate School of Education and Human Development (GSEHD). Issues such as the role of schooling in political socialization; the application of psychological theory and research to human learning and development; the ties among economic, social, and educational policies; the relations among race, gender, language, ethnicity, and class and schooling; the historical and philosophical foundations of teaching and learning; the uses of technology in human growth and development; and other matters of significance to contemporary society may be studied as part of work in other colleges of the University. A wide range of classes, seminars, field work, and independent study is available.

It is also possible to explore (and even begin specific careers) through GSEHD as an undergraduate. Students are encouraged to talk with any member of the School's faculty. General questions may also be directed to the Office of Academic Services, 304 Lattimore Hall, (716) 275-3950.

PREPARING FOR SECONDARY SCHOOL TEACHING

The Secondary Teacher Education Program is a joint program of the College of Arts and Science and the Graduate School of Education and Human Development leading to certification (grades 7-12) in English, social studies, mathematics, modern foreign languages, and the natural sciences—biology, chemistry, physics, earth science, and general science.

Students must complete five education courses and student teaching.

Application for admission to the Secondary Teacher Education Program should be made during the first semester of the junior year. Since New York State certification requirements do not necessarily coincide with the University's degree requirements, students considering a career in teaching should discuss their plans with a College of Arts and Science faculty advisor and a GSEHD subject area specialist as soon as possible.

ADMISSION REQUIREMENTS

1. Junior standing and evidence, including good academic standing, that certification and bachelor's degree requirements will have been completed by the end of the senior year.
2. A grade-point average of 2.5 or higher in the field selected for student teaching and an overall grade-point average of 2.0 or higher.

APPLICATION PROCEDURE

The following steps must be taken by students seeking admission:

1. Obtain instruction and application form from the Office of Academic Services, 304 Lattimore Hall, early in the first semester of the junior year.
2. Return completed application to the Office of Academic Services and receive interview assignments.
3. Meet with the assigned faculty advisors for interviews and (following admission) preliminary program planning.
4. Enroll, at the next regular registration, in the courses selected in conference with the assigned faculty advisors.

For applications and further information, contact the Office of Academic Services, 304 Lattimore Hall, (716) 275-3950.

FIFTH YEAR IN TEACHING PROGRAM

Recognizing the critical national, state, and local need for minority teachers, the University of Rochester has begun a unique program to encourage its minority undergraduates to enter the field of teaching. This program, Fifth Year in Teaching, provides full tuition to African-American, American Indian, and Hispanic University of Rochester graduates who are U.S. citizens or permanent residents. Students apply during the senior year and are accepted for full-time graduate study in the GSEHD's Master of Science or Master of Arts in Teaching degree programs leading to certification in teaching. Scholarships covering the cost of on-campus room and board are available for students with financial need; university loans (forgivable after one year of teaching) are available for students who are not eligible for scholarships. Graduates of this program are obligated to teach for one year in an urban school in the United States. For applications and further information, contact the Office of Academic Services, 304 Lattimore Hall, (716) 275-3950.

THE 3-2 PROGRAM IN HUMAN DEVELOPMENT

The 3-2 program offers an opportunity for qualified students to begin graduate study toward the Master of Science in Counseling and in Human Development degree during their senior year, and to complete the 45-hour master's program in one year of postgraduate study. Students may concentrate in psychological development, school guidance, or higher education counseling.



In the first year of the 3-2 program, students finish their undergraduate program and receive the bachelor's degree in their undergraduate concentration at the end of the senior year; they are simultaneously enrolled in the master's degree program, completing 15 credit hours of graduate course work that are part of credit-hour requirements for both degrees. In the second year, the final 30 hours are devoted to course work in the student's area of concentration, research projects, and field experience. A master's thesis is required.

ADMISSION REQUIREMENTS

1. Junior standing, with a grade-point average of approximately 2.8 or higher.
2. Evidence that the student's undergraduate concentration will be completed by the end of the junior year, or assurance from the concentration department that requirements for the bachelor's degree will be met by the end of the senior year.

APPLICATION REQUIREMENTS

1. Obtain application form, early in the junior year, from the Office of Academic Services, 304 Lattimore Hall, (716) 275-3950.
2. Schedule an appointment for an interview with an appropriate GSEHD faculty member.
3. Return completed application to the Office of Academic Services by February 15 of the junior year.
4. Upon admission, students will be assigned an academic advisor in GSEHD, so that a program of study may be planned.

For applications and further information, contact the Office of Academic Services.

EDUCATION AND SOCIETY

Since the industrial revolution, and particularly since the mid-nineteenth century, many people have equated education with schooling. In western societies, however, education has historically been a complex process involving the cultural transmission of knowledge through a variety of institutions, including not only schools, but also families,

peer groups, religious and social agencies, and the media. Educational practices and institutions are products of social processes and understandings; by studying them, a great deal can be learned about the social and political instantiation of ideas, beliefs, and values.

Faculty from the College of Arts and Science and the GSEHD are collaborating on the development of a new interdisciplinary major in education and society that will allow students to explore education in this broader social context. Further information on this program may be obtained from the Office of Academic Services, 304 Lattimore Hall, (716) 275-3950.

The following courses may be taken as part of an education and society major:

The Education of American Women: A Social and Cultural History. This course examines American women's experiences with education and as educators from the seventeenth century to the present. Topics covered include the following: women's role in family or domestic education; the gradual admission of women to formal schooling between 1800 and 1900; the "feminization" of the teaching profession; social class, racial, and ethnic differences among women as they affect education; women as academics; women in other educating professions, such as social work and journalism; and affirmative action. These themes are discussed within the context of American history, including economic and ideological changes as they relate to the social construction of gender.

Western Education in Historical and Contemporary Perspective. This course covers the broad area of education and socialization from the European Renaissance to modern America, considering the development of education in its social and historical contexts. Topics include the following: family structures and attitudes toward family life and child-rearing, domestic life and the education of women, social status and educational opportunities, primary schooling and literacy, the curriculum and peda-

gogy of secondary education, and educational change and school reform movements.

Biography, Autobiography, and the Creation of Knowledge. Team-taught by a psychologist and a historian, this course defines autobiography as the purposeful re-creation of the past in the present, by the self, in terms of what is socially and culturally possible at a given historical moment. Theories of biography are also investigated, including the following: biography as a model for cultural reproduction, biography as myth and symbol, educational biography, feminist biography, and psychoanalytic biography.

GENERAL COURSES: PERSPECTIVES ON EDUCATION

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are available in the Office of Academic Services, 304 Lattimore Hall.

Legal Issues in Medicine and Education.

This course provides an introduction to a set of legal problems common to the human services of medicine and education. Among the topics are abortion, the right of patients to refuse life-saving care and other forms of medical treatment, informed consent, the rights of the mentally ill, compulsory inculcation of the young, regulation of access to potentially harmful medical and educational treatments, malpractice suits brought against physicians and teachers, the right to medical care and education, inequalities in the provision of medical and educational services, and the rights of the individual physician and teacher.

Introduction to Children's Literature:

A Survey for Undergraduates. A survey of the major categories of books which make up the field of children's literature. Participants study the criteria used to evaluate the quality and validity of literary selections. Special attention is given to the role of literature in the lives of children.

School Governance and Rights of Students and Teachers. A review of individual constitutional rights of students and teachers, with emphasis upon the implication of those rights for school policy and administration. Selected issues in school governance are addressed.

Legal Research and Reasoning for Educators. This course introduces education students to the legal system, the finding of the law, legal reasoning, and legal problem solving. This is a generic course suitable for students pursuing careers in educational administration at all levels, as well as for prospective social studies teachers interested in the teaching of high-school law courses.

Race, Class, and Gender in U.S. Education. Whether and how schools (K-12) reproduce race, class, and gender inequalities are the focus of this course. The course integrates educational theory and teaching practices by analyzing recent changes in sociological and political explanations for social inequality, reviewing research on the reproduction and production of educational inequalities, and evaluating and implementing proposals for school and classroom reform.

Adolescent Development. A course designed to provide a better understanding of the adolescent student population for secondary teachers.

Language Development. An examination of the processes involved in language development. Developmental changes in syntax, semantics, phonology, and conversation are discussed. Theoretical and empirical research in the area of language acquisition are presented and evaluated.

Introduction to Learning and Learning Disorders.

An overview of cognitive processes in learning and learning disorders. Learning disorders are viewed from two related perspectives: theoretically—a way of understanding cognition and cognitive development, and practically—cognitive theory in educational practice. Topics include contemporary cognitive theory and research, intelligence, motivation, and creativity. The emphasis is on an understanding of practical cognitive activity in the context of everyday life.

History of American Education. This course defines education broadly as the formal or conscious transmission of culture in family life, colleges, peer groups, youth agencies, religious and cultural organizations, and the media. The processes of cultural transmission across four centuries of American history, beginning in the mid-1600s, are investigated, but the major emphasis will be on post-1900 themes. Issues of race, class, ethnicity, and gender are a key component of the course. Readings involve mostly primary sources, including novels, autobiographies, and newspapers, as well as selected biographies and works of historical interpretation.

Philosophy of Education. This course examines a small number of historically influential philosophical theories of education as a background to constructing a contemporary philosophical perspective on educational practice. The course focuses on theories of human development and of a just social order, and the role of these theories in guiding educational practice. Readings are drawn from such figures as Aristotle, Rousseau, Kant, and Dewey, and from the best of recent philosophical work on education.

Western Education in Historical and Contemporary Perspective. (See description above.)

The Education of American Women.

(See description above.)

History of Higher Education. An introduction to the history of the formal institutions of higher education, beginning with the medieval universities and emphasizing the American experience from the seventeenth century through the mid-twentieth century.

Liberal Education: Origins, Development, and Modern Debate. A historical investigation into the origins and development of discussion explicitly concerning liberal education and liberal arts, extending from ancient Athens to modern America. Emphasis is upon reading and discussing primary texts in English translation.

Professions in American Culture. Beginning in the colonial period, this course investigates the development of the idea of "profession" in American culture by way of examining the historical experience of the vocations of theology, law, medicine, and education.

Biography, Autobiography, and the Creation of Knowledge. (See description above.)

The Family and Social Dynamics. This course studies the family as a social institution, exploring how the family is related to other institutions and how this relation has changed historically. It considers the reciprocal relations of the family with forces external to it, and how it is constituted by, and articulated with, the lives of its individual members.

Sociology of the Life-Course. An examination of how the individual's biographical experience and view of his or her personal past and future are shaped, both by societal institutions and by interpersonal expectations. Maturation, aging, and developmental issues relating to family and career are examined in a variety of cultural and historical settings, but with special attention to contemporary society.

Social Organization of Work and Career. An examination of historical and cultural variations in the nature, content, and circumstances of work, as well as major theoretical issues related to these variations. Taught from a life-course perspective, this course gives special attention to the biographical development of work experience, to the concept of "career," and to factors accounting for alternative career patterns.

Cultural Studies in Education and Society. This course addresses the question of difference and diversity in social and cultural contexts. Cultural studies open up new ways of thinking about the everyday experiences of groups marginalized by race, class, gender, and ethnic difference. Educational studies raise questions about knowledge and cultural representations in educational encounters. A major assumption of this course is that an understanding of the dynamics of teaching and learning requires a foundational knowledge of the cultural processes which



operate within the context of schools. Through reflection on theoretical writings and fictional works, as well as film and other popular media, students will examine how culture is differently lived, represented, and signified, and how the politics of understanding and misunderstanding work through educational practices.

With the approval of the student's undergraduate academic advisor and the instructor, students are welcome to take

additional introductory graduate courses (400 level) in GSEHD.

For additional courses and further information on the Graduate School of Education and Human Development, consult the Official Bulletin: Graduate Studies or contact the Office of Academic Services, 304 Lattimore Hall, University of Rochester, Rochester, New York 14627, (716) 275-3950.

William E. Simon
Graduate School of
Business
Administration

Charles I. Plosser, Ph.D. (Chicago)
Acting Dean

Although undergraduate degrees in business are not offered, the William E. Simon Graduate School of Business Administration cooperates with other University divisions in offering the 3-2 program, through which a student can earn in five years, instead of the usual six, a bachelor's degree in his or her undergraduate concentration and a master of business administration degree.

THE 3-2 PROGRAM LEADING TO A B.A. AND AN M.B.A.

The Simon School cooperates with other University of Rochester colleges—and other colleges and universities—in offering a combined undergraduate and graduate degree program. The 3-2 M.B.A. Program allows students to earn both a bachelor's degree in an undergraduate major and a Master of Business Administration in five years, rather than the traditional six.

Students in the 3-2 program study for three years in their undergraduate major and complete major and distributive course requirements. Between January and March of their junior year, qualified students apply for admission to the Simon School. After acceptance, they take the first year of the M.B.A. program, rather than the traditional "elective" senior-year courses.

At the end of that year, 3-2 students should receive a bachelor's degree in their undergraduate major. They then complete the Simon School M.B.A. in one additional year.

3-2 PROGRAM FACTS

- A bachelor's degree and an M.B.A. degree are earned in five years.
- The program maintains all of the full-time M.B.A. program requirements.
- Admission to the 3-2 program is limited and is offered only to exceptionally well-qualified students.
- Students may enter in September or January.
- Some undergraduate preparation in economics, mathematics, or statistics is desirable but not required.
- Application to the 3-2 program is made during the junior year of the undergraduate degree program.

3-2 PROGRAM ADMISSION REQUIREMENTS

The 3-2 program requirements are the same as for the full-time M.B.A. program.

Applicants must

- have achieved outstanding scholarship in their first two and a half years of undergraduate study;
- have considered or have completed a business internship prior to commencing the M.B.A. program;
- have obtained their undergraduate department's permission to enter the 3-2 program;
- have scored well on the Graduate Management Admission Test (which they should take by January of their junior year);
- have interviewed with a member of the Simon School's Admission Office staff.

Transfer students may apply for admission to the 3-2 M.B.A. Program after completing two and a half years of study at another institution. Students should make certain their undergraduate school will accept the first year of the M.B.A. program as completion of the requirements for the bachelor's degree. Other

admission requirements are the same as those for University of Rochester students.

3-2 PROGRAM CURRICULUM

Students in the 3-2 program must meet the same requirements, and take the same core courses listed for the full-time M.B.A. program. Students are also required to pass the management-communication sequence, and the same options are available for concentrations and electives. The M.B.A. curriculum consists of 10 required core courses, nine required electives, a capstone course, and a noncredit management-communication sequence.

THE CORE

The core curriculum is taken during the first three quarters. Students who enter the M.B.A. program in September take the core curriculum in the fall, winter, and spring quarters. Students who enter the M.B.A. program in January take the core curriculum in the winter, spring, and summer quarters. During the first three quarters, students complete the 10 required courses, an internship elective, and the noncredit management-communication sequence.

The core curriculum provides a comprehensive general business education and serves as the foundation for advanced study in selected areas of concentration. The core curriculum is comprised of the following 10 courses: ACC 401, Essentials of Accounting; O&M 401, Managerial Economics; APS 401, Probability and Decision Analysis; CIS 401, Information Systems for Management; APS 402, Data Analysis and Forecasting; FIN 402, Capital Budgeting and Corporate Objectives; ORM 402, Management Science Models; MKT 402, Marketing Management; OMG 403, Operations Management; and O&M 403, Organization Theory.

Concentrations and Electives

Elective courses in each of the 10 areas of concentration are devoted to applying, implementing, and integrating the principles learned in earlier courses. These courses use case studies, reviews of current literature, or research projects with local corporations. Students are required to take nine elective courses and at least one integrative course in business policy or corporate strategy which serves as the students' M.B.A. capstone experience. Five or more of the elective courses must form a sequence of concentration; students may choose to concentrate in one or more of the following areas: accounting and information systems, corporate accounting, public accounting, business environment and public policy, computers and information systems, entrepreneurship, finance, marketing, operations management, and organizations and markets.

Courses from other schools and colleges of the University may also be taken, with M.B.A. Program Committee approval, when related closely to the student's area(s) of concentration.

APPLICATION INFORMATION

Priscilla Gumina
Assistant Dean for M.B.A. Programs
William E. Simon Graduate School of
Business Administration
Dewey Hall
Rochester, New York 14627-0107
(716) 275-3533

CONCENTRATIONS

Accounting and Computers and Information Systems

In response to the automation of major accounting functions in organizations, the Simon School has designed an integrated concentration in computers and information systems and accounting which provides thorough training in both areas.

Corporate Accounting

The corporate accounting major is actively recruited by corporations for positions in controller's, treasurer's, and internal auditing offices, as well as in accounting departments.

Public Accounting

This concentration meets the educational requirements of the State of New York for admission to the Uniform Certified Public Accounting Examination used by all states and has been registered with and approved by the Division of Professional Education, New York State Education Department.

Business Environment and Public Policy

This concentration provides students with the skills to understand the economic environment in which a firm operates for business success.

Computers and Information Systems

The computers and information systems concentration prepares graduates for management responsibilities in using computer systems and will enable them to provide organizations with successful management information systems.

Entrepreneurship

The entrepreneurship concentration allows the student to draw from a variety of carefully selected courses to become a business generalist well versed in organizing and managing resources and in assessing risks. The concentration is designed for graduates interested in entrepreneurship, start-up ventures, or running small businesses.

Finance

This concentration provides students with state-of-the-art techniques for financial analysis. Students learn to formulate and solve important corporate finance problems and learn to obtain information from the many data bases on financial markets.

Marketing

The marketing concentration continues to be a strong area of opportunity for graduates with an M.B.A. The concentration gives students excellent preparation for marketing research, marketing consulting, and product management.

Operations Management

Operations management is concerned with the managerial decisions by which a firm allocates and utilizes its physical, financial, and human resources to produce goods or services. The resurgence of interest in operational productivity has reinforced the demand for M.B.A.s with the ability to analyze resource management problems in manufacturing and service firms.

Organizations and Markets

This concentration focuses on the theory of the firm, also popularly referred to as price theory. There is a growing recognition that understanding the economics of corporate behavior is essential to managers for making sound business decisions. This concentration provides students with a solid foundation of this discipline.

RESEARCH ACTIVITY

Research activity at the Simon School includes independent research conducted by faculty and graduate students and other studies carried out at the School's research centers.

The *Bradley Policy Research Center* was established in 1966 to investigate the impact of government policy on business firms. The center has been recently reorganized to encompass three separate programs of research:

Macroeconomic Studies: This program supports research on topics such as business cycles, economic forecasting, and monetary and fiscal policymaking.

Industry Policy Studies: This program studies topics such as applied microeconomics, industrial organization, political economy, antitrust policy, industrial regulation, and privatization of public corporations.

Managerial Economics Research Studies: This program supports the study of economics and regulation of the market for corporate control, corporate finance, executive compensation, financial markets, and regulation.

The *Center for Manufacturing and Operations Management* is concerned with the management problems that confront manufacturing and service managers today. The focus is on reintegrating the manufacturing and operations functions into corporate strategy and developing a scientific understanding of manufacturing and service operations to provide line managers with a sound basis for decision making.

THE MANAGEMENT LIBRARY

The Management Library, located on the third floor of Rush Rhees Library, has seating for 160, carrels and open studies for 88 graduate students, and six research studies. In addition, the adjoining fourth-floor stacks house 50 student carrels and 32 studies.

The University libraries overall have resources of over two million volumes, and Rush Rhees Library is a depository for United States and New York State documents. It regularly receives more than 10,500 periodicals and serials, of which over 1,000 relate to management. The main library collections on business and economics (about 100,000 volumes) are adjacent to the Management Library.

With the help of two librarians, 10 to 12 student assistants, and clerical staff, the management librarian maintains extensive collections of reference, research, and reserve materials for the Simon School's use, including management, business, and economics periodicals. Corporate annual reports are available for approximately 6,000 companies. A special geographical file is maintained on economic conditions, along with an industry file of statistics and trends and a large file of research reports and working papers from other institutions.

THE SIMON SCHOOL COMPUTING CENTER

The William E. Simon Graduate School of Business Administration maintains its own computing center housed in a 4,500-square-foot area specifically designed for this purpose. All faculty and

administrative offices have been wired for connecting workstations, and most offices have terminal equipment or personal computers connected to the Center's communications systems.

The Simon School Computing Center has an IBM 4361 mainframe computer and a Hewlett Packard HP3000 Series 68. The IBM 4361 was provided by IBM as part of a \$2 million grant for use in research and instruction in the management of information systems. Both systems have been expanded by adding a variety of peripherals and software and are linked to more than 80 terminals located in offices, classrooms, and the Center itself. The Center also houses 40 IBM-compatible personal computers and 20 Macintosh microcomputers.

The Center houses a large library of computer programs and data bases to process and analyze information for a wide variety of purposes. Staff specialists and programmers are available to help students with programming problems.

As a result of the integration of the computer system into course work, the Center has become a focal point of student activity over the years. Students interested in improving their skills in computers will find numerous noncredit short courses available to them on a variety of topics. Together with the computers and information systems (CIS) concentration, these courses provide Simon School students with a wide range of options for learning how to use modern computer technology. The Center is open seven days a week, approximately 16 hours a day, and is available for remote use 24 hours a day.

THE PLACEMENT OFFICE

The Simon School maintains its own Placement Office, specifically designed to serve M.B.A. students and employers. The mean starting salary offered to 1990 M.B.A. graduates for positions in finance, marketing, and operations management was \$44,499. The Placement Office organizes a broad array of programs, including career seminars, a weekly noncredit career course, and frequent guest speak-

ers from a variety of firms. It also operates a New York Recruiting Program and a Boston Job Fair in which firms that have not recruited on campus are invited to interview students in New York City or Boston, respectively.

COURSES OF INSTRUCTION REGULARLY OPEN TO UNDERGRADUATES

The following list gives a general indication of the courses that have been offered in the past academic year, and, in some cases, courses that are new for 1991-92. Some courses are offered only in alternate years. Definitive course listings are distributed prior to registration.

The following courses are offered in both the day and evening sessions and are available to full- and part-time undergraduate students.

ACCOUNTING

201. Principles of Accounting. An introduction to the principles and procedures employed in analyzing business transactions, recording their financial effects, summarizing them in financial statements, and interpreting these statements. Not open to freshmen.

221. Cost Accounting. Study of the accounting problems involved in determining, analyzing, and controlling production and distribution costs, and income determination for financial statements. Budgetary control, standard costs, and other topics are discussed from the viewpoint of management use in planning and control. Prerequisite: ACC 201.

BEHAVIORAL SCIENCES IN INDUSTRY

241. Fundamentals of Personnel Administration. A survey of all aspects of human resources. Topics include strategic planning, staffing, training and development, compensation, benefits, health and safety, employee and union relations, and laws governing how organizations must treat people. Open to juniors and seniors only.

COMPUTERS AND INFORMATION SYSTEMS

150. Introduction to Computers in Management. This course provides a fundamental understanding of information system concepts, management needs for information, and basic computer architectures and software concepts. Emphasis is placed on the understanding of the practical role of computers as a key element in the production of management information. Current versions of PC-based software implementations of relational databases, electronic worksheets, and statistical analysis are used by the students to implement several of the business system models discussed in class on both Macintosh and IBM or IBM-compatible personal computers.

215. Foundations of Management Information Systems. A survey of information system technology and its application to the various functional areas of business. Topics include a complete overview of computer hardware and software, introduction to systems analysis, database management systems, data communications, system development and acquisition, management of computing, and analysis of the strategic considerations of information systems for business. Prerequisite: one of CIS 150, EE 171, OPT 105, CSC 110, CSC 181, or any 200-level CSC course.

225. Data Management. An in-depth study of data management, data processing, and database techniques. Topics include input and output processing; data structures; sequential, direct, and indexed access methods; report generation; and theory and practice of database management systems. A high-level data processing language (COBOL) is used by students for file processing. The design, operation, and management of database systems are practiced using a relational database product (SQL/DS). Prerequisite: CIS 215.

FINANCE

205. Financial Management. This course provides a market-oriented framework for analyzing the major types of financial decisions made by corporations.

Discounted cash-flow techniques are introduced and applied to the capital budgeting problem (the choice among alternative investment projects) and financial asset valuation. Security markets are discussed and topics of capital market efficiency and portfolio theory are introduced. The effects of capital structure and dividend policy on the value of the firm are analyzed. Prerequisites: ACC 201; ECO 207 or equivalent.

GENERAL BUSINESS ADMINISTRATION

157. Fundamentals of Business Administration. An introduction to the principal activities, responsibilities, types of policy problems, and interrelationships of the main phases of business, including personnel, production, marketing, and finance. Frequent use is made of business cases for illustrative purposes and to introduce the student to the method of business problem analysis. Not open to freshmen.

291. Reading Course. Independent study in some specific area of business administration, at a level advanced beyond that of regular course offerings. Prerequisite: written approval of the supervising faculty member.

LAW

205. Business Law. A study of basic principles in several fields of law of significance to businesses and other organizations, including constitutional law, contracts, and business torts. This will be preceded by a review of certain environmental and historical aspects of the law, including the legal processes by which our laws are created, and the functions of the courts. Throughout, the emphasis is on developing an understanding of the reasoning process used by the courts to resolve disputes and define new law. Open to juniors and seniors only.

MARKETING

203. Marketing. Problems involved in the movement of goods from producers to consumers and industrial users through the different channels of distribution. Analysis of the marketing

functions performed by manufacturers, wholesalers, retailers, agent middlemen, and market exchanges. Critical analysis of major marketing policies. Evaluation of such topics as pricing, branding, choice of distribution channels, selective selling, and the planning and administration of sales programs. Not open to freshmen.

213. Marketing Projects and Cases. This course concentrates on the practical application of sound marketing principles. The specific business situations involve the student in analyzing the available information and in developing appropriate marketing plans. Recommendations regarding prices, communications, and distribution channels are evaluated against the context of customer needs and competitive positions. Practical guidelines for analyzing problems and for creating plans are developed involving cases, guest speakers, readings, lectures, and projects.

OPERATIONS MANAGEMENT

231. Operations Management. The course discusses problems encountered in managing the production of goods and services, and models and techniques for dealing with these problems. Emphasis is on developing analytic insight into selected models which have proved useful. Topics include strategy and tactics, decision theory, forecasting, production management, material planning, project planning, and quality control. Video presentations and case discussions are also included to gain practical insights into the operations function. Not open to freshmen.

For further information on the William E. Simon Graduate School of Business Administration, consult the Simon School catalog or write to Priscilla E. Gumina, Assistant Dean for M.B.A. Programs, William E. Simon Graduate School of Business Administration, University of Rochester, Rochester, New York 14627-0107.

Academic Services & Information

ACADEMIC SUPPORT SERVICES

In addition to consulting their faculty advisors, all undergraduate students in the College of Arts and Science are strongly encouraged to use the services of the College Center for Academic Support throughout their college careers. The professional advisors in this office assist students in arranging their programs, suggesting courses, obtaining faculty advisors, and making the unavoidable paperwork as simple as possible. Preliminary questions concerning interdepartmental studies and many other concentrations will be answered. The Study Abroad Office, University Tutoring Program Office, and Orientation Program Office are located in the Center in 312 Lattimore Hall. Immediately adjacent to the Center the Academic Information Counter serves as a focal point for satisfying quickly many routine academic inquiries, for making immediate appointments or walk-in arrangements to see an academic advisor, and for providing fast referrals to other offices. The counter is open on weekdays from 9 a.m. to 5 p.m., including the period from noon to 1 p.m. Most College of Arts and Science forms and general academic materials can be picked up at this counter. Students should feel free to consult members of the staff whenever they have questions about courses, degrees, or any other academic matter.

The College of Engineering and Applied Science offers academic advising through a faculty advising system and the Dean's Office, 401 Dewey Hall.

The Graduate School of Education and Human Development offers advising and information assistance related to programs in education through its Office of Academic Services, 304 Lattimore Hall, and through faculty of the school.

PROGRAM PLANNING

One of the University's goals is to help undergraduates plan an integrated program of study which will provide intellectual satisfaction and challenge. Program planning with the help of faculty advisors begins during Summer Orientation and continues throughout a student's academic career at Rochester. Discussions with faculty and professional staff advisors are useful in working out a schedule of courses for a particular semester as well as an overall plan for future semesters. Many special services designed to assist undergraduate students are described below.

FACULTY ADVISORS

Freshmen interested in degree programs in the College of Arts and Science continue the advising relationship with their freshman advisor begun during Orientation throughout their first year. After being admitted to an area of concentration at the end of the sophomore year (or after completion of 16 courses in the case of part-time students), students are assigned faculty advisors in their area of concentration.

Students interested in degree programs in the College of Engineering and Applied Science have faculty advisors assigned to them at the beginning of the freshman year and are encouraged to consult with them frequently.

Students entering the University with a declared interest in nursing will be assigned a School of Nursing faculty advisor. Students interested in exploring nursing as a career option should contact the Office of Admissions at the School of Nursing, (716) 275-2375.

PROGRAM PLANNING WORKSHOPS

During Summer Orientation sessions, faculty members representing all River Campus academic areas are on hand to assist new students in choosing and registering for courses. In November and in April, during a period called "early registration," students already enrolled who have financial clearance from the bursar select their courses and submit their class schedules for the following semester to the registrar. Each semester, just prior to early registration, the College Center for Academic Support coordinates advising-related events where students may obtain help in planning programs, concentrations, and sorting out the ways in which academic goals may be fulfilled.

REGISTRATION

Entering students register for their courses during one of the orientation programs scheduled during the summer. Returning students who have received financial clearance from the bursar may register during the early registration periods scheduled in November and April. A person is not considered a student until registered.

Students who have not received financial clearance before the early registration periods will forfeit their priority for course selection and lose the opportunity to participate in the room drawing procedure.

In cases where students settle their accounts after the early registration period, the bursar's office will notify the registrar's office that the student is cleared for registration. Cleared students may then submit their registration and apply for on-campus housing. Should accounts remain unsettled at the end of the term, the bursar's office will refer such cases to the dean of the student's college for withdrawal for financial reasons.

UNIVERSITY

TUTORING PROGRAM

The University Tutoring Program is administered through the College Center for Academic Support. This University-wide service offers, through a carefully selected group of tutors, supplementary tutorial assistance to students based on their individual needs. The tutor's role is to help provide the student with a better understanding of the subject and to help discover and remedy the cause of the difficulty.

Students interested in tutorial assistance should apply at the College Center for Academic Support. Financial help to those students needing it may be arranged upon recommendation of the Financial Aid Office.

Only tutors approved by the University Tutoring Program are paid for their services. Students wanting to become tutors are welcome to apply at that office.

STUDY SKILLS CENTER

Counselors in Learning Assistance Services, 124 Lattimore Hall, offer help in study skills and math by talking with students individually and helping them to develop strategies for studying more effectively and efficiently. Tutors in the Humanities Writing Center, 100 Morey Hall, help students to examine their written work, correct problems, and make appropriate revisions. (See page 215.)

COURSE DEFINITION

The ordinary unit of undergraduate instruction is the course. Most courses numbered between 100 and 399 carry the equivalent of four hours of credit. Some courses carry one, two, or three credit hours. Every four-hour course requires approximately one-quarter of the student's working time for one term. Restrictions concerning prerequisites and approval required are noted in each semester's schedule of courses and must be observed carefully. In some cases, special forms are required and may be obtained in the appropriate advising offices.

PROGRAM OF COURSES

A normal schedule for regularly enrolled students is four courses per semester. This permits completion of the 32 courses required for graduation in eight semesters. Full-time students are expected to take four years for the degree. A few accelerate. Others occasionally find it necessary to make up work during the summer. Taking extra credits is not considered a means of speeding up the timetable for attaining a degree, but rather a means for enriching an academic program. Only students with a "B" average or better are permitted to take more than 19 credit hours per semester. This is referred to as an "overload." For full-time students, fewer than 14 credit hours is termed an "underload." First-semester freshmen are not permitted an overload. Both overload and underload programs must be approved by the dean of the college in which the student is enrolled. If credits in excess of the standard four-course load are used to accelerate, a retroactive tuition adjustment will be assessed for all credits in excess of the normal 16-hour course load per semester counting towards degree requirements.

**Noncredit course fees:* All persons attending noncredit courses must pay fees as announced for these courses. If they are organized outside the normal academic framework, noncredit courses may not be covered by the usual blanket undergraduate full-time tuition.

Course Numbering System

- 001-099** Noncredit courses*
- 100-189** Introductory courses—usually at the freshman and sophomore level; no graduate credit
- 190-199** Freshman preceptorials
- 200-299** Courses at the junior and senior level that may also carry graduate credit
- 300** Study abroad
- 301-399** Experimental courses, independent courses, courses toward degree with distinction or honors
- 400-489** Graduate courses at the master's level or the first year of graduate study; open to undergraduates by special permission
- 490-499** Master's-level reading or research courses
- 500-589** Advanced or specialized graduate courses—usually at the doctoral level
- 590-599** Doctoral-level reading or research courses

CLASS ATTENDANCE

Each instructor sets the regulations regarding attendance for each class; many do not make class attendance mandatory. However, consistent absence from class may determine whether or not students pass a course. When it is necessary to be absent because of travel or illness, students are expected to make arrangements with instructors for catching up on class work they miss.

Students may wish to contact University Health Service (UHS) when an illness causes them to be absent from class and they believe medical certification will be required by the course instructor. If a student has been seen by a Health Service provider during the course of an illness, the UHS, upon request of the student, will be able to document the knowledge of the illness or restricted activity. Students who are treated elsewhere may request that documentation from the person who provided the care be submitted to the Health Service.

STUDENT RETENTION

Of the 1,212 full-time, first-time freshmen who enrolled at the University in the fall of 1984, 75 percent had graduated by the spring of 1990.

SPECIAL ACADEMIC OPPORTUNITIES

Students are encouraged to take courses offered by any University of Rochester school or college—or study elsewhere if necessary—to fulfill academic goals. Admission to certain courses requires special permission. Usually, this means permission of the instructor, whose signature is then required on the registration form. Special requirements must be met in the following instances:

Affiliated Area College Courses. Students who wish to take a course at one of the area colleges in order to complement their programs of study may obtain information and registration forms at their colleges' advising offices or the Office of the University Registrar. Grades received in approved courses are noted on the transcript, except for freshmen, but are not used in computing the grade-point average.

Applied Music Courses at the Eastman School of Music. Students desiring to enroll in one of these courses should consult the Music Advisor on the River Campus. Application forms for applied music courses are available from the Music Office, Todd Union.

Audited Courses. If a student plans to participate in class sessions and work without earning a grade for a course, and without earning credit toward a degree, the course may be included in the class schedule at the time of registration. There is no extra cost for matriculated full-time students, but permission of the instructor is necessary. The audited course will not appear on the transcript.

Freshman Preceptorials. Announcements of these offerings are advertised prior to each semester. Enrollment is by application; materials are mailed to freshmen in the summer for fall courses and are available in the advising offices

for spring courses. These courses may be used to satisfy foundation requirements.

Graduate Courses. Qualified undergraduates may, with the written permission of the instructor and the approval of their dean, register for graduate-level courses.

Honors Seminars. Special application is required in some cases. Courses and restrictions are listed in the schedule of courses.

Independent Study Courses. Formal arrangements must be made with appropriate faculty members for these special reading or research courses. An Independent Studies Form is submitted to the appropriate college advising office at the beginning of the semester. At the conclusion of the term the instructor provides a written evaluation of the student's progress using the form on which the student has described the nature of the course. The Independent Studies Form and the evaluation are kept in the student's academic file. Students are eligible to apply for a 4-credit-hour independent study course each semester. Independent study courses required specifically for a concentration are listed under departmental offerings. Internships provide another kind of independent study.

Internships. In the College of Arts and Science, these off-campus learning experiences require that arrangements for academic credit be made by the end of the third week of the semester. A maximum of eight hours of credit for Rochester-area internships may count toward the degree. Students who obtain approval from the Internship Committee for work outside the Rochester area may receive as much as a full semester's credit toward their degree. Admission to some programs is highly selective. Questions should be addressed to the College Center for Academic Support in 312 Lattimore Hall.

The College of Engineering and Applied Science cooperates with private industry to provide internships to selected undergraduates. Applicants for internships are screened by the department chairs and

the dean; final selection is made by the company. Interns are paid for their work experience and thus do not receive academic credit. However, written evaluations of the work experience, both by the student and the employer, become part of the intern's academic record. There is opportunity for a second work block.

Perspectives. A list of the special courses designated as Perspectives is released prior to early registration. No application is necessary. Perspectives may be used to satisfy foundation requirements. (See page 35.)

Study Abroad. Information about the various programs sponsored by the University of Rochester and about other opportunities for study abroad is available in the College Center for Academic Support in Lattimore Hall. (See page 26.)

Summer School Courses. Day and evening courses in a variety of fields are offered in several sessions each summer at the University. Grades earned in these courses are calculated into the cumulative grade-point average, and credit toward the degree is awarded for courses in which passing grades are earned. Credit for summer study at other institutions may require approval from the department offering comparable work at the University of Rochester. Approved summer work at other institutions completed with a grade of "C-" or better is recorded in terms of course credit, but the grades are not used in computing the student's cumulative average. Further information and approval forms are available at the colleges' advising offices.

Ventures. These integrated course sequences for freshmen (described on page 33) are open by application. Courses taken as part of a Venture may be used to satisfy foundation requirements. Materials are mailed to freshmen before Summer Orientation.

Double Majors

Students enrolled in the College of Arts and Science or in the College of Engineering and Applied Science may choose to pursue two concentrations, provided that both lead to the same bachelor's de-

gree. In most instances students may do so by fulfilling concurrently the concentration requirements determined by each of the two departments and by receiving written permission (usually on the concentration forms) from the respective concentration advisors to pursue a double major in the other area. Questions concerning double majors can be addressed to the colleges' advising offices and the appropriate concentration advisors.

Double Degrees

Students who plan a program leading to more than one baccalaureate degree, such as the Bachelor of Arts and a Bachelor of Science, are required to meet all requirements for each degree and to augment the minimum number of courses or credits usually required for either degree. The amount of augmentation will be determined individually by faculty members and deans in each area, taking into account the quality of work submitted. The approval forms are available in the deans' offices of the colleges awarding undergraduate degrees. Students who wish to complete work in two areas of concentration as part of a single degree need only obtain approval for each concentration and for the double major (see Double Majors above). The requirements for double degrees within the College of Engineering and Applied Science are specified on page 165.

Minors

Students may choose to minor in one of the several dozen areas available to them (see list of minors, page 13). One minor is permitted students with a single major concentration; students who complete two concentrations (double major) may not have a minor. Students are eligible to declare a minor after they have been accepted into a concentration and before the end of the first semester of their senior year.

ACADEMIC PROCEDURES

Full-time students are subject to the following regulations. Part-time students should check with their college of enrollment for any variations in regulations.

Course Changes

Students register for their courses during early registration or at Summer Orientation, as described earlier. They may later change their programs and withdraw from a course, add a course, or drop one course and substitute another. These changes are made on a Change Notice (drop-add form) that may be obtained from the appropriate advising office or registrar's office. Change Notices may be filed at the specified time (about three weeks after early registration and again at the beginning of the semester) until the deadline for the particular action, as described below.

Students in the College of Arts and Science may add independent study courses through the third week, and other courses through the fourth week, with the instructor's written approval, and drop them without penalty through the last day of classes, providing the instructor has been informed. Courses from which students have withdrawn will not appear on their transcripts. The advising record will, however, show a "W" and the week of the semester in which the course was dropped for all actions taken after the fourth week.

Students in the College of Engineering and Applied Science may add or drop a course during the first seven weeks. Courses added require the instructor's signature. Courses which are dropped in the first seven weeks will be deleted from a student's record. The signatures of the faculty advisor and the associate dean are required. To drop a course after the seventh week, a student must obtain the signatures of the instructor, his or her advisor, and a dean of the college. The instructor has the option of refusing to sign the change notice; in this case, the instructor will assign the letter grade the student has earned at the end of the semester. No record of withdrawals will show on the official transcript.

Students in the School of Nursing may not add courses after the start of the semester; courses may be dropped until classes end with the permission of the Associate Dean for Academic Affairs and the faculty advisor.

In all colleges, course changes can be made only if the college's deadline is met, if the instructors of the affected courses approve, and if the change meets the provisions outlined earlier for overload or underload schedules. Students in the College of Engineering and Applied Science must also obtain the approval of their faculty advisor and the associate dean.

Student Petitions

The faculty of each college establishes degree requirements within that college. The faculty recognizes that there are instances in which interpretations are required and exceptions should be made. The Administrative Committee of each college, comprising both faculty and students, reviews requests for exceptions to faculty regulations.

Students seeking exceptions to regulations submit a written petition to their advising office for review by the appropriate committee. It is an advantage to discuss the content of the petition with a faculty or academic advisor before submitting the petition. Students will be informed in writing of the committee's action.

Satisfactory-Fail Option

Undergraduate students are encouraged to venture outside areas of their concentration, investigate new disciplines, and discover new, perhaps unsuspected, interests. The satisfactory-fail option may reduce anxiety about electing a course in an area in which the student has had little or no prior experience.

Students enrolled in the College of Arts and Science and the College of Engineering and Applied Science may elect to take one course per semester up to a maximum of eight courses and receive grades of Satisfactory (S) or Fail (F). The grades "S" and "F" do not affect the cumulative grade-point average.

Instructors assign and submit regular letter grades for students choosing this option, as they are not informed which students have elected the option. The registrar records "S" for letter grades "A" through "D-" or "F" for the letter



grade "E" on the student's permanent record, retaining the letter grades "A" through "E" on file. Students who are interested in conveying maximum information on the transcript to professional and graduate schools should speak to an advisor prior to electing the option.

Students enrolled in the College of Arts and Science may declare the option in the College Center for Academic Support through the fourth week of classes and, except for transfer students in their first semester who may change or declare the option through the thirteenth week of the semester, the option may not be changed. The option may not be elected for courses used to fulfill concentration or foundation requirements, including the upper-level writing or foreign language requirement.

Students enrolled in the College of Engineering and Applied Science may declare the option in the Dean's Office, Dewey Hall, through the fourth week of classes. Once declared, the option may not be changed. Students planning degrees from the College of Engineering and Applied Science should note that courses taken with the satisfactory-fail option may be used to satisfy distribution or English requirements (see page 163) or as free electives for an engineering degree. Further, all courses taken beyond those required for a degree may be taken with the option.

Students enrolled in the School of Nursing may exercise the satisfactory-fail option for one elective course per semester (four credits). Students may declare the option through the Associate Dean's Office in Helen Wood Hall through the fourth week of classes; the option may not be changed.

Procedure for "Incomplete"

If a student in the College of Arts and Science or the College of Engineering and Applied Science is unable to complete course work by the end of the semester, a form requesting a grade of "Incomplete" should be obtained from the student's college advising office. This form, indicating the work outstanding, the deadline for its completion, and the action to be taken if the work is not completed must be signed by both the student and the instructor and submitted to the appropriate college office. In both colleges, the student's failure to submit the form, or to complete the course work, may result in the assignment of the grade of "E" for the course. Only after a final grade has been submitted, whether passing or failing, will the course appear on the transcript of students in the College of Arts and Science and the College of Engineering and Applied Science. The grade of "I," however, will appear on the advising record.

In the School of Nursing, a student receiving an "Incomplete" must complete the course work prior to the beginning of the following semester. A form requesting the "Incomplete" grade may be obtained from the Office of the Associate Dean for Academic Affairs in Helen Wood Hall and must be completed according to the instructions on the form. Failure to file this form will result in a grade of "E" for the course.

Repeating a Course for a Grade

There are times when students wish to demonstrate on their official record that they understand the material better than their grades indicate. Students are encouraged to discuss with their advisors the appropriateness of retaking a course for a better grade. When a course taken at Rochester is repeated for a grade, both

course registrations and both grades appear on the advising record, but only the second (not necessarily the better) grade is used to calculate the grade-point average. Only the second registration and grade appear on the transcript unless the student requests that both be listed. Forms for reporting a repeated course are available in the colleges' advising offices or the registrar's office.

Senior Year in Absentia

Students in the College of Arts and Science who are admitted to a professional or graduate school at the end of their junior year may be eligible to spend their senior year *in absentia*. All college and concentration requirements should be completed by the end of the junior year. Those students considering a senior year *in absentia* should discuss the possibility in the College Center for Academic Support and petition the Administrative Committee for approval. If *in absentia* status is approved, the student will earn a baccalaureate degree from the University of Rochester following successful completion of the first year in the graduate or professional program. Students who have spent their junior year abroad will not receive approval to spend the senior year *in absentia*.

Because a student's most advanced work can be done in the senior year, the College of Engineering and Applied Science and the School of Nursing do not encourage their students to take that year *in absentia*. Students interested in attending other colleges as special students or in beginning medical or law school early should consult their faculty advisors.

Withdrawal and Inactive Status

Students who contemplate withdrawal from the University should consult their colleges' advising offices. Failure to notify the appropriate dean's office of intended withdrawal by the date specified in the calendar will result in forfeiture of the enrollment deposit.

Students wishing to spend a semester or more away from the University to work, to travel, or to study at another institu-

tion may apply for "inactive" status in their advising offices. Those students who are placed on inactive status pay a nominal fee and receive preregistration materials. Housing priority is assigned in accordance with their classification.

Students holding residence halls contracts who withdraw or are withdrawn from the University for any reason should be aware that their residence hall contracts are automatically cancelled upon receipt of a withdrawal notice from the appropriate advising offices. Withdrawn students have no further claim to their assigned space. Students who are reinstated by the University and who wish to live in the residence halls must submit a new contract, and they will be placed on a space-available basis. These conditions also apply to students *in absentia*, Study Abroad or in internship programs, and students going on inactive status who change their plans and request reinstatement for the semester in which they originally had intended to be away.

Adjustment of Charges, Withdrawal and Inactive Status

For students who withdraw or declare inactive status during the first four weeks of the semester, or who change from full time to part time, tuition will be adjusted according to the schedule that follows. A class week is defined as seven calendar days dating from and including the first day of classes of a semester. The period for tuition adjustment will be measured from the beginning of classes to the effective date of the change determined by the appropriate academic dean's office.

Withdrawal or declaration of inactive status, or change from full time to part time, during

| | |
|--------------------|--------------------------|
| First week: | 80% reduction of charges |
| Second week: | 60% reduction of charges |
| Third week: | 40% reduction of charges |
| Fourth week: | 20% reduction of charges |
| After fourth week: | No reduction of charges |

The room and board charges will be adjusted on a daily prorated basis measured from the beginning of the contract period to the date of contract termination.

For students withdrawing or declaring inactive status or changing to part-time status for medical reasons, tuition refunds will be calculated after consultation with University Health Service and the appropriate academic dean's office.

Withdrawal from the University

Students contemplating withdrawal from the University need to complete the following two-step process:

1. Matriculants in the College of Arts and Science need to consult with an advisor in the College Center for Academic Support. Matriculants in the College of Engineering and Applied Science and the School of Nursing need to consult with a representative in their dean's office.
2. Complete the withdrawal process in the Office of the University Registrar. Students who comply with this process will be able to expedite their formal withdrawal from the University.

Failure to complete this two-step process by the published deadlines will result in forfeiture of the enrollment deposit.

Adjustment of Financial Aid, Withdrawal and Inactive Status

Because financial aid is based upon total anticipated costs, adjustments in these costs because of withdrawal ordinarily will result in a reduction of previously committed financial assistance. The calculation of the reduction will be made by the financial aid officer after verification of the date of withdrawal by the dean and the determination of actual costs by the bursar and the directors of University Services and of Residential Life.

Inactive students studying at another institution are not eligible for University-administered financial aid.

Completion of a consortium agreement, however, may allow such students to receive their Stafford Loans, Pell Grants,

and, if attending another New York school, Tuition Assistance Program grants.

Determination of Student Status

The University retains the right to determine the student's status within the University. The University has discretionary powers to maintain a student's enrollment, to grant academic grades, to authorize graduation, or to confer any degrees or grant any certificates. Each student concedes to the University the right to require the student's withdrawal at any time for any valid reason, including failure to pay the term bill.

THE GRADING SYSTEM, TRANSCRIPT, AND DEGREES

Grades

The undergraduate grading system for all River Campus colleges is as follows:*

| Letter Grade | Performance Level | Grade Points |
|--------------|----------------------------|--------------|
| A | Excellent | 4.0 |
| A- | | 3.7 |
| B+ | | 3.3 |
| B | Above Average | 3.0 |
| B- | | 2.7 |
| C+ | | 2.3 |
| C | Minimum Satisfactory Grade | 2.0 |
| C- | | 1.7 |
| D+ | | 1.3 |
| D | | 1.0 |
| D- | Minimum Passing Grade | 0.7 |
| E | Failure | 0.0 |

Grades which carry no grade points:

| | |
|----|--|
| I | Incomplete |
| W | Withdraw without effect on the grade-point average |
| P | Pass (mandatory grading system in certain courses) |
| S | Satisfactory (Satisfactory-Fail option) |
| F | Failure (Satisfactory-Fail option) |
| CR | Credit (for certain music ensembles) |
| NC | No credit (for certain music ensembles) |

*As of January 1986 the College of Engineering and Applied Science voted to do away with the grades of D+ and D-.

Freshman Transcript Policy

Because grades are the most common medium of communication between faculty and students about academic progress, faculty members grade freshmen as they do upperclassmen. Within the University, all advice and decisions (such as the Dean's List and academic probation) are based upon the grades that freshmen earn. The official University transcript for the freshman year, however, reports only the courses that were successfully completed and the corresponding credits earned. The grade point average is based only on grades earned in the sophomore, junior, and senior years.

Dean's List

An overall semester grade-point average of 3.0 and completion of four full courses, at least three of which have normal letter grades, are required for a student to be named to the Dean's List. For example, a student who receives grades of "A," "B," "B," and "C" would have a 3.0 grade-point average and would qualify for placement on the Dean's List.

For the College of Engineering and Applied Science, Dean's List appointment requires a 3.0 grade-point average or better and the completion of 15 semester hours. Graduating seniors who underload are exempt from the semester credit-hour requirement.

For the School of Nursing, Dean's List appointment requires 3.0 grade-point average or better and the completion of at least 12 semester hours taken for letter grades.

Probation and Separation

The colleges regularly review the academic progress of registered students and act to place on probation or separate those not meeting these standards:

- An overall (or cumulative) grade-point standing for all semesters completed of at least 2.0
- A grade-point average for the latest semester of at least 2.0
- Acceptance into an area of concentration before achieving junior standing and, once accepted, a grade-point average of at least 2.0 in the courses submitted for the concentration.

Usually, a college warns a student of impending difficulty by placing him or her on probation for a semester before considering separation. Students on probation are encouraged to seek advising, tutoring, and counseling assistance. Their advisors are notified of students' academic difficulties, as are the Department of Sports and Recreation (for students on intercollegiate teams), the Director of Minority Affairs (for minority students), and the Department of Naval Science (for students affiliated with the NROTC Program). Any student whose enrollment is continued will be considered in good academic standing.

The dean of the college can be asked to review actions on separation. Any request must be made in writing. Reviews are granted only when pertinent new evidence is presented.

Financial aid for students on probationary status is subject to adjustment. Federal and New York State aid recipients must meet standards of satisfactory academic progress in order to remain eligible for these awards. Additional information about these standards is available from the Financial Aid Office or the University registrar.

Academic Honesty

Cheating or plagiarism is a concern not only of the student and the professor involved, but of the entire University. Each student is expected to perform all required work without improper or unauthorized help.

Findings of guilt or innocence in cases of suspected academic dishonesty are decided by the Board on Academic Honesty, not by individual faculty members or proctors. When a complaint is received by the chair of the board, the student's entire file is reviewed and a decision is made whether or not to bring a charge of academic dishonesty. After due notice to the student, the board hears and decides the case, giving the student a fair opportunity for defense against the charge.

The board forwards its findings, the complete file on the student, and its rec-

ommendation for action to the dean of the student's college. Appeals from penalties imposed by the dean may be made to the Office of the Provost.

Grade Reports

Students receive grade reports from the registrar's office at the conclusion of each semester. The report includes: courses taken, grades received, credit hours earned, and semester and cumulative grade-point averages. Freshman grade reports will include only the semester grade-point average. The University reserves the right to withhold grade reports in the event of an outstanding balance owed the University.

For University policy regarding reports to parents, see University Records, page 238.

Academic Transcripts

Official academic transcripts, which include a record of the student's entire undergraduate program, are issued by the registrar's office to other institutions or prospective employers at the student's written request. Grades for the freshman year do not appear on the transcript. The University reserves the right to withhold academic transcripts in the event of an outstanding balance owed the University.

Bachelor's Degree Cum Laude, Magna Cum Laude, and Summa Cum Laude

The College of Arts and Science recognizes outstanding college-wide achievement of its students by awarding these degrees. The dean of the college assigns the levels of award, based on criteria established by the Steering Committee of the Faculty Council.

Bachelor's Degree with Distinction, High Distinction, and Highest Distinction

The College of Arts and Science recognizes quality of performance in a concentration by awarding the degree with "distinction," "high distinction," or "highest distinction." Each department establishes its own criteria for the varying levels of distinction subject to the approval of the College Curriculum

Committee and the Steering Committee of the Faculty Council.

The College of Engineering and Applied Science recognizes outstanding achievement with levels of distinction. Each department may establish its own criteria for distinction subject to the approval of the Administrative Committee of the College. A student shy of the minimum grade to attain distinction may be able to qualify by completing a special paper or project.

Bachelor's Degree with Honors

Certain departments in the College of Arts and Science offer programs of study leading to the degree "with honors." An honors program requires students to complete a minimum of 12 credit hours in courses designated by the department as "honors courses." These courses must include at least one advanced course or seminar and the course or courses in which the senior thesis or research project is completed. Specific course requirements for each concentration may be found in the appropriate departmental section in this Bulletin.

TRANSFERRING WITHIN THE UNIVERSITY

College of Engineering and Applied Science

Engineering students enroll in the College of Arts and Science for the first two years. Those who have met the requirements (see page 163) for their particular programs are then admitted to the College of Engineering and Applied Science for the last two years. Students should seek assistance from engineering faculty members, particularly their faculty advisors (assigned in the freshman year), and dean's office personnel to help ensure that first-year courses both explore potential areas of concentration and prepare the student for each one which might be chosen. Students who satisfactorily complete the four-year sequence receive a B.S. degree in chemical engineering, electrical engineering, engineering and applied science, geomechanics, mechanical engineering, or optics.



Another, less specialized degree program is also available in the College of Engineering and Applied Science (pending New York State approval). This program leads to a B.A. in engineering science and it has the same distribution requirements as other B.A. degrees, including the foreign language requirement. As a result, transfers to and from programs in the College of Arts and Science are easier.

School of Nursing

Students intending to complete work for a degree in the School of Nursing are directed to the requirements on page 193 of this bulletin.

Members of the School of Nursing faculty are appointed as advisors to students majoring in nursing.

Students interested in transferring into the School of Nursing at the junior level from any other college in the University or from any other college or university are encouraged to contact the School of Nursing Admissions Office, (716) 275-2375, as soon as possible to ensure completion of specific required courses that are transferable to the University of Rochester School of Nursing.

Career & Counseling Services

Students considering graduate studies or employment obtain help from faculty and staff members, college and departmental offices, and the centers described below. Students seek advice and assistance from appropriate departmental offices in conjunction with using the following resources and services.

CAREER SERVICES AND PLACEMENT CENTER

The Career Services and Placement Center offers comprehensive assistance to undergraduates, graduate students, and alumni who are preparing and applying for admission to professional and graduate schools, and to those who are seeking career information or employment. The Center is used primarily by students and alumni of the College of Arts and Science, the College of Engineering and Applied Science, and the Graduate School of Education and Human Development. Faculty committees and career counselors help students plan programs that will enhance their credentials. Located at 224 Lattimore Hall, the Center is open from 9 a.m. to 5 p.m. Monday through Friday.

All students are encouraged to become familiar with the resources of the Center early in their college careers. Reflecting the broad interests of the student population, counselors are available to help students assess their skills, identify career interests, and prepare credentials for employment or further study upon graduation.

A student's introduction to the Center may be to come in and look over the Hyman J. V. Goldberg Career Library. A career librarian is available to direct students to the resources as well as explain the Center's program and policies. Career information in the library ranges from books such as the *Occupational Outlook Handbook*, to files containing career descriptions on over 500 occupations, to company directories and actual job listings in business and industry, education and other nonprofit organizations. The library also includes many resources for applicants to graduate and professional programs, such as *Peterson's Annual Guide to Graduate Study*, *Prelaw Handbook*, and *APA Guide to Graduate Study*, and a collection of catalogs on microfiche from almost every college and university in the United States. Additional information includes files on hundreds of companies—many of whom recruit at the University—magazines such as *Graduating Engineer* and *Working Woman*, and a listing of faculty research projects that undergraduates may pursue. Appointments can be made in 222 Lattimore Hall to meet with a counselor and assess interests and goals, have a resume critiqued, or discuss applying to graduate and professional schools.

Upon request from a student, an individual credentials file will be established and maintained by the Center's staff. The file will contain letters of recommendation which the student has requested from faculty members and employers with whom he or she has studied or worked. When the time comes for students to submit applications for fellowship awards, special honors, graduate

or professional schools, or employment, the file becomes a valuable source of information. At the student's written request, letters of recommendation are prepared and forwarded by the Career Services and Placement Center.

Students considering professional or graduate school may consult with one of the counselors who specializes in the area, learn about special workshops and informational meetings with faculty members and staff, and become acquainted with the Center's library. In addition to standard guides on graduate study, such as *Peterson's*, the Center also produces annually revised publications especially designed for Rochester students.

Students who are unsure about their career goals, or who are having difficulty in matching their interests with a career area, may find it helpful to attend some of the special panel presentations, discuss specific careers with volunteers from the Rochester Career Cooperative, or join a career decision-making group.

EMPLOYMENT

Each year from October through April Career Services staff arranges for over 100 organizations to visit the River Campus for individual employment interviews with seniors and graduate students. Companies in the aerospace, computer, chemical, petroleum, and automotive industries are represented along with banks, securities, insurance companies, and retail stores. There is also the opportunity to interview for positions with federal and state agencies, educational

and other nonprofit institutions. Background information about these and other firms is maintained on file in the Center's library. Students who plan on immediate employment after graduation are encouraged to begin pursuing this information early and to seek advice from a counselor. In preparation for employment applications and interviews, the staff helps students learn how to analyze their job-related skills, to prepare an effective resume, and to handle an interview situation with poise and confidence. Opportunities to videotape mock interviews are available throughout the year and programs are offered that are designed specifically for the employment-seeking senior. Guidebooks such as *Writing an Effective Resume* may be consulted. Listings of current job opportunities for openings in the profit and nonprofit sectors are maintained throughout the year and mailed to interested alumni. Listings are also available for volunteer and internship programs. Whatever the anticipated field, the Center will work actively to acquaint the student with job possibilities in his or her area(s) of interest.

Of those students in the Class of 1989 who reported their plans to the Career Services and Placement Center, 30 percent were accepted into graduate or professional school and 52 percent entered employment. At the time of that survey (six months after graduation) the plans for 13 percent of the graduates were not yet final.

A recent survey of graduates from the Class of 1982 found that 73 percent of the class had enrolled in a graduate program within five years after completing their bachelor's degree. Detailed descriptions follow of several of the specialized preprofessional advising services available.

HEALTH PROFESSIONS

Admission to graduate degree programs in the health professions and health sciences is highly selective. Applicants must have excellent academic credentials as well as personal commitment, knowl-

edge of the profession, and maturity. The University of Rochester has a fine record of acceptance: over 80 percent of those seniors who applied over the last five years are now in medical school and all applicants to dental school were accepted.

Graduate and professional schools encourage prospective students to pursue a baccalaureate degree program in the liberal arts. Professional schools usually have core course admission requirements, including an academic year of general chemistry, organic chemistry, general physics, college mathematics, biology beyond the introductory level, and English. It is not necessary to complete a concentration in the natural sciences, and the University of Rochester does not offer a concentration in "premed," "pre-dent," or any other preprofessional area. With the assistance of counselors in the Career Services and Placement Center and faculty advisors from both the River Campus and the Medical Center, students develop an integrated program.

Health professions counseling begins during the Freshman Orientation Programs and continues throughout and sometimes beyond four years. Students are urged to see a health professions counselor in the Career Services and Placement Center and establish a credentials file during the first years of college. It is advisable to begin collecting letters of recommendation even that early, and these letters will form a vital part of the faculty advisory committee letter which will be prepared for the student at the time of application to a graduate or professional program.

Each year the Center publishes the guidebook *Preparing for a Career in the Health Professions*. The Hyman J. V. Goldberg Career Library also contains numerous publications describing individual health professions, helpful information and comments from recent alumni, catalogs for graduate and professional programs, and lists of opportunities for volunteer service.

With the University of Rochester School of Medicine and Dentistry next door and numerous hospitals and clinics in the Rochester area, students have many opportunities both to observe health professionals at work and to participate in research and clinical activities. Some students find paid positions, while a variety of volunteer opportunities is also available. The Campus Y, for those considering medical school, provides a chance for students to volunteer and observe in a hospital setting. The Dental Chairside Program includes practical experience in assisting a dentist. The Young Adult Volunteer Program provides another opportunity for students to explore career options in the health professions, especially nursing. Many students *volunteer* in area hospitals and clinics, either in clinical or research capacities. Lists of volunteer possibilities both at the University of Rochester and in the larger community are available in the Hyman J. V. Goldberg Career Library.

The Center sponsors several meetings and workshops of interest to students considering a career in the health professions. The Junior Applicant Meeting takes place each February and helps students begin the application process for programs in medicine, dentistry, osteopathy, optometry, podiatry, and veterinary medicine. At the Interview Skills Workshops students view and discuss videotapes of simulated interviews and participate in practice interviews. A Workshop on the Writing of Application Essays is held one evening each spring.

For more information about health professions at the University of Rochester, please write to Health Professions Advising, Career Services and Placement Center, 224 Lattimore Hall, University of Rochester, Rochester, New York 14627-0397.

LAW

With the assistance of faculty members and deans, a prelaw counselor offers students detailed academic information and advice about undergraduate preparation at Rochester, law school admission criteria, the procedure for applying,

and careers in the legal profession. The counselor is in regular contact with law school deans and staff, and with Rochester graduates now enrolled in law schools, in order to provide current undergraduates with up-to-date, practical, and factual information. In addition, the counselor provides opportunities for students to obtain direct advice from visiting law school representatives and from practicing lawyers. The following are among the special services provided by the Career Services and Placement Center.

Information meetings acquaint prospective law school applicants with the ABCs of the application process and ways to enhance the applicant's chances of acceptance.

Annually revised University publications include *Getting into Law Schools and Applicant Results*, a printout providing information about where the most recent Rochester applicants were accepted, rejected, and/or wait-listed.

On-campus visits by law school representatives each fall semester include deans or other admission officers from about 30 law schools who meet informally with prospective and current applicants individually or in small groups.

Recent law school graduates and successful attorneys are invited to speak about their experiences in law school to all students interested in careers in law.

Comments from recent Rochester graduates now enrolled in law school are available in a notebook in the Hyman J. V. Goldberg Career Library.

We are concerned that our students make the best use of the University's offerings for their personal intellectual growth as well as in preparation for the study of law. For the last 10 years, between 88 and 100 percent of University of Rochester students seeking admission to law school have been accepted at one or more schools. This is well above the national average.

EDUCATION

Students interested in careers in education should contact the Office of Academic Services in the Graduate School of Education and Human Development, 304 Lattimore Hall, (716) 275-3950. Students wishing to apply for teacher certification should consult with the Office of Academic Services by the end of the sophomore year. Placement services and updated job listings for teaching, school guidance, administration, higher education (administration or counseling), and other education careers are available in the Career Services and Placement Center, 224 Lattimore Hall, (716) 275-2366.

COUNSELING AND PSYCHOLOGICAL SERVICES (CPS)

CPS is located in 107 Lattimore Hall. Students can see counselors by appointment Monday through Friday from 9 a.m. to 5 p.m. An appointment can be made in person or by calling 275-2361 during office hours.

CPS offers psychotherapy and counseling services to help students with personal, vocational, and educational concerns—such as maintaining interpersonal relationships, alleviating emotional distress, gaining self-confidence, clarifying vocational goals, improving academic effectiveness, handling external pressures, and coping with stress and discomfort.

In addition to individual therapy or counseling, CPS offers a variety of group meetings and workshops on topics such as stress management, interpersonal communication, weight and body image, etc. Students are also invited to consult with a counselor, either about themselves or others. Often students who are not yet sure they need particular help find it useful to make a single appointment with a counselor in order to express feelings about how things are going and to decide the best course of action.

All of CPS's services are offered on a confidential basis. The content of conversations with a counselor will not be released to anyone without the student's written consent.

Learning Assistance Services (LAS)

Academic effectiveness is a major concern of many students, and LAS offers a number of specialized programs in this area. These programs include assistance with:

Study Skills. Individual counseling and group workshops address concerns about preparing for exams, taking effective notes, managing time, and enhancing concentration.

Reading Effectiveness. Instruction is available in strategies to improve comprehension and retention of college-level texts.

Exam Anxiety. By working with a counselor, students can strengthen their methods of test preparation and test taking, which may reduce anxiety during exam sessions.

Academic Motivation. Students who are concerned about motivation and procrastination can work with a counselor to learn how to set and attain reasonable goals.

Mathematical Skills. Students can work with a math counselor to improve problem-solving skills and become more confident when taking math exams.

Learning Disabilities. Students with special learning needs can receive help in planning academic modifications and developing strategies for meeting the demands of course work.

Writing Skills. With the help of Humanities Writing Center tutors, students can refine their skills in prewriting, drafting, and revising in order to meet the demands of college-level writing assignments.

Learning Assistance Services also maintains a test bank of previously administered exams and provides word-processing facilities (both IBM and Macintosh).



Students seeking more information or wishing to make appointments may do so in person or by phone. The main office of Learning Assistance Services is located in 124 Lattimore Hall, (716) 275-9049. Writing tutorials and word-processing facilities are located in the Humanities Writing Center, 100 Morey Hall, (716) 275-3873.

TESTING

The Testing Office administers testing programs and services in conjunction with counseling and, in addition, administers those tests that are required for advanced work or special programs.

Additional information about testing programs can be obtained in the Testing Office in 312 Lattimore Hall. The major testing programs administered by this office in recent years include:

- Foreign Language Proficiency Examinations
- Graduate Record Examination (GRE)
- Law School Admission Test (LSAT)
- Medical College Admission Test (MCAT)
- Graduate Management Admission Test (GMAT)
- Test of English as a Foreign Language (TOEFL)
- National Teacher Examinations (NTE)

Questions about other national testing programs should be directed to the Testing Office. If the tests in question are not given there, students will be referred to the proper locations.

Student Affairs

T

he University of Rochester recognizes that its students develop socially, spiritually, emotionally, physically, and culturally, as well as intellectually. The Student Affairs offices and all the student support services are intended to assist this comprehensive development and to help students integrate their lives at the University.

Many students consider their lives outside the classroom as a source of significant and enduring learning experiences, which complement their formal academic pursuits and enrich their personal lives. Informal learning at the University includes broadly diversified opportunities in sports and recreation, sororities and fraternities, student government, a student judicial board, clubs and activities, religious and intercultural programs, off-campus experiences, volunteer work, the performing arts, and residence halls programs. Staff in Student Affairs and other service offices are available to help students make satisfying use of these opportunities.

OFFICE OF THE DEAN OF STUDENTS

Paul J. Burgett, Ph.D. (Rochester)
Vice President and University Dean of Students
Jody Asbury, M.A. (Simmons College)
M. Ed. (Boston University)
Associate Dean of Students and University Intercessor

Two of the major functions of the Office of the Dean of Students are to

1. help students to integrate their in-class and out-of-class experiences at the University

2. attend to the general quality of student life at the University.

Administratively, Student Activities and Wilson Commons, the Chaplains' Office, the Office of Minority Student Affairs and the Higher Education Opportunity Program, the International Student Office, and services for handicapped students are part of the Office of the Dean of Students.

In addition, Sports and Recreation, Residential Life, and University Health Service have reporting relationships to the Vice President and University Dean of Students.

The staff in the Office of the Dean of Students works directly with other student service and support offices to enhance the development of undergraduate and graduate students. The staff acts as the principal student advocate in the University, and is available to all students, individually and collectively, for counseling, guidance, and assistance.

Some of the services provided through the Office of the Dean of Students include:

Problem Solving. The staff and students work together to identify and solve problems that affect many members of the University community. Currently, the dean and others are working on projects related to personal safety, handicapped student concerns, judicial affairs, retention, women's concerns, and the special needs of graduate students.

Discipline. The office administers non-academic discipline. The judicial officer works with the All-Campus Judicial Council to maintain order within the

community and to ensure that everyone's rights are respected.

Dean's Loan Program. Short-term, no-interest loans are available to all full-time River Campus students through the Office of the Dean of Students. Funds for the Dean's Loan Program have come from a number of gifts, including gifts from the University of Rochester classes of 1933 and 1958, as well as a gift from the United States Steel Foundation.

STUDENT ACTIVITIES / WILSON COMMONS

The Wilson Commons Student Activities staff provides professional advice and planning for the active participation of students in a diversified program of social, cultural, and recreational activities. The student activities program is varied and broad. Throughout the academic year students, campus organizations, and academic departments schedule a variety of events during the daytime, evening, and weekend hours.

Wilson Commons is the focal point for out-of-class life on the River Campus. The Commons is the place to meet friends, schedule meetings, plan programs and events, make informal contacts with faculty and staff, or just relax. Located in the Commons are offices for student organizations, dining services, a recreation center, meeting and rehearsal rooms, the Hartnett Art Gallery, the Student Activities Office, the Hair Company, and the Office of the Vice President and University Dean of Students.

Participation in the student activities program at the University can help stu-

dents develop skills, explore new ideas, develop leadership potential, and learn more about themselves.

Student Government. The Students' Association includes all undergraduates and is governed by a student-elected senate and president. The Student Senate and its over 50 funded organizations are supported by the student activities fee, which is assessed to all undergraduate students. The Senate has four standing committees: the Student Life Committee, the University Relations Committee, the Appropriations Committee, and the Academic Affairs Committee.

Journalism. Students may obtain editorial, business, and writing experience working on publications, including the *Campus Times* (a student paper that has served the University since 1873), *Interpres* (a yearbook), *Logos* (a literary magazine), and a variety of political and satirical magazines.

Communications. Students may gain experience in broadcasting, announcing, and engineering by joining WRUR, the student-operated AM and FM radio station, or the Amateur Radio Club (K2ZWI).

Drama. Various dramatic productions allow students to develop their skills as actors, set designers, theater technicians, or playwrights. The principal drama organizations are the Committee on the Performing Arts and the Association for Black Drama and the Arts.

Clubs and Organizations. Informal activities which complement classroom learning and which concentrate on students' special interests are available through departmental organizations and through groups such as the Outside Speakers Committee, International Students Association, Black Student Union, Campus Cinema Group, Simulation Gaming, and several dozen other clubs.

Music. River Campus music organizations include the Chamber Singers, Glee Club, Gospel Choir, University Symphony Orchestra, Symphonic Wind Ensemble, Jazz Ensemble, Yellowjackets, and Vocal Point. Information about membership

in these groups may be obtained from the Music Program of the College of Arts and Science.

COUNSELING AND SPECIAL SERVICES

Counseling and Psychological Services (CPS)

CPS is located in 107 Lattimore Hall. Counselors can be seen by appointment Monday through Friday from 9 a.m. to 5 p.m. An appointment can be made in person or by calling 275-2361 during office hours.

CPS offers counseling services to help students with personal, vocational, and educational concerns. See page 215 for a more detailed description of CPS's services.

Career Services and Placement Center

Located on the second floor of Lattimore Hall, the Career Services and Placement Center serves as the focal point in a student's search for vocational information, advice, and placement. Offices are open from 9 a.m. to 5 p.m. Monday through Friday. See page 213 for a detailed description of its services.

Mental Health Section, University Health Service

See University Health Service description for services available (page 219).

Services for Handicapped Students

The University of Rochester provides equal opportunity in admissions and student aid regardless of sex, age, race, color, creed, handicap, sexual orientation, and national or ethnic origin. Further, the University complies with all applicable nondiscrimination laws. Staff in the Office of the Dean of Students work closely with disabled students coordinating support services, resources, and counseling.

Minority Student Affairs

The Office of Minority Student Affairs focuses on enhancing the quality of life (academic, personal, and social) of minority students. The office is committed to ensuring a multi-cultural living/

learning environment for members of the University community.

The Office of Minority Student Affairs offers a range of services to minority and non-minority students including study-tutorial sessions, group workshops, individual learning opportunities, and counseling.

Under the umbrella of the Office of Minority Student Affairs is a service component, the Higher Education Opportunity Program (HEOP). HEOP serves students of diverse racial, ethnic, and cultural backgrounds. It is a program that provides an opportunity for eligible applicants to attend a private four-year institution of high academic standing. The program is designed to assist those students who, because of their economic or educational background, might not consider attending our University. HEOP staff coordinate a variety of academic support, counseling, and financial aid services to enable a participating student to successfully complete a degree in eight or ten semesters. To be eligible for HEOP students must be residents of New York State and meet specific academic and economic criteria.

International Student Affairs

The International Student Office (ISO) provides a full range of programs and services for approximately 1,100 international students and 200 spouses from 80 countries. This office administers, under specific government regulations, the F-1 Student and J-1 Exchange Visitor Programs. The ISO also interacts with units within the University community to advocate for and address various international students needs.

The ISO is responsible for issuing visa documents and advising students on immigration matters. The office is also an information resource which assists internationals in adjusting to life in the United States, the University, and the Rochester community. Other services include the publication of a bi-monthly newsletter, an international support group, and individual counseling to assist students in effectively coping with

personal and cultural adjustment. In order to promote intercultural understanding many educational, cultural, and social programs are planned each year: an Orientation Program, International Coffee Hours, Cultural Round Tables, and an annual International Women's Conference.

The ISO is a member of the National Association for Foreign Student Affairs and works closely with several community organizations such as the Rochester International Friendship Council and Literacy Volunteers who provide hosting and offer a variety of cultural, social, and English-language programs.

THE INTERFAITH CHAPEL

The Chaplains' Office, located in the University's Interfaith Chapel, offers students a variety of opportunities for religious worship and meditation, social service and personal counseling, and cultural and social events. Roman Catholic, Protestant, and Jewish chaplains are available to work with all members of the University community. The Director of University Religious Affairs works with students, chaplains, and University departments to facilitate and coordinate the many programs carried on within the chapel. Chapel rooms may be reserved for lectures, discussions, or social events.

The Protestant Chapel Community focuses on the weekly Sunday service. Attempts are made, both formally and informally, to raise and deal with important issues within the University, church, and society and to involve community and church in University life. The Interdenominational Worship Community provides the opportunity of worshipping in the African-American tradition. Other groups such as the Chapel Choir, the Gospel Choir, and Inter-Varsity Christian Fellowship offer additional opportunities for religious expression.

As the Catholic campus parish, the Newman Community welcomes undergraduate students as well as other members of the University. The Newman Community provides a regular schedule of Sunday and daily Masses and other

sacramental celebrations and offers a wide range of opportunities for personal enrichment, education, service, and social events.

The Hillel Foundation serves to transmit the Jewish heritage through educational, religious, cultural, social, and counseling services. The Hillel student leadership is committed to projects on widely divergent aspects of Judaism.

The Chaplains' Office maintains close contact with representatives of other religious communities which are organized on campus, or are found in the Rochester area. Students belonging to one of these traditions will be put in contact with appropriate representatives either by stopping in at the Director's Office, or calling 275-4321.

UNIVERSITY HEALTH SERVICE

The University Health Service (UHS) provides a comprehensive, prepaid health care program for all full-time students, postdoctoral fellows, and Strong Memorial Hospital housestaff.

Health Plan. All full-time students pay a mandatory health fee that entitles them to use the Health Service throughout the academic year and the following summer (September to September), as long as they are enrolled on a full-time basis. The health fee has two parts: 1) the mandatory portion which covers medical visits to UHS primary care providers, visits to UHS mental health professionals, and health education; and 2) the waivable insurance (Blue Cross and Blue Shield) portion of the plan which covers diagnostic laboratory tests, x-rays, surgical procedures, infirmary care, hospitalization, and other specific services not covered by the mandatory portion of the plan. A Blue Cross and Blue Shield family insurance plan is available for students who wish to have coverage for themselves and their dependents.

Students already covered by health insurance policies comparable to the University Blue Cross and Blue Shield plan may waive the insurance portion of the plan by submitting the Health Plan Options Form. This form is included

with the registration materials students receive prior to each fall semester and must be submitted each year. Students who waive the insurance portion of the health fee are responsible for paying any charges which the University Blue Cross and Blue Shield plan would have paid.

Should a student choose to see a private physician or seek care outside UHS without the appropriate referrals, the student assumes all responsibility (including financial responsibility) for the health care received.

Information about the health plan is sent to students in the fall semester. Pamphlets are also available at all UHS locations, in UHS brochure racks in Wilson Commons and the Administration Building, and by writing the UHS Health Education and Communications Unit, Box 617, 250 Crittenden Blvd., Rochester, NY 14642-8617.

LOCATIONS

Medical Care Section. The Medical Care Section has three locations. The main office is located on the ground floor of the Medical Center at 250 Crittenden Blvd. At this office, comprehensive medical care is provided by faculty physicians (specialists in internal medicine), nurse practitioners, and registered nurses. The office is open Monday-Friday, 8 a.m.-5 p.m., except Tuesdays, when the office opens at 9 a.m. During the summer, this office closes at 4:30 p.m. Students are encouraged to schedule appointments to be seen in this office. The number to call is 275-2662. Walk-in care is available on a limited basis.

For the convenience of students needing minor health care or health information during the academic year, UHS has two satellite medical offices, one on the River Campus and one at the Eastman School of Music. Both offices are staffed by a registered nurse. The River Campus office located on the ground floor of Susan B. Anthony Halls, is open 24 hours a day, seven days a week, during the academic year while classes are in session. The Eastman School of Music office is open during the academic year, while

classes are in session: Monday, Wednesday, and Friday, 8 a.m.–4:30 p.m. and Tuesday and Thursday, 9:30 a.m.–4:30 p.m. The registered nurse on duty at either of these locations may send students to the main office of UHS when more comprehensive health care is needed.

Mental Health Section. The Mental Health Section, located in the University Towne House, offers evaluation and treatment for a wide variety of problems such as anxiety, depression, difficulties in personal relationships or sexual functioning, coping with academic pressures, etc. The Mental Health Section is open Monday–Friday, 8:30 a.m.–5 p.m. year around. Appointments are made by calling 275-3113. A mental health professional is available 24 hours a day to deal with urgent situations and can be reached at 275-3113. In addition to working with individuals and couples, the Mental Health Section staff is available to discuss topics or concerns of special interest to groups of students. Arrangements can be made by calling 275-3113.

Environmental Health and Safety. This section is charged with minimizing environmental hazards to health and safety throughout the University. Its areas of expertise include: fire safety, food sanitation, occupational and radiation safety, pest control, hazardous waste management, and industrial hygiene. Section staff members are also available to present programs on topics of interest to students. Arrangements can be made by calling 275-3241.

Health Education. The UHS Health Education and Communications Unit promotes the health of the University community through education concerning the development of a healthy lifestyle and the effective use of health care services. Staff members present programs on numerous health-related topics to groups of students. Arrangements can be made by calling 275-4493.

Getting to UHS. The University of Rochester shuttle bus stops at all UHS locations. Students can also walk to UHS locations.

Health History Forms. All entering full-time students must submit a University Health History Form which includes immunization information. New York State law requires all students to provide proof of immunity to measles, mumps, and rubella.

Confidentiality. The relationship between UHS health care providers and their patients is strictly confidential. The staff of UHS assumes that students and their parents agree that the student is able to give consent for most medical treatment, including minor surgical procedures. Notification of others, including parents, is generally considered the student's responsibility unless the condition is serious or the student is unable to assume responsibility for informing others.

RESIDENTIAL LIFE

The Residential Life Program is designed to enhance students' academic progress and opportunities for personal growth.

The Residential Life staff supports student needs and interests with a variety of social and cultural activities developed in the residential setting, through leadership programs, and through programs like special-interest housing corridors, where students with similar academic or extracurricular program interests may live together.

Residents are encouraged to share interests with their roommates and neighbors. Many participate actively in the functioning of their residence hall, for example, by participating in a hall's student government or serving on one of its committees for social, cultural, and educational programming. Students' academic growth may be aided also by the faculty-in-residence program, which fosters informal student-faculty-staff interaction within the halls.

One of the students' earliest contacts with residential living is with the Resident Advisor. RAs are carefully selected and trained upperclassmen who are assigned to floors or corridors in University housing. They provide residents counseling on making adjustments to academic

and campus living, and on developing friendly relationships with roommates and student neighbors. They also provide information on campus resources; basic academic advice; programming and leadership development support; and services in an emergency until other personnel arrive.

Freshmen whose applications for residence space are received on time are guaranteed housing and are generally placed in double rooms in one of the Quads or Towers halls, or in Susan B. Anthony Halls. Opportunities for other living arrangements expand gradually after the freshman year. Although most freshmen and sophomores live in double rooms, six-person suites and single rooms become increasingly available to upperclassmen. These spaces are allocated by a lottery system, with seniors drawing first, juniors next, then sophomores. Rooms are selected by students in the spring for occupancy during the following academic year. In certain buildings sophomores, juniors, and seniors may elect not to participate in the University's board plan.

Residence Areas

The Quad. Burton, Crosby, Gilbert, Hoeing, Lovejoy, and Tiernan Halls and Quad Annex, Drama and Medieval Houses are individual buildings offering single and double rooms. Hoeing Hall houses men only; Lovejoy Hall houses women only. The other Quad halls are coeducational.

Tiernan Hall is available by application to students who apply and commit themselves to an organized program of community involvement. Quad Annex is a former Greek house with coed living. Drama and Medieval Houses are also former Greek houses now providing room for special-interest housing programs related to their names. Admission to Drama and Medieval Houses is through the School of Arts and Science.

Freshmen and upperclassmen live in all Quad buildings. Resident Advisors live in all areas where there are freshmen. Faculty- or staff-in-residence live in Burton and Crosby Halls.

Anthony Halls. Susan B. Anthony Halls include Gannett, Gates, Hollister, and Morgan Halls. These halls include both single and double rooms. Floors are co-educational and most have two male and two female corridors, each staffed with a Resident Advisor. One full floor has coed rooms alternately. A faculty- or staff-in-residence lives in Anthony.

Hill Court (Chambers, Fairchild, Gale, Kendrick, Munro, and Slater Houses) is a group of six small-scale, four-story units for sophomores, juniors, and seniors. Each house contains suites, which include six single rooms, or four singles and one double, private bath, and common living room. Chambers, Gale, and Slater suites each include a small kitchenette; residents of these buildings may choose not to participate in the University's dining plan. All houses are coeducational and have residential life staff, or faculty- or staff-in-residence.

The Towers (Anderson and Wilder) include both suites and double rooms. Suites include four single rooms and one double room, a bath, and common living room. Some non-suite double rooms have adjoining bathrooms. Twelve RAs and faculty-in-residence staff the Towers, which are coeducational. Freshmen live in Towers double rooms and some suites; other residents of the Towers are upperclassmen.

De Kiewiet and Valentine Towers house sophomores, juniors, and seniors in two- and three-room apartments with kitchenettes. Two Graduate Resident Advisors and 12 Resident Advisors staff these buildings.

The Towne House, adjacent to the University Medical Center, houses male and female upperclass students in double rooms, each with a private bath. Two Graduate Resident Advisors staff this unit. Male and female rooms are distributed in a random arrangement throughout the building.

Goler House is a large apartment building near the Medical Center and Towne House. Many apartments have been allocated for use by upperclass undergraduates; medical and graduate students,

and some faculty and staff also live in this building. Program support for the undergraduate residents is provided by two Graduate Resident Advisors.

Off-Campus Life

Although nearly 90 percent of undergraduates choose to remain in the residence hall system in their sophomore and upperclass years, the University supports and encourages students who are so inclined to spend a year or so in non-University housing. Sharing an apartment or taking a room in a private home and dealing with one's own shopping, cooking, transportation, and other daily concerns can be an exciting, maturing, and altogether delightful experience for college-age people. There are several attractive Rochester neighborhoods within a reasonable distance where University students have found pleasant accommodations among other young adults. Off-campus students can continue, of course, to take advantage of the wide range of on-campus recreational and extracurricular programs and participate in student government, athletic, religious, and music programs, and to dine when they wish in University dining centers.

The Residential Life Program includes a referral service for rental opportunities in the larger community, guidance on tenant and landlord relationships, tips on shopping, roommates-wanted, transportation, and other concerns of the commuting student. The objective is to provide the fullest possible support for the student who is attracted by the more independent in-town life while preserving for him or her all of the social, cultural, and other advantages of the vibrant campus society.

AUXILIARY SERVICES

University policy requires that parking, food, bookstore, and housing services—services that are used selectively and substantially as matters of individual preference—be sustained by the fees and other charges paid by those who use them, including provisions for depreciation, replacement of equipment, and maintenance. Those services, therefore,

are self-supporting and not supported from the University's tuition and other educational income.

Student Identification Cards

The University provides student identification cards for all students. They are required for charging out books from the library, for cashing checks on campus, and for admission to various campus events, and certain facilities and activities. The card has the student name, identifying number, signature, and picture. Students at the Medical Center are required to wear identification badges. The regular student identification card serves this purpose; worn as a lapel badge, one side of the card carries the student's name and photograph. The same cards, with their magnetic and bar codes, serve as keys for admission to residence halls, and to identify those students who have purchased Dining Plan contracts and are entitled to meals at University dining centers. In addition, the cards are useful for security purposes and for positive identification on campus and elsewhere.

Entering freshmen are photographed during the Freshman Orientation and keep their cards through their sophomore years. Juniors, who get new ID cards, are photographed at the end of the second semester of their sophomore years. Transfer students are photographed early in the fall and spring terms.

No initial charge is made for the identification card, but there is a fee for replacement of a lost or damaged card.

Bookstores

The University bookstores provide goods and services that reduce the need for students to leave the campus. In addition to required textbooks and supplies, they stock paperback and hardbound titles in a wide range of subjects and a variety of clothing and other merchandise to serve personal needs. In addition to new texts, the bookstores carry a substantial stock of lower-priced used textbooks.

The principal bookstore is located on the ground floor of the Frederick Douglass Building on River Campus and is open

weekdays and Saturdays. Other bookstores are located at the Eastman School of Music and at the Medical Center to serve students who take all or part of their programs there. VISA, MasterCard, and American Express, as well as personal checks, are accepted. If a student is on Dining Option A, bookstore purchases may be made using the Key Account.

Computer Store

The University has a computer store on campus in Fauver Stadium and in the Medical Center, G-7220, which carry computing hardware, software, and accessories commonly used by students and faculty. The store specializes in personal computers of the sort most useful in University programs. Educational discounts are offered to students on the products stocked. Repair service is available through the store.

University Dining Service

The University operates its own dining service under the direction of professional food-service administrators. Dining Plan participants may eat at either of the River Campus dining centers (Danforth Dining Center or the Frederick Douglass Dining Center) or at the Eastman School of Music Dining Center. Dining centers serve three meals a day Monday through Saturday, and brunch and dinner on Sunday. Meals can be purchased with cash or by using a prepaid Dining Plan (required for all freshmen and all students living in mandatory residence halls).

The cafeteria-style service of the dining centers provides an attractive variety of nutritionally balanced foods—all-you-can-eat—for breakfast, lunch, and dinner. Frequent special meals are offered throughout the year, such as a fish fry on Fridays. A snack bar and confection and beverage vending machines are available in Wilson Commons and Eastman Commons. Wilson Commons also offers the Backdoor Pizza in the Common Ground Cafe for fast-food choices either by pick up or delivery. Also, an à la carte luncheon service is available, Monday through Friday, in the Hill Side Restau-

rant located in the Susan B. Anthony Halls.

The Medical Center Cafeteria, called The House of the Six Nations, offers breakfast, lunch, and dinner every day.

"The Corner Store," located in Frederick Douglass Building, offers snack and grocery items as well as health and beauty aids. It is open every night until 1:00 a.m. Purchases may be charged to a student's Key Account.

River Campus students who join the Dining Plan contract at the beginning of the year for one of three options:
Option A—Lunch and dinner, every day;
Option B—Lunch or dinner, every day;
Option C—Lunch, weekdays only.
 Breakfast is available under all options.

Eastman School residents are required to be on Option A. All other Eastman students may contract for Option A, B, or C.

All freshman on-campus residents, and all undergraduates who live in residence halls that are not equipped for cooking (Quad Residences; Fairchild, Munro, and Kendrick Halls in Hill Court), must subscribe to Dining Option A. Residents of the Towne House must subscribe to either Option A or B. Option C and a commuter dining plan are available to meet the needs of commuter students, though they may choose any of the Dining Plan Options.

The total payment is divided into two accounts—the Dining Plan fee and the Key Account. The academic year Dining Plan fee entitles the student to use the dining facilities; it covers fixed operating costs such as staff, equipment, and utilities. In addition to this fee, each subscriber establishes a "Key Account" from which he or she can draw to cover the food costs of each meal. One's account is charged only when one comes for a meal at Danforth, Douglass, or Eastman Dining Centers. Breakfasts and between-meal snacks at Wilson Commons, from The Corner Store, concessions, the Eastman Commons Orchestra Pit, or Backdoor Pizza also may be charged against one's Key Account. If a student is on Option A, bookstore and computer

store purchases may be made using the Key Account.

Dining Plan contracts are for the full academic year and are effective from the day the residence halls open, before classes begin in the fall, through Commencement Day in May, except during academic recesses.

For further information on Dining Plans, please call 275-3975.

University Security

The University's Security and Traffic Division is responsible for helping to keep the University safe for students, staff, and visitors. The University Security Office is located in the University Towne House. Security patrol cars and staff are available in all University areas 24 hours a day.

In emergencies, the Security Division can be reached from any telephone in the University system by dialing the two-digit number 13. The extension for non-emergency calls is x5-3333 from any campus phone, or (716) 275-3333 from telephones not in the University system. There is a system of over 25 "blue light" emergency phones, which are connected directly to the Security dispatcher. They are located in many parking areas and along pathways. At any hour, all reports of fire, accident, and threat to persons or property should be reported to those numbers. The Security Division is the liaison between the University and local law enforcement and fire agencies, and will summon them as required.

The Crime Prevention Office is located in the Medical Center (Room G-6009) and the telephone number is 275-2220.

The Security Division also manages the primary lost-and-found property service for the University. Lost-and-found inquiries are welcome during regular business hours. The telephone number is 275-2552.

Student Employment Office

The Student Employment Office (SEO) assists students interested in working part time during the academic year and full time during the summer. Opportu-

nities are available on and off campus, locally and in other parts of the country. Assistance is available to all students regardless of their financial aid status.

Programs administered by SEO include: on-campus job development (encompassing the federally subsidized College Work-Study Program as well as departmentally funded opportunities); Tempo, a short-term employment service; off-campus job development, reaching out into the Rochester community and beyond; and JobSmarts, informational programs to assist students in the job search process.

Additionally, SEO has developed REACH for Rochester, a program which provides new options for undergraduates in summer employment, and individually tailored "experienceships" in administrative and problem-solving areas. The REACH programs emphasize the commitment of SEO to provide substantial preprofessional opportunities to undergraduates designed to enhance the career and personal development plans of the individual student.

SEO is located in 323 Meliora Hall; telephone 275-2138. Office hours are 8:30 a.m.-5 p.m. daily.

Office of University and Community Affairs

Located in Todd Union, the Office of University and Community Affairs serves as a clearinghouse for community services programs. Its role is to develop and establish joint programs between community agencies, organizations, and groups and the University. Programs with local schools, libraries, settlement houses, and neighborhood centers have been initiated through this office. Student participation is actively encouraged in these programs.

University Intercrossors' Offices

The intercrossores' offices provide a resource for solving problems that do not seem to belong elsewhere in the University. Students, staff, or faculty members who have concerns about their University experience that cannot be worked out through obvious channels are encouraged

to contact the intercrossores' offices for assistance. These offices are particularly interested in identifying patterns of problems that indicate a need to change organizational structures or procedures. Helping individuals is an important way to learn what needs to be done to improve the total program. One of the intercrossores has primary responsibility for handling concerns regarding sexual harassment and another oversees racial harassment concerns. The intercrossores' offices can be reached by phone at 275-4085 or 275-2867.

Lost and Found Offices

A lost and found service is maintained in Wilson Commons for the River Campus. Articles found are turned in there for safe keeping until they can be identified and claimed by their owners. Articles found elsewhere on University premises are turned in to the Security headquarters at the Medical Center.

Intercampus and Public Bus Services

The University provides free, scheduled shuttle bus service from the River Campus to the de Kiewiet-Valentine Towers-University Park area, Whipple Park, River Road Buildings, the Medical Center, Goler House, Towne House, and Kendrick Road Lot. Free service is also provided between the River Campus and the Eastman School of Music, Memorial Art Gallery, and selected intermediate points.

Regional Transit Service (RTS) also provides regular, scheduled service between downtown Rochester, a number of suburban towns, and University facilities.

Automobiles and Parking

Students may bring automobiles to the University at any time, but should be aware that parking spaces for students (and particularly those spaces on the River Campus) are at a premium. Students may find that the only parking space available is in a lot at the far side of the campus or in a lot some distance from the center of campus. Free shuttle buses providing service from the more

distant lot to the campus run from 6:30 a.m. to 2 a.m. weekdays when school is in session. Resident students do not usually need a vehicle since the shuttle buses provide access between University properties. Because of the expectation that financial aid recipients must watch their spending patterns closely, it is difficult to justify ownership of a vehicle for them.

The City of Rochester allows limited parking on Wilson Boulevard, the public road adjacent to the River Campus.

On-campus parking for students, faculty, and staff is by permit only, and several options are available. A restricted number of permits are set aside for students (the fee in 1990-91 was \$115.56 for the academic year or \$155 for the entire year) which entitle them to park in either the Hill Court or the River Lots at the north end of the campus near the residence halls. Other options include the Park Lot, which is at the southern end of the River Campus (fee for the academic year 1990-91 was \$115.56). At a lower rate of \$70.62 (for the 1990-91 academic year), students may purchase permits that allow them to park in the Kendrick Road Lot that is a 15-minute walk from the River Campus. This lot is served by the free shuttle bus to and from the campus. Students holding any of these permits may park in central campus lots not restricted by posted signs between 4 p.m. and 8 a.m. weekdays, and at any time on weekends or University holidays. A limited number of metered spaces are available at the rate of \$.50 per hour.

For one-day visits to the campus, parking information is available (and permits for the day may be purchased) at the Visitor Information and Parking (VIP) Booth at Wilson Boulevard and Alumni Road. For visits of only a few hours the attendant at the booth can provide directions to on-campus parking meters.

Applications for permits and further information may be obtained from 8 a.m. to 4:30 p.m. in the River Campus Parking Services Office, located in Room 15 Fauver Stadium, or by phone at 275-3983.

Bicycles, Mopeds, Motorcycles, and Scooters

In all but the snowiest of seasons, bikes are a convenient and popular means of getting between University buildings and to nearby shopping areas. Parking permits are not required for two-wheeled vehicles on the River Campus; however their use and parking are subject to University regulations, which are published in the River Campus "Parking Guidelines." Generally speaking, these vehicles are not permitted in University buildings and may not be locked to trees, lamp standards, railings, or the like. The annual fee for motorcycles was \$10.70 in 1990-91.

Telecommunications Service

All River Campus undergraduate residence hall suites and rooms have telephone instruments, Rolmphones, which connect to the University's telecommunications system. The cost of the basic service, which includes both voice and data communications, is included in the room fees. The voice service provides dial access, without extra cost, within the University system, including security services and emergency medical facilities, as well as other student phones and University offices. Calls to Rochester and its suburbs are subject to charges from the local telephone company, but an allowance for free calls has been provided in the charges covered in the room rent. Calls from off campus to students may be dialed directly to the individual's room or suite telephone, or through the University operator at (716) 275-2121.

All student residence halls telephones have, as a part of the regular service, "PhoneMail," a voice-message service, so one need not have an answering machine. (And, in fact, answering machines will not work in this all-digital phone system.)

Students will also be able to open an account to use the University's low-cost, long-distance network. The charges for these calls will be competitive with, if not less than, other long-distance options. Students are responsible to the

University for all long-distance charges they incur on the University's network. They may also use any other long-distance service offered in the Rochester area.

The data communications service consists of an access port which is built into the Rolmphone. Students who connect their personal computers or terminals to the port will have access to the vast array of computer resources available at the University. In addition, students will be able to establish computer communications amongst themselves. The port uses a standard RS-232C interface. A variety of interface cables is available for purchase by students who need them.

University Apartments

Furnished and unfurnished apartments are available for married undergraduates in the University's Goler House, Graduate Maisonettes, University Park, and Whipple Park, all of which are served by University shuttle buses. Some single upperclass students are housed in the de Kiewiet and the Valentine Towers and in selected Goler House apartments as a part of the River Campus residential life program, at standard academic-year room contract rates.

Apartments among the blocks allotted to the undergraduate Residential Life Program are available for undergraduates who must have year-round housing and are prepared to take a lease. Otherwise, the University's apartment facilities are reserved for graduate students.

The University Apartments Office and its associated Off-Campus Living information center are dedicated to assisting students to locate housing both within and outside the University. These services are headquartered in the east wing of the University Towne House, at the corner of Mt. Hope and Elmwood Avenues. Housing counselors are available from 8:30 a.m. to 5:00 p.m., Monday through Friday, and may be reached by telephone at (716) 275-5824. The mailing address is University of Rochester, University Apartments Office, 1325 Mt. Hope Avenue, Rochester, NY 14620-3990.

Banking Services

Branches of the Chase Lincoln First Bank of Rochester are located on both the River Campus and at the Medical Center. Each provides full checking, savings, and loan services. Check cashing also is provided for students who have Chase Lincoln First accounts. Such service also may be provided, up to a \$100 maximum, at nominal charge for others with a University identification card.

In addition to full counter service during normal bank hours, both of the University banks have automatic tellers which are accessible for most regular transactions at night and on weekends and holidays. Other 24-hour automatic tellers are available at Rush Rhees Library on the River Campus and in the lobby of the University's Strong Memorial Hospital.

Postal Services

University Mail/Courier Services operates a branch post office in Todd Union on the River Campus. All classes of mail are handled there, including parcel post. Another postal service office is located at the University Medical Center.

All undergraduate students who live in campus residences are rented key-locked postal boxes at rates set by the University. This C.P.U. box number (with University of Rochester, Rochester, NY 14627-XXXX) serves as the student's mailing address and is required for delivery of mail. (Items addressed to residence halls or room numbers must be rerouted, readdressed to the postal box, and hence are delayed.) Box numbers are assigned upon application as soon as students arrive on campus or in advance at freshman and transfer student orientations. Box numbers assigned to students upon enrollment are retained; therefore a student's postal address will remain unchanged from one academic year to the next.

The 1991-92 box fee for an undergraduate student is \$10 for the period July 1, 1991, through June 30, 1992.

Sports & Recreation

Jeffrey Vennell, M.S. (Massachusetts)
Director of Sports and Recreation

Christian Battaglia, B.S. (SUNY,
 Cortland) *Coach/Recreation
 Specialist*

John Bernfield, M.S. (Brockport)
Trainer/Recreation Specialist

William L. Boomer, M.Ed. (Rochester)
*Associate Professor of Physical
 Education; Associate Director for
 Intramurals, Coach/Recreation
 Specialist*

Raymond Farrell, M.S. (East Texas State
 University) *Coach/Recreation
 Specialist*

Margaret Garland, M.S. (Canisius)
Coach/Recreation Specialist

Timothy Hale, B.S. (Cortland)
Coach/Recreation Specialist

Barbara Hartwig, M.A. (Ohio State
 University) *Coach/Recreation
 Specialist*

Laurel Heilman, M.Ed. (Slippery Rock
 State College) *Coach/Recreation
 Specialist*

Steve Locker, M.Ed. (Pennsylvania
 State University) *Coach/Recreation
 Specialist*

Peter Lyman, M.S. (Brockport)
Coach/Recreation Specialist

Brent Mikel, M.Ed. (University of
 Georgia) *Coach Intern*

Kevin Naughton, B.A. (Middlebury
 College) *Coach/Recreation Specialist*

Michael C. G. Neer, M.S. (Rochester)
*Coordinator of Physical Education,
 Coach/Recreation Specialist*

Marrie Neumer, M.A. (Springfield
 College) *Coach/Recreation Specialist*

Richard Parrinello, M.S. (Nazareth)
*Willard F. Clarey, Sr. Head Football
 Coach/Recreation Specialist*

Jane S. Possee, M.S. (Syracuse)
Coach/Recreation Specialist

William Scoggins, B.A. (Harvard), M.A.
 (University of West Florida) *Coach/
 Recreation Specialist*

Donald C. Smith, M.Ed. (Springfield)
*Associate Professor of Physical
 Education, Associate Director of
 Athletics for Men, Coach/Recreation
 Specialist*

Peter G. Stark, M.S. (Syracuse)
Coordinator Facility Scheduling

John Vitone, M.S. (Case Western Reserve)
*Coordinator Club Sports, Coach/
 Recreation Specialist*

Joyce S. Wong, Ph.D. (Indiana)
*Associate Director of Athletics for
 Women, Coach/Recreation Specialist*

Paul E. Bitgood, M.Ed. (Springfield)
*Professor Emeritus of Physical
 Education*

Sylvia Fabricant, M.S. (Wellesley)
*Associate Professor Emeritus of
 Physical Education*

Merle Spurrier, B.A. (Ohio Wesleyan)
*Professor Emeritus of Physical
 Education*

The Department of Sports and Recreation encourages student participation in intercollegiate athletics, in intramural competition, and in a variety of club, instructional, and recreational activities. The intercollegiate program seeks to attract as many participants as possible;

and, nearly 65 percent of Rochester's students participate in the University's extensive intramural program, which includes men's, women's, and coed competition in team and individual sports.

PHYSICAL EDUCATION COURSES

The sports and recreation program offers many selections. All activities are coeducational unless otherwise indicated. Students may choose from the following list of activities:

| | |
|-------------|---------------------|
| CPR | Self-defense |
| First Aid | Squash |
| Fitness | Swimming |
| Golf | Tennis |
| Lifesaving | Water Safety Instr. |
| Racquetball | Weight Training |

Activities not directly offered but supported by the Department of Sports and Recreation include:

| | |
|----------|--------------|
| Aerobics | Scuba Diving |
|----------|--------------|

INTRAMURAL SPORTS

C—coed; M—men; O—open; W—women

| | |
|-------------------------|-------------------------|
| Basketball, O, W | Racquetball, |
| Five Person | M, W |
| Soccer, C, O | Rec. Football, O |
| Floor Hockey, | Slow Pitch |
| C, O | Softball, C, O |
| Inner-Tube Water | Tennis, C, M, W |
| Polo, C | Volleyball, |
| | C, M, W |

COMPETITIVE CLUB SPORTS

| | |
|----------------------|--------------|
| Crew, M, W | Spirit Squad |
| Ice Hockey, M | Pep Band |



INTERCOLLEGIATE SPORTS

Men

| | |
|---------------|----------------------|
| Baseball | Squash (coed) |
| Basketball | Swimming |
| Cross-country | Tennis |
| Football | Track |
| Golf | (indoor and outdoor) |
| Lacrosse | |
| Soccer | |

Women

| | |
|---------------|----------------------|
| Basketball | Swimming |
| Cross-country | Tennis |
| Field Hockey | Track |
| Lacrosse | (indoor and outdoor) |
| Soccer | outdoor) |
| Squash (coed) | Volleyball |

Students planning to participate in intercollegiate sports should contact the appropriate coach.

ATHLETIC FACILITIES

The University's River Campus sports complex includes:

Zornow Sports Center: Houses offices for the Department of Sports and Recreation; the Speegle-Wilbraham Aquatic Center, whose pool is 25 meters long and 25 yards wide with a separate well for three-meter and one-meter diving; three regulation basketball courts, which also serve as multipurpose areas for volleyball, badminton, and fitness workouts; four indoor tennis courts; 12 lighted rooftop tennis courts; a Nautilus Fitness Center; a lounge, and a meeting room.

Alexander Palestra: Home site for University intercollegiate basketball and volleyball, with permanent seating capacity of 2,500. Also houses coed training room.



Alumni Gymnasium: Offices of the Department of Sports and Recreation, six racquetball courts, five squash racquet courts, and calisthenic and weight rooms.

Field House: 12,000-square-foot indoor playing surface covered by synthetic turf with a 225-yard polyurethane-surface running track around the perimeter (and extending through a tunnel under the adjoining Palestra). The area is used for activities of most University intercollegiate athletic teams, many intramural events, and recreational sessions.

Fauver Stadium: 5,000-seat concrete and brick outdoor stadium, with lights, an all-weather playing field, and a 400-meter eight-lane track. Site of intercollegiate football, field hockey, soccer, lacrosse, track and field, and a full range

of intramural and recreational activities. Also houses locker rooms for men and women and a coed training room.

Other Outdoor Facilities: Baseball, large natural grass area used for field sport practices, track throwing events, and intramural play; includes two softball fields with lights.

NOTICE TO FRESHMEN

All students are encouraged to attend the Sports Fair conducted in early September, preceding the first day of class. At the Sports Fair complete information is available concerning recreational opportunities, courses of instruction, intramural and club activities, and varsity sports.

Admissions

ADMISSION

The University of Rochester welcomes students who are able to take advantage of excellent resources and an outstanding faculty. Undergraduates are admitted as freshmen or as transfer students for full-time or part-time study. Application forms, appointments for interviews, and other information may be obtained by writing to the Office of Admissions, Meliora Hall, University of Rochester, Rochester, NY 14627-0251, by calling (716) 275-3221, or through fax machine (716) 461-4595.

Individual attention is given to each student from the time he or she first becomes interested in the University. A large staff of counselors and many faculty members participate in the advising of applicants and review of applications. Admission decisions are based on a student's high-school work, recommendations from instructors and counselors, verbal and quantitative skills, participation in school and community life, and, for transfer students, college course work already completed.

RECOMMENDED PREPARATION FOR ADMISSION

The University does not use a specific minimum for high-school or college grades or test scores; it does seek students who can grow and mature intellectually through its academic programs and opportunities. Grades and test scores are not the only indicators of potential success. Because secondary schools vary greatly in the diversity and quality of courses which they offer, it is important to know what a student has accom-

plished within his or her total environment. Therefore, students are evaluated in terms of their individual accomplishments.

The University recommends that students have sound basic preparation in several disciplines. A strong secondary school program usually includes four years of English with continuous practice in writing, four years of social studies, at least two years of a foreign language, three to four years of mathematics, and two or more years of laboratory science. Honors, Regents, or Advanced Placement courses are expected of students in secondary schools offering these programs.

Several concentration programs at Rochester have science requirements. A prospective applicant intending to earn a B.S. degree in chemistry or chemical engineering or a degree in biology should have taken high-school chemistry, and chemistry also is strongly recommended for the applicant who designates a B.S. degree in nursing. Physics is required for admission to the B.S. degree program in physics or in physics and astronomy, and is highly recommended for all prospective engineering concentrators.

INTERVIEWS AND VISITS TO THE UNIVERSITY

The Office of Admissions is open all year on weekdays for interviews or group information sessions and campus tours. Interview appointments are scheduled from 9 a.m. to 4 p.m. In the fall semester, the office is open for interviews or group information sessions every Saturday morning between September 7 and December 14 except for November 30.

During the spring semester, the office is open every Saturday morning between February 1 and May 2. Weekday visits are preferred, however, so that candidates will have the opportunity to attend classes if they wish.

Prospective and current applicants, as well as interested parents, are encouraged to visit the campus. Visiting students find that informal conversations with admission counselors or student interviewers, academic and career counselors, and faculty members in departments of their interest prove invaluable. Interviewers are knowledgeable about the undergraduate curricula and the various facilities and special programs available to undergraduates.

Students with questions concerning academic departments, student life, or extracurricular activities should write to the Office of Admissions; questions will be referred to faculty or staff members or to students for personal replies. Students planning to visit the campus are urged to call or write to the office in advance of their visits so that appointments can be made with faculty or staff members. During the academic year, the Office of Admissions is often able to arrange overnight accommodations on campus for prospective students. Requests to stay on campus overnight should be made approximately two weeks in advance.

Applicants who live at some distance from Rochester may wish to arrange to have an informal interview with an alumni representative in their area. Please call or write to the Office of Admissions for further information.

TRAVEL INFORMATION

The River Campus is located on Wilson Boulevard at Elmwood Avenue. Motorists coming to Rochester via the New York Thruway from the east should use exit 45, take I-490 to the Goodman Street exit, turn left on South Goodman to Elmwood Avenue, and right on Elmwood to Wilson Boulevard. A right turn on Wilson Boulevard leads to the River Campus and the Admissions parking area, Meliora Lot (see the map on page 240). From the south, take I-390 to exit 16, cross East Henrietta and West Henrietta roads, take East River Road to Kendrick Road, turn right on Kendrick to Lattimore Road, left on Lattimore to Elmwood Avenue, left onto Elmwood to Wilson Boulevard, and proceed as above. From the west, use Thruway exit 47, take I-490 to I-390, and I-390 south to exit 17 (Scottsville Road). Turn left on Scottsville Road to Elmwood Avenue, right on Elmwood to Wilson Boulevard, and left onto Wilson Boulevard, following the map to the Admissions parking area, Meliora Lot.

Rochester is served by American, Continental, Delta, Mohawk, Northwest, Pan Am Express, Trans World Express, United, and USAir airlines. The campus can be reached by taxicab from the airport in approximately 10 minutes. The Greyhound and Trailways bus terminal is within walking distance of Main Street East, where Regional Transit Service Bus #19 or a taxi may be taken to the River Campus. Transportation to Rochester is also provided by Amtrak trains.

APPLYING TO ROCHESTER

Students may apply to enter Rochester for either the fall or spring semester. Freshman applications should be submitted by November 15 for spring consideration and January 15 for fall consideration. Students wishing an early decision for the following fall should see the instructions below. Transfer applications (see page 230) are reviewed on a rolling admission basis, with no formal deadline for United States citizens or permanent residents.

The following materials are required before the application review can begin: an

official copy of a high-school transcript, a recommendation from a counselor or faculty advisor, the SAT or ACT score report, and a completed University or Common Application form including a personal essay. Applicants are invited to submit additional instructor recommendations and other materials which may be useful in the application review.

College Entrance Examinations

Applicants for admission are required to take either the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board or the American College Test (ACT) of the American College Testing Program. Both are offered several times a year at centers throughout the world.

Scores from CEEB Achievement Tests are recommended but not required. However, students are urged to take Achievement Tests, particularly in areas such as English, a foreign language, mathematics, and sciences, because the scores indicate the level of achievement in these areas and may prove valuable to both an admitted student and faculty and staff advisors in determining appropriate introductory college courses. For example, students may satisfy the College of Arts and Science foreign language requirement on the basis of a sufficiently high score on a foreign language Achievement Test. Applicants for admission should take the SAT or the ACT no later than February of the final year in secondary school for fall admission or no later than November for spring admission.

Application forms for the SAT may be obtained from secondary schools or the College Entrance Examination Board, Box 592, Princeton, New Jersey 08540, or the Board's Pacific Coast Office, Box 1025, Berkeley, California 94701. Application forms for the ACT can be obtained through secondary schools or by writing to the American College Testing Program, Box 168, Iowa City, Iowa 52240.

Early Decision

Students who decide that Rochester is their first-choice college may apply for an early decision on their applications. Early decision may be requested until Febru-

ary 1. Students applying by November 15 will receive a special early decision financial aid application from the University, if applying for financial aid. If admitted, early decision candidates agree to withdraw all other applications and enroll at Rochester.

If the application is filed by November 15 and completed by November 30, candidates are notified of the decision of the Committee on Admissions by December 15, and if admitted, are expected to make formal acceptance of the offer of admission, including payment of the nonrefundable \$400 deposit, by January 15. (Please note that SAT scores from the November test date, though not received until after November 30, are acceptable for early decision review.)

After November 15 and until February 1, applicants are welcome to request an early decision in writing, and a response will be sent within three weeks of the receipt of all credentials. Admitted students will be expected to submit their deposits within two weeks of the date of notification.

If Rochester is a student's first-choice college, it is to the student's advantage to apply for early decision. Those who receive a "postpone" letter rather than admission are notified that their applications will be reviewed again in early spring with regular applications.

Notification of Admission Decision

An applicant for spring-term admission will usually be notified soon after the application is complete. Applicants for the fall semester will be notified between early and mid-April. Applicants for financial aid will be notified of financial aid action at the same time as, or shortly after, they are notified of admission. Students requesting a decision on or before a specific date because of special circumstances may receive an earlier notification provided that the application is complete. For fall admission, the University subscribes to the uniform Candidates' Reply Date, whereby admitted students are not required to notify the University of their decision until May 1.

Students who accept the offer of admission submit an enrollment deposit of \$400. The deposit is nonrefundable for those who subsequently decide not to enroll, but for enrollees it is deducted from the first tuition bill after the start of classes.

Deferred Admission

Students who are offered admission may request a deferral of their admission for a period of up to one year. During the time of deferral, students may take a limited number of college courses for purposes of enrichment but not, under this arrangement, matriculate as full-time students at another college or university. Students deciding to attend another college for a semester or longer may at a future date reactivate their applications for transfer admission consideration. Students granted deferred admission must pay the nonrefundable deposit to reserve a place in the next class.

Financial aid decisions are not deferred. Students granted deferred admission must resubmit an application for financial aid.

ENGINEERING AND APPLIED SCIENCE

Prospective students interested in pursuing a degree program in engineering should be sure to indicate this interest on their applications. Students planning to pursue programs of study in engineering are assigned faculty advisors from the College of Engineering and Applied Science at the beginning of their freshman year and they may begin taking engineering courses as early as their first semester at the University. Among the benefits for engineers are a strong liberal arts exposure for engineering students, and the better integration of students pursuing a variety of programs of study.

APPLYING FOR ADMISSION TO A DEGREE PROGRAM IN MUSIC

There are two kinds of bachelor's degree programs in music at the University and, hence, two different application procedures. The College of Arts and Science offers, in cooperation with the Eastman

School of Music, the Bachelor of Arts (B.A.) degree with a concentration (major) in music (see page 124). This degree program addresses students who can meet both the intellectual and musical challenges of a course of study that emphasizes the broad experience of a liberally educated person. The concentration in music comprises a balanced program of academic study, private instruction, and ensemble experience. Although the concentration is a demanding one (students usually take between one-third and one-half of their courses in music), many music majors often also explore beyond the introductory level one or more nonmusic disciplines, sometimes as a double major. In addition to completing Parts 1 and 2 of the application, potential B.A. music concentrators are encouraged to audition (in person or by tape) as part of the admission process so that musical achievement can be considered in the admission decision and the applicant can be advised of his or her placement in private instruction at the Eastman School. Students should request application forms and address inquiries for the B.A. degree program to the Director of Admissions, River Campus, University of Rochester, Rochester, NY 14627-0251. Auditions for prospective B.A. music concentrators are arranged through the Music Program of the College of Arts and Science, 207 Todd Union, (716) 275-2828.

The Eastman School of Music of the University of Rochester offers the Bachelor of Music (B.M.) degree in applied music, music composition, music theory, music history, and music education. Students in these degree programs pursue intensive studies in music performance and academic music subjects comprising approximately three-fourths of the program, the remainder devoted to English and to other related humanities or science subjects of choice. Housing for Eastman students is provided in nearby residence halls. To apply for the Bachelor of Music degree, please write to the Director of Admissions, Eastman School of Music, 26 Gibbs Street, Rochester, NY 14604.

ROCHESTER EARLY MEDICAL SCHOLARS PROGRAM ("REMS")

REMS is an eight-year B.A./B.S.-M.D. program for exceptionally talented undergraduates. Students enrolled in this program enter the University of Rochester with an assurance of admission to the School of Medicine and Dentistry when they complete their undergraduate degree programs, provided that they maintain a high level of academic achievement, fulfill college and departmental requirements, and complete required premedical courses. REMS enrollees work closely with faculty mentors, and participate in special seminars and events. To be considered for the REMS program, candidates must have a very strong secondary school record and recommendations; have SAT scores generally at 1250 or above (exceptions may be made for students with otherwise strong records); complete the regular undergraduate admission application (Parts 1 and 2) by January 15; complete, by January 15, the special REMS Supplementary Application, available upon request from the Office of Admissions; and possess a demonstrated interest in medicine. Finalists will be invited to campus for required REMS interviews.

FOREIGN STUDENTS

The University of Rochester welcomes applications from foreign students. Admission is competitive, and students needing financial assistance should be aware that financial aid for international students, if it is available, is typically limited to less than one-half of the University's yearly costs. Foreign applicants are required to submit the same application materials and to take the same entrance tests as United States citizens. All correspondence and applications should be sent by air mail, or fax machine (716) 461-4595. Because the SAT and the ACT may not be given as often abroad, and scores take longer to be reported, foreign students are advised to write to the American College Testing Program or to the College Entrance Examination Board as soon as they decide to apply to the University to ascertain where and when the next test is offered

in their area. The SAT and ACT should be taken no later than January for fall admission consideration. Because it is often difficult to interpret and evaluate secondary school transcripts from abroad, translations and explanations of grading systems should be submitted when necessary. The Ordinary and Advanced level examinations administered in many countries are strongly recommended when available; the results will be considered both for admission and for placement.

Applicants whose native language is not English are strongly urged to submit scores from the Test of English as a Foreign Language (TOEFL). Students are expected to have a firm command of the English language before they apply; no provisional admission is offered whereby a student may come to the University and spend a semester or a year learning English.

All applicants intending to earn their baccalaureate degree from the School of Nursing are required to submit TOEFL scores. In addition, applicants who are already nurses are required to successfully complete the Commission on Graduates of Foreign Nursing Schools (CGFNS) qualifying examination.

ADVANCED PLACEMENT

Entering students may receive course credit and/or higher-level course placement at the University through the College Entrance Examination Board Advanced Placement Program. Advanced Placement score reports must be forwarded to the College of Arts and Science from the CEEB. As soon as these reports are received, admitted students are notified about placement or course credit. During Freshman Orientation this information is used in course selection. Specific questions may be addressed to the Director of Orientation Programs, 312 Lattimore Hall.

COLLEGE CREDIT FOR PRIOR COURSE WORK

For the sake of coherence and uniformity of instruction, the University prefers that as far as possible its entering freshman

students take all their courses, basic and advanced, from its own faculty. With the exception of CEEB Advanced Placement and International Baccalaureate work, the University normally does not recognize nor grant college credit for secondary school course work or for courses taught in a secondary school by the school's own faculty for college credit.

Credit may be granted to entering students for prior course work completed with a grade of "C-" or above at an accredited college or university. Upon receipt of an official transcript from the institution of higher learning where the student was enrolled, the course work will be evaluated to determine if it is equivalent in level and/or content to course work offered through the University of Rochester college awarding the degree. Students wishing to receive credit for such college work already completed or who are now considering taking college or university courses elsewhere should ask the Office of Transfer Admissions in Meliora Hall for advice about credit transfer and/or selection of courses.

TRANSFER ADMISSION

The University of Rochester encourages students who have begun their academic careers at other colleges or universities to continue their educations here. Ordinarily, students who have previously enrolled for at least one semester of full-time study or who have completed a minimum of eight credit hours at another college or university after graduation from high school are eligible to apply for transfer admission. Students undertaking college-level course work as part of their high-school programs or in order to satisfy high-school diploma requirements are eligible to enter as freshmen, although they are welcome to request academic credit for their college work.

Application Procedure

Transfer students may apply for admission to either the fall or spring semester. Because transfer admission operates on a rolling basis, each application is reviewed as soon as all the necessary materials are received. The admission process is conducted one semester at a time. Applica-

tion review for the fall semester begins in late January; for the spring semester, in mid-September. Although there is no formal deadline for submission of an application, it is to the student's advantage to complete an application well in advance of the semester for which he or she is applying. This is especially true for students who are requesting consideration for financial aid and/or on-campus housing.

Application Materials

In addition to Part 1 and Part 2 of the application, transfer applicants should submit official transcripts from each college previously attended; recommendations from every college attended on a full-time basis; the high-school transcript and recommendation; SAT or ACT scores; and a catalog or bulletin from each college in order that all previous course work can be evaluated for transfer credit.

Applicants who have been out of high school five years or more may request the Modified Transfer Admission Application. Under the guidelines of this application, SAT or ACT scores as well as college and high-school recommendations are not required; however, if available that information is incorporated into the application review.

Foreign students living outside the United States are required to submit the same documents (translated, if the originals are not in English) and to take the same tests as students living in the United States in order to complete their applications. Although the TOEFL is not required (except for students/nurses applying to the B.S. program in nursing), foreign applicants are strongly encouraged to submit their TOEFL test results.

Academic Review

Emphasis is placed on the most recent semesters of course work completed at the college level. Applications from candidates who could enter with more than four semesters of transfer credit are generally reviewed by the particular department in which concentration is planned. After reviewing an application, the Committee on Transfer Admissions no-

tifies the candidate of its decision soon after the application is completed. The decision on financial aid is also announced at this time if the financial aid application is complete. All transfer students are encouraged to meet with a member of our transfer admissions staff during the application process to discuss their application status.

Transfer Credit

Courses taken at another college are evaluated individually for transfer credit and placement. Courses which are judged comparable in level and content to course work offered at Rochester, and completed with a "C-" or better, will transfer for college requirements or for elective credit.

Residency Requirement

The College of Arts and Science and the College of Engineering and Applied Science require a minimum of two semesters in residence. Students must satisfactorily complete at least 12 credits in each of the two semesters in order to be eligible for the bachelor's degree. More than two years of credit will be transferred to an Arts and Science degree only if approval is granted by the intended area of concentration. Summer school course work taken after transfer to the College of Engineering and Applied Science does not apply towards its residency requirement. (Part-time students in Arts and Science must complete 24 credit hours during one three-year period; this rule is superseded by any residency requirement in force in the student's department of concentration at the time when it might reasonably be applied.)

Transfer students are expected to fulfill all requirements set by the college in which they intend to earn their degrees. Students transferring into the College of Arts and Science particularly are reminded that they must demonstrate proficiency in one foreign language before the degree can be awarded. The School of Nursing requires a minimum of 32 nursing credits taken at the University of Rochester. These nursing credits may be taken on a full- or part-time basis.

Housing

Transfer applicants who plan to enroll for the fall semester customarily receive a housing assignment from the Office of Residential Life if their deposit and the University housing contract are received by a specified date in early spring. Campus housing may also be available for the spring term. Information regarding this matter is available from the Office of Transfer Admissions, (716) 275-5312. Students in need of housing whose application process is completed after all available space has been allocated will be offered assistance in securing campus or alternative housing placement.

School of Nursing

Transfer students who wish to complete requirements for the Bachelor of Science degree in nursing should contact the Admissions Office at the School of Nursing, (716) 275-2375, prior to enrollment so that arts and science credits earned elsewhere may be assessed. (Refer to specific course requirements on page 193.) Nursing applicants who transfer into the freshman or sophomore level are admitted through the College of Arts and Science where they are enrolled in a sequence of pre-nursing courses. Upon completing 56 credits (including transfer courses), students declare their concentration with the School of Nursing.

Students currently or previously enrolled in another baccalaureate program in nursing may transfer to the School of Nursing on a space-available basis. All requests from other programs will be reviewed by the Associate Dean for Academic Affairs. In addition to meeting admission criteria, a nursing student must submit a written recommendation from the academic administrator of his or her current or previous nursing program, and course outlines of any nursing course work completed. An interview may also be required.

Campus Visits

Students who are considering transfer are urged to visit Rochester in order to become familiar with the campus and the University community, and to obtain answers to questions concerning admission

procedures and academic opportunities. Requests for application materials, interview appointments, and overnight visits should be directed to the Office of Transfer Admissions, University of Rochester, Rochester, NY 14627-0254, telephone (716) 275-5312. Appointments are scheduled Monday through Friday from 9 a.m. to 4 p.m. Some Saturday appointments are available upon request. Prior to applying, students bringing copies of their transcripts may obtain an advisory opinion of their probable credit and class standing.

Financial Aid

Transfer students in need of financial assistance should file the University of Rochester's application for financial aid, which is contained in the Part 2 application folder, and the Financial Aid Form of the College Scholarship Service. A financial aid application will be sent to students who request the modified application materials. A financial aid transcript, documenting all sources of financial aid received from previous colleges, must also be filed by all financial aid applicants. It is recommended that students requesting financial assistance complete the application early. For additional information, see the section on financial aid on page 233. Applicants should note especially the Meliora Transfer Scholarship awarded to students who demonstrate financial need and high academic success.

READMISSION

Students who withdraw from the University or are separated for any reason and who wish to re-enter should apply through the Office of Transfer Admissions. Applications for readmission are reviewed by representatives of the various colleges. Students who appear ready to resume their programs are generally approved for readmission, subject to space limitations in departments and residence halls. Applications for readmission should be filed at least a month before the beginning of the term in which the student plans to re-enter.

PART-TIME STUDENTS AND SPECIAL STUDENTS

Persons wishing to take courses for general enrichment or on a trial basis may do so without formal admission procedures. However, subsequent matriculation as a regular student, if desired, will be subject to an appropriate admissions procedure. Please refer to *The Part-timer's Guide to Registration & Services* for details. Students who wish to change their status from full-time to part-time, or vice versa, need to inform their college dean prior to the first day of classes. Tuition will be adjusted for students who change their time status after classes begin. Persons wishing to explore the options available to part-time students are welcome to visit the College Center for Academic Support, 312 Lattimore Hall, between the hours of 9 a.m.–6 p.m. Mondays, Tuesdays, and Thursdays, and 9 a.m.–5 p.m. Wednesdays and Fridays.

Special guidance in planning a program of study in engineering is available from the Office of the Dean, College of Engineering and Applied Science, 401 Dewey Hall. Part-time students are encouraged to write or telephone for appointments.

The category *special student* includes those full-time students desiring to pursue course work not leading to a degree, those who wish to complete professional school prerequisites, and "visiting" students currently enrolled in another college who wish to attend the University for only a term or a year. Preprofessional advising is available to those special students planning to complete requirements at the University for admission to medical or dental school, law school, or other graduate and health professions programs (refer to Career and Counseling Services). Prospective special students are welcome to direct their inquiries to the Office of Transfer Admissions.

SCHOOL OF NURSING— ADMISSION

Prospective freshmen interested in pursuing a degree program in nursing should be sure to indicate this interest on their application. Students planning

to pursue a degree in nursing are assigned faculty advisors from the School of Nursing at the beginning of their freshman year or as soon as they officially declare nursing as their major course of study. Students from other institutions planning to apply for junior standing should seek information about courses which meet admission requirements during their first two years of study. They may obtain application forms and information concerning admission from the Office of Transfer Admissions, (716) 275-5312, or the Office of Admissions, School of Nursing, (716) 275-2375. In addition, juniors and seniors currently enrolled in a nursing program at other schools are invited to enrich their degree programs as special or "visiting" students (see above) for a semester or a year at the School of Nursing.

Requirements for admission to the professional course of study require the successful completion of specified liberal arts and science courses in the following subjects: English (writing and thinking); human anatomy and physiology; psychology (1 semester general; 1 semester developmental); statistics; microbiology (including laboratory); humanities (2 semesters); chemistry (2 semesters, organic and inorganic, including laboratory); sociology (2 semesters) or one each of sociology and anthropology.

Students may transfer to the University of Rochester at all levels. However, the professional course of study begins in the junior year. A minimum of 32 nursing credits must be completed at the School of Nursing. Students who wish to transfer to the School of Nursing should contact the Office of Admissions in the School of Nursing.

Physical education courses required in other colleges attended are not accepted for transfer credit.

The minimum academic standing expected of all applicants to the School of Nursing is 2.0. Courses for transfer from outside the University of Rochester must be completed with a grade of "C–" or above. Required courses cannot be taken with the S/F option.

The School of Nursing has articulation agreements with several colleges and universities to facilitate transfer of students into the upper-division nursing program. These schools include:

Allegheny College
Geneva College
Houghton College
Mercyhurst College
Miami/Dade Community College
Monroe Community College
St. Lawrence University
Wheaton College (Illinois)

Students interested in this program should contact the Assistant Dean for Recruitment at the School of Nursing, Office of Admissions and/or the Health Professions Advisor at the school of his or her choice.

The School of Nursing requires evidence of a strong desire to make nursing a career, together with evidence of aptitude for such a career.

Students, especially those taking part-time study over a period of time, are advised to check periodically regarding degree requirements and the acceptability of courses to be offered for admission to the nursing major.

REGISTERED NURSES— REGULAR ADMISSION

Registered nurses who have graduated from diploma or associate degree programs and who seek admission to the School of Nursing may obtain information concerning admission from the School of Nursing, Office of Admissions, (716) 275-2375. Under the admission procedures just described RNs are eligible for transfer credit through transcript evaluation and specified nursing examinations. It is possible for registered nurses who study full time to complete the baccalaureate program in one year.

A combined baccalaureate-master's degree program in nursing is available for select registered nurses with defined career goals. Specific details concerning admission criteria and course work are available through the School of Nursing, Office of Admissions, (716) 275-2375.

Financing an Education

Expenses to be anticipated in determining the cost of an education at Rochester can best be understood as a combination of *fixed* and *variable* expenses. Fixed costs are those payable directly to the University for tuition, fees, and room and board for those living on campus and participating in a University board plan. Those costs and information relevant to their payment are summarized below.

Variable expenses are those which an individual student incurs over and above these fixed costs. The largest components of variable expense are likely to be books and transportation. Amounts spent for clothing, recreation, and personal items will differ widely according to the financial circumstances and personal spending patterns of individuals.

On the basis of past experience and for purposes of assessing the need for financial aid, the Financial Aid Office can estimate the average cost to an undergraduate for one year. Generally referred to as the *estimated student budget*, this figure for students living on campus during the 1991-92 academic year is \$21,400 plus travel. Commuting students who live with their parents in the greater Rochester area may estimate an annual budget of \$17,850.

Fixed Costs

Tuition for full-time undergraduates is \$15,150 for the 1991-92 academic year. A room in a campus residence, including linen service, double or triple occupancy, is \$3,420 per year. The most comprehensive board plan is \$2,330 per year. Upperclass students who elect to live in the residences and do their own

cooking or eat at non-University-operated eating establishments are charged a kitchenette fee of \$30. Freshmen incur a one-time charge of about \$130 for meals and accommodations during orientation.

A mandatory health fee of \$241 per year is charged to all full-time students.

All students pay an activity fee, which is established annually by the student government. The fee is \$120 for the academic year. In addition, all resident students pay a social fee of \$10 for the academic year.

River Campus and School of Nursing: Fixed Cost Summary 1991-92

| | |
|---|-----------------|
| Tuition (for full-time students) . . . | \$15,150 |
| Room | 3,420 |
| Board | 2,330* |
| Fees (approximately) | 325† |
| Total Annual Fixed Cost | \$21,225 |

*Other plans available.

†Junior nursing students pay an additional \$50 lab fee each semester; senior nursing students pay a \$25 lab fee each semester. Fees do not include the health insurance fee.

Engineering juniors and seniors pay an engineering equipment fee equal to approximately 3% of junior year tuition, and is the same dollar amount for the senior year.

NOTE: Variable expenses incurred by nursing students include the following: uniforms; books and supplies; and expenses in connection with field trips or clinical experience, including transportation to and from clinical settings.

These expenses may vary from \$500 to \$600 per year. NOTE: For adjustment of charges in case of withdrawal, see page 210. Adjustment Charges, Withdrawal, and Inactive Status.

NOTE: *Noncredit course fees.* All persons attending noncredit courses must pay fees as announced for these courses.

Payment Plans

Undergraduate students are billed on the basis of charges for a full academic year. The University offers a choice of an eight-payment plan, a two-payment plan, or a one-payment plan. Financial aid is credited and the net balance is payable in accordance with the payment plan selected by the student. Late payment penalties are assessed on payments not received by the due date. Students who are delinquent in their payments are not allowed to register for the next semester, receive transcripts, or participate in the Housing Lottery. Students with delinquent balances at the end of a semester may be withdrawn from the University.

A Prepaid Tuition Plan is available which enables incoming freshmen to prepay four years of tuition at the tuition rate in effect during the year of their initial enrollment at the University. Financing is available for this plan through the SHARE Loan program, described in more detail on page 236. Students other than freshmen may prepay tuition at the beginning of the fall term for the remainder of their undergraduate years at the tuition rate in effect at the time prepayment is made.

Students interested in the Prepaid Tuition Plan or wishing further information about the payment options may request details from the Bursar's Office.

Detailed information about financial aid follows. In addition, parents may wish to investigate time payment plans available through commercial lenders and local banks to pay for University education costs.

FINANCIAL AID

Recognizing that the cost of a quality education is high, the University has made a commitment to provide a sound program of financial aid for undergraduate students enrolled in degree-granting programs. Financial aid awards administered directly by the University, including scholarships, grants, loans, and part-time campus employment, are held by approximately 60 percent of our undergraduates. Over 80 percent of undergraduate students receive some type of financial assistance from the University, from sources outside the University, or from a combination of both. Through careful allocation of available resources, the University attempts to provide financial support for many who would otherwise be unable to attend.

A general discussion of student aid follows. Additional information is available from the Financial Aid Office. Our brochure, *Putting It All Together*, provides a comprehensive discussion of financial aid, including eligibility and application procedures for many specific aid programs. This publication is available upon request.

Making Application

Applicants for financial aid must complete the financial aid section of the application for admission and must submit the Financial Aid Form (FAF) to the College Scholarship Service. The FAF usually is available from the secondary school; copies also may be obtained from the Financial Aid Office. Freshman aid applicants should submit the required forms by January 31. Transfer aid applicants should submit the forms at the same time they submit admission applications and also must provide documentation of all sources of financial aid received at all colleges previously attended. All applicants who are not United States citizens or permanent residents should file the International Student Financial Aid Application instead of the Financial Aid Form. This application is available from the Financial Aid Office.

Basis for Award and Renewal of Financial Aid

Most aid awards, including University scholarships, are based on the applicant's need, after expecting a reasonable contribution from the student and parents toward meeting educational costs. Within need, however, the proportion of scholarship assistance to loan or work will reflect the student's merit and special talents. Applicants are considered for all types of scholarships, loans, and employment for which they are qualified and eligible.

The amount of financial assistance offered is subject to subsequent adjustment if the applicant receives additional aid outside that which is under the direct administration of the University, or if changes in financial need become apparent. Students are expected to submit the appropriate applications for all outside awards for which they qualify. An Acceptance of Financial Aid document is required of those students who decide to enroll.

Aid awards are reviewed annually, and a renewal application for the subsequent academic year must be submitted by March 31. In the review of upperclass applications, the University takes into consideration continuing financial need, and academic achievement at a level which assures satisfactory completion of degree requirements. In the determination of financial need, all resources available to the student to help meet college costs are considered in the decision to continue University-administered financial assistance.

Assuming that the student continues to demonstrate at least the same level of need, University scholarships ordinarily are continued at their original dollar amount for a maximum of eight semesters for students entering as freshmen in the fall term. Transfer students are eligible for renewed scholarship consideration based upon the number of semesters remaining between entrance and the anticipated graduation date (class year designation) established at the time of enrollment. With the exception of students who were separated by

the University, financial aid recipients who withdraw are eligible for continuation of assistance upon completing all requirements for readmission. The amount of aid will depend on the availability of funds and the student's need and will not necessarily be equal to a previously held award. Students with a previous educational loan in default status are not eligible for renewal of aid.

Verification of Financial Information

The University is required to document the financial circumstances of federal fund recipients and must adhere to regulations governing federal awards, particularly with regard to the eligibility of applicants according to financial need.

For these reasons, Rochester has joined other universities in requiring verification of financial information through submission of a copy of the preceding year's Federal Income Tax Return. Specific instructions regarding this requirement are included in the award letter.

TYPES OF FINANCIAL ASSISTANCE UNIVERSITY SCHOLARSHIPS

Scholarships administered by the University include general and endowed scholarships and special awards made under the sponsorship and annual support of specific individuals or groups. Students applying for aid are considered for all scholarships for which they are eligible.

Alumni Scholarships. Interested students must be nominated by one of the University of Rochester Volunteer Admissions Network Committees throughout the United States and abroad. Final selection of recipients from among those nominated will be based on academic merit and financial need. Names of alumni volunteers are available upon request from the Office of Admissions. An alumni interview is required by February 19.

University of Rochester AHORA Scholarships. Winners selected from among residents of Puerto Rico and Monroe County, New York.

Meliora Transfer Scholarships. Winners are selected based on academic merit and financial need.

Phi Theta Kappa Scholarships. Awarded to needy transfer students who are members of the Phi Theta Kappa honor society.

Certain honorary scholarships, based upon superior qualifications, provide a minimum stipend without regard to need. Honorary achievement scholarships of particular distinction include: **National Merit Scholarships.** Awarded to entering freshmen on the basis of the annual National Merit Scholarship Corporation qualifying test. In addition to corporation and foundation sponsors, the University also sponsors renewable scholarships to selected finalists who designate Rochester as their college choice.

University of Rochester-Urban League Scholarships. Winners are selected from among students nominated by participating chapters of the Urban League throughout the United States on the basis of academic achievement and demonstrated leadership qualities.

Bausch & Lomb Science Award. Awarded by many high schools, the prestigious medal also enables highly qualified students to be considered for special scholarship assistance.

Xerox Humanities/Social Science Award. Awarded by many high schools, this prestigious recognition also enables highly qualified students to be considered for special scholarship assistance.

Wilson Scholarships. Students selected for these prestigious awards are among the strongest applicants to the University. Selection is based on both academic and nonacademic achievements. No special application is required.

NROTC Scholarships. Scholarship assistance is available from the United States Navy for students enrolled in the NROTC Program. NROTC students enlisting in 1991 will also be eligible for additional gift assistance to cover the cost of a room on campus. See page 126 (Naval Science) for further information.

FEDERAL FINANCIAL AID*

The University is an approved participant in the Perkins Loan, Stafford Loan, Federal Nursing Student Loan, College Work-Study, Pell Grant, and Supplemental Educational Opportunity Grant programs of the federal government. Approved by acts of Congress, these programs make funds available to United States citizens or permanent residents for grants, loans, and campus employment. With the exception of Pell Grants and Stafford Loans, the administration of these federal student aid funds rests with the University, however, and recipients are selected by the Financial Aid Office. Preference is given to applicants with the greatest financial need, and continuation of aid from this source depends upon annual Congressional appropriations.

The Pell Grant is an entitlement program not under the direct administration of the University, which does not select recipients nor determine eligibility. This program makes direct grants to matriculated undergraduates who qualify solely on the basis of financial need. Instructions for applying for Pell Grants are available from secondary schools and also are included with the Financial Aid Form of the College Scholarship Service.

LOAN PROGRAMS

Educational loans as a means of self-help toward meeting college costs have increased markedly in recent years. With few exceptions, student loans offer the advantage of deferred repayment until the completion of studies. Loan programs commonly used by Rochester undergraduates include:

Perkins Loans. Loans from this federal program are authorized by the Financial Aid Office. Repayment at 5% interest may be extended up to 10 years, following a nine-month grace period after

completion of studies (six months for loans made prior to 1987-88). Further deferments are possible during periods of additional study, service with the Armed Forces, or volunteer service with certain agencies such as the Peace Corps or VISTA. A substantial portion of total indebtedness may be canceled for students who enter specified fields of education, such as the teaching of handicapped children. For students borrowing for the first time after July 1, 1987, service in the Peace Corps or VISTA can also lead to partial cancellation of the loan. Eligibility restricted to U.S. citizens or permanent residents.

Federal Nursing Loans. Loans from this federal program are authorized by the Financial Aid Office. Repayment begins nine months after completion of studies at 5% interest (6% for loans made prior to 1988-89). Similar to Perkins Loans, specified deferment provisions are available. Eligibility restricted to U.S. citizens or permanent residents.

Stafford Loan Program. This federal program makes loans of up to \$2,625 per year to freshmen and sophomores and \$4,000 per year to juniors and seniors. Aggregate undergraduate borrowing is limited to \$17,250. Eligibility is based on demonstration of financial need, and is restricted to U.S. citizens or permanent residents. Interest is deferred while students are in school. Students borrowing for the first time in 1988-89 or beyond will pay 8% interest for the first four years of repayment and 10% thereafter. Although authorized by federal legislation, the Stafford Loan Program is subject to individual state and lender regulations. Further information and applications are available from hometown lenders such as banks, savings and loan associations, or credit unions.

Supplemental Loans for Students (SLS). A federal program designed for graduate students and undergraduates no longer dependent upon parents. Terms and conditions are similar to PLUS loans (see below).

University Loans. The University itself makes a limited number of loans avail-

*Eligibility requirements, terms, conditions, and amounts of federal student financial aid are subject to sudden revision by Congress. Descriptions of federal aid programs included in this publication, therefore, may not be applicable at the time of enrollment.

Furthermore, 18-year-old male applicants are reminded that current law requires registration with Selective Service prior to the disbursement of federal grants and loans.

able to students needing further assistance to meet educational costs. These loans, with interest at 9%, may be repaid over a period of five years following graduation, with a minimum repayment of \$30 per month. Special arrangements may be made to defer repayment during periods of full-time graduate study.

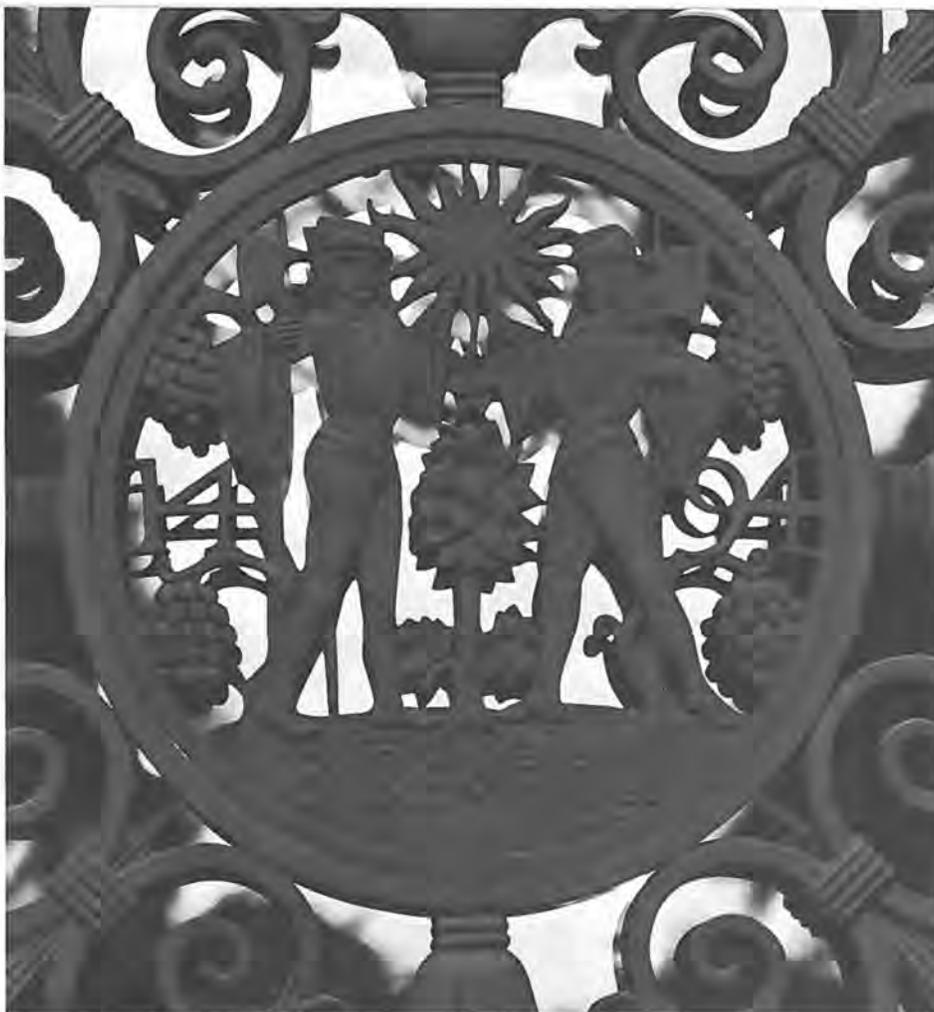
PARENT LOAN PROGRAMS

Parent Loans for Undergraduate Students (PLUS). This federal program provides up to \$4,000 per year at a variable interest rate (52-week T-bill plus 3.25% not to exceed 12%) to parents of financially dependent students. Although interest begins to accumulate immediately, payment of principal and interest can be deferred for up to four years while the student is enrolled full time. The amount borrowed, together with all other financial aid, including the Stafford Loan, cannot exceed the cost of attendance.

SHARE Loans. This program allows credit-worthy borrowers \$2,000 to \$20,000 per year per student, or up to four years of tuition to finance the University's prepaid tuition plan. Both fixed and variable interest rates are available, with a home-equity option available to allow families to preserve the tax-deductibility of their interest payments. Repayment begins immediately with up to 20 years to repay.

PART-TIME EMPLOYMENT

Students may be given priority status for placement in campus jobs as part of their total aid award. Many of these jobs are funded through the Federal College Work-Study Program. Ordinarily 10 to 15 hours per week is a suggested work load. In addition, the Student Employment Office maintains an open job file which may be used by any student seeking employment on or off campus. Considerable expansion of career-related work opportunities is currently taking place. See page 213 for a description of these new programs.



SCHOOL OF NURSING EXTERNSHIPS

Upon completion of the sophomore year, University of Rochester School of Nursing students are eligible to apply for summer positions as Nurse Externs in Strong Memorial Hospital, where they work either part time or full time at an hourly rate. Frequently nursing students continue their work as externs on a part-time basis throughout the remainder of their program.

ASSISTANCE FROM OTHER SOURCES

Applicants for financial aid also are urged to seek information concerning their eligibility for assistance from outside sources such as state scholarship programs (New York State Tuition Assistance Program and Regents Scholarship Program for New York State residents), Veterans Administration benefits, the Office of Vocational Rehabilitation, and local community agencies, corporations, foundations, or similar organizations.

Application instructions and other conditions affecting receipt and retention of outside scholarships and grants will vary among sponsors, and applicants therefore must be aware of acceptable procedures.

Students receiving funds from federal or New York State financial aid programs must meet standards of satisfactory academic progress and timely pursuit of a program of study in order to assure continuation of their awards.

Additional information about these standards is available from the Financial Aid Office or the Office of the University Registrar.

General Regulations

S

tudents are expected to abide by the rules of the University and its faculties and to conduct themselves in accordance with accepted standards of good citizenship, honesty, and propriety, and with proper regard for the rights of others. When the University delegates judicial and disciplinary responsibilities to faculty or student groups, students must abide by their decisions. Of course, students must obey federal, state, and local laws as would any other citizens.

The following paragraphs indicate some of the standards expected of the Rochester student. More specific regulations are to be found in the University's "Standards of Conduct and Procedures," the University statement on harassment and hazing, the room and board contract, the University's parking regulations, and the policy statements issued by the various deans' and directors' offices and student activities centers.

Disciplinary sanctions up to and including suspension, expulsion, or termination may be imposed upon members of the University community for:

1. Academic cheating or plagiarism,* furnishing false information to the University or to members of the University community, forgery, alteration or misuse of University documents, records, or identification cards, or violation of fire safety regulations.
2. Acts which are illegal under the law are also violations of University regulations. These would include, but are not

limited to, theft; disorderly conduct; computer crime; manufacture, sale, possession, or distribution of illegal drugs, including alcohol; rape; possession or use of firearms or explosive materials; assault or battery; vandalism; reckless endangerment of other persons; unauthorized possession of master keys; and failure to comply with reasonable requests of University officials in performance of their duties.

INVENTORY OF REGISTERED PROGRAMS

The New York State Education Department has authorized the University of Rochester to offer the undergraduate-level programs which appear in the following inventory. A listing of graduate programs may be found in the *Official Bulletin: Graduate Studies*. Programs offered at the Eastman School of Music may be found in the *Official Bulletin: Eastman School of Music*.

| Program Code | Hegis Code | Program Name | Degree | Cert |
|------------------------------------|------------|---|--------|------|
| College of Arts and Science | | | | |
| 10797 | 2202 | Anthropology | BA | |
| 83250 | 1703 | Applied Mathematics | BS | |
| | | Art and Art History | | |
| 10677 | 1003 | Art History | BA | |
| 10676 | 1002 | Studio Arts | BA | |
| 10608 | 0401 | Biology | BA | |
| 81462 | 0401 | Biology | BS | |
| 10612 | 040101 | Biology 7-12 | BA | B |
| 10609 | 4902 | Biology-Geology | BS | |
| 10767 | 1905 | Chemistry | BA | |
| 10766 | 1905 | Chemistry | BS | |
| 10770 | 190501 | Chemistry 7-12 | BA | B |
| 78521 | 190501 | Chemistry 7-12 | BS | B |
| 84114 | 4901 | Cognitive Science | BA | |
| 83145 | 0701 | Computer Sciences: Mathematics | BA | |
| 83146 | 0701 | Computer Sciences: Applied Mathematics | BS | |
| 10780 | 191701 | Earth Science 7-12 | BA | B |
| 78522 | 191701 | Earth Science 7-12 | BS | B |
| 10798 | 2204 | Economics | BA | |
| 10729 | 1501 | English | BA | |
| 10731 | 150101 | English 7-12 | BA | B |
| 83154 | 1010 | Film Studies | BA | |
| | | Foreign Languages, Literatures, & Linguistics | | |
| 10716 | 1107 | Chinese | BA | |
| 78107 | 1503 | Comparative Literature | BA | |

*Plagiarism is more explicitly defined in the *Policy on Academic Honesty*, which also delineates the procedures for adjudicating such charges.

| Program Code | Hegis Code | Program Name | Degree | Cert |
|---|------------|----------------------------------|--------|------|
| 78106 | 1503 | Foreign Literature | BA | |
| 10702 | 1102 | French | BA | |
| 10697 | 110201 | French 7-12 | BA | B |
| 10706 | 1103 | German | BA | |
| 10703 | 110301 | German 7-12 | BA | B |
| 87111 | 1108 | Japanese | BA | |
| 10739 | 1505 | Linguistics | BA | |
| 10715 | 1106 | Russian | BA | |
| 10714 | 1105 | Spanish | BA | |
| 10709 | 110501 | Spanish 7-12 | BA | B |
| 10813 | 4902 | Integrated Sciences | BA | |
| 10776 | 1914 | Geology | BA | |
| 10779 | 1914 | Geology | BS | |
| 10669 | 0912 | Geomechanics | BS | |
| 85228 | 2299 | Health & Society | BA | |
| 10802 | 2205 | History | BA | |
| 10812 | 4901 | Interdepartmental Degree Program | BA | |
| 10744 | 1701 | Mathematics | BA | |
| 10747 | 170101 | Mathematics 7-12 | BA | B |
| 77418 | 1799 | Mathematics & Statistics | BA | |
| 10691 | 1005 | Music | BA | |
| 10740 | 1509 | Philosophy | BA | |
| 10756 | 1902 | Physics | BA | |
| 10758 | 1902 | Physics | BS | |
| 10753 | 190201 | Physics 7-12 | BA | B |
| 78520 | 190201 | Physics 7-12 | BS | B |
| 10775 | 1901 | Physics & Astronomy | BA | |
| 10774 | 1901 | Physics & Astronomy | BS | |
| 10805 | 2207 | Political Science | BA | |
| 09314 | 2001 | Psychology | BA | |
| | | Religion and Classics | | |
| 10736 | 1504 | Classics | BA/MA | |
| 10743 | 1510 | Religion | BA | |
| 10793 | 220101 | Social Studies 7-12 | BA | B |
| 10807 | 2208 | Sociology | BA | |
| 10751 | 1702 | Statistics | BA | |
| 85431 | 1702 | Statistics/Medical Statistics | BA/MS | |
| 83147 | 4903 | Women's Studies | BA | |
| College of Engineering and Applied Science | | | | |
| 10662 | 0906 | Chemical Engineering | BS | |
| 10663 | 0909 | Electrical Engineering | BS | |
| 80164 | 0909 | Electrical Engineering | BS/MS | |
| 10655 | 0901 | Engineering & Applied Science | BS | |
| 10669 | 0912 | Geomechanics | BS | |
| 10668 | 0910 | Mechanical Engineering | BS | |
| 10673 | 0999 | Optics | BS | |
| School of Nursing | | | | |
| 10721 | 1203 | Undergraduate Nursing | BS | |
| 84160 | 1203 | Undergraduate/ | BS/MS | |
| | 1210 | Graduate Nursing | | |

B = provisional teacher certification.

UNIVERSITY RECORDS

The University policy on student records is available to students and their parents through the Office of the Vice President and University Dean of Students.

Reports to Parents

Grade reports and general announcements about events at the University will be sent to parents or guardians of all dependent students.

It is the policy of the University to consider all matriculated undergraduate students dependent unless they formally declare their independence, either at the time of enrollment or subsequently through application to the dean's office of their college.

Unless otherwise directed, reports concerning dependent students will be sent to the parent(s) or guardian(s) at the address designated on the registration materials at the time of enrollment.

If divorced or separated parents wish to receive individual mailings of grade reports and general announcements, the student should so advise the registrar's office (River Campus and School of Nursing students, Office of the University Registrar; Eastman School students, the Eastman School Registrar).

Notification of a change of address, or of a change in the designation of the parent who is to receive University mailings, should be made by the student to the appropriate registrar's office.

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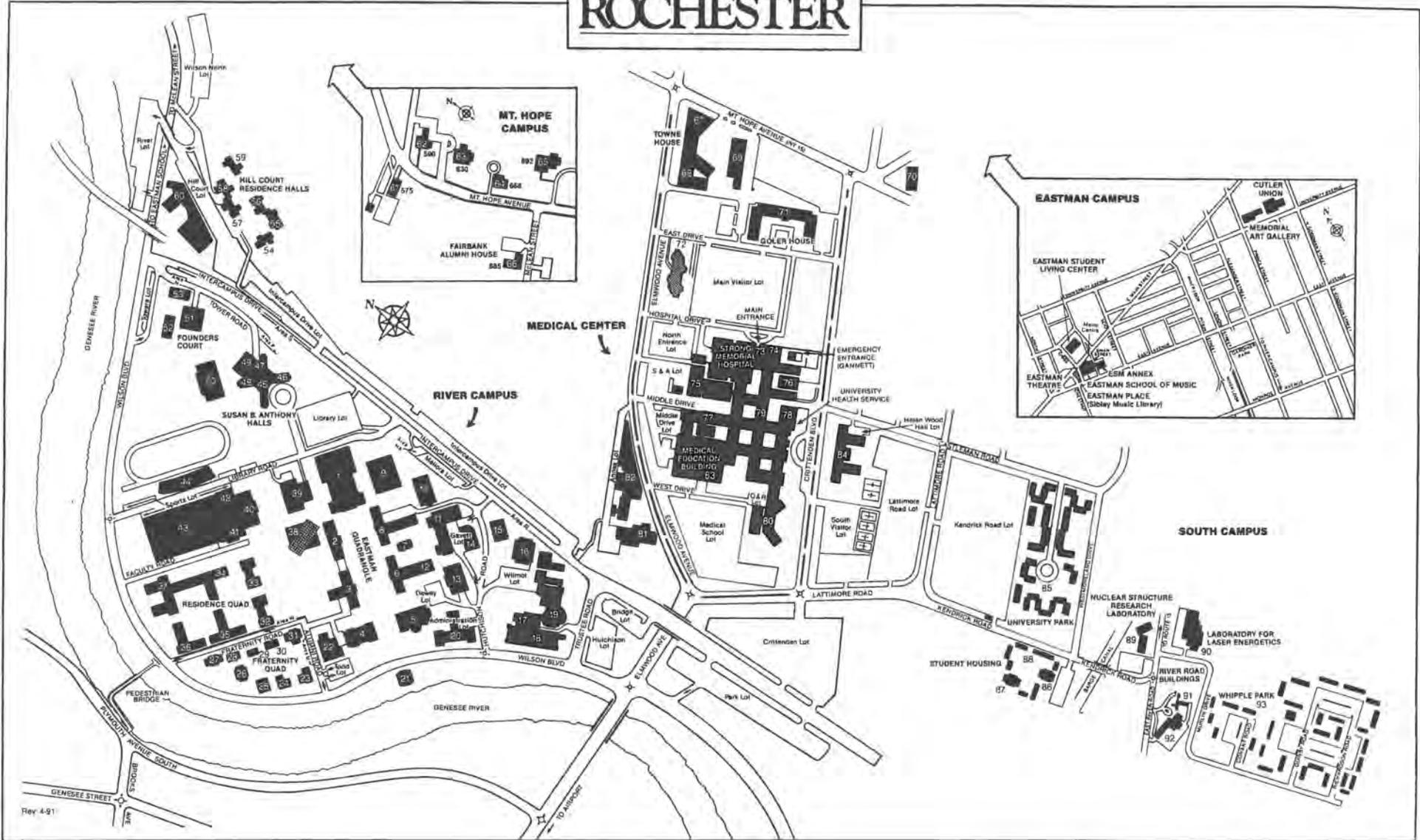
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UNIVERSITY OF ROCHESTER



Rev 4-91

University Buildings

Key

1. Rush Rhees Library*
2. Morey Hall*
Eastman Kodak Colonnade
3. Lattimore Hall*
4. Strong Auditorium*
5. Schlegel Hall*
6. Dewey Hall*
7. Hoyt Hall*
8. Bausch & Lomb Hall*
9. Meliora Hall*
10. Harkness Hall*
11. Gavett Hall*
12. Carol G. Simon Hall*
13. Hopeman Engineering Bldg.*
14. Taylor Hall*
15. N.Y. State Center for Advanced Technology
16. Wilmot Bldg.*
17. Hylan Bldg.*
18. Hutchison Hall*
Hubbell Auditorium*
Lander Auditorium
19. Computer Studies Bldg.*
20. Administration Bldg.*
21. Interfaith Chapel*
22. Todd Union*
23. Delta Kappa Epsilon
24. Alpha Delta Phi
25. Theta Chi
26. Psi Upsilon
27. Quad Annex
28. Sigma Alpha Mu
29. Sigma Chi
30. Medieval House*
31. Drama Center*
32. Burton Hall
33. Crosby Hall
34. Hoeing Hall
35. Lovejoy Hall
36. Tiernan Hall
37. Gilbert Hall
38. Wilson Commons*
39. Frederick Douglass Bldg.*
Bookstore
Faculty Club
Dining Center
40. Alumni Gymnasium*
41. Alexander Palestra*
42. Field House*
43. Zornow Sports Center*
44. Fauver Stadium*
- 45-49 Susan B. Anthony Halls*
45. Gates Hall
46. Morgan Hall
47. Hollister Hall
48. Gannett Hall
49. Danforth Dining Center
50. Spurrier Hall*
51. Sage Art Center*
- 52-53 Founders Court
52. Anderson Tower
53. Wilder Tower
- 54-59 Hill Court
54. Slater House
55. Munro House
56. Kendrick House
57. Gale House
58. Fairchild House
59. Chambers House
60. Maintenance-Transportation Bldg.
61. 575 Mt. Hope Ave.
62. 590 Mt. Hope Ave.
63. 630 Mt. Hope Ave.
(Peter Barry House)
64. 668 Mt. Hope Ave.
(Ellwanger & Barry Bldg.)
65. 692 Mt. Hope Ave.
(Patrick Barry House)
66. Fairbank Alumni House
67. Towne House*
68. Computing Center
69. Mt. Hope Professional Bldg.
70. Mail Services Bldg.
71. Goler House*
72. Eastman Dental Center
(independent affiliated agency)
73. Strong Memorial Hospital*
74. Gannett Emergency Center*
75. Supplies & Accounts Bldg.
76. Cancer Center*
77. Department of Biophysics*
78. University Health Service*
79. Department of Orthopaedics*
80. Department of Psychiatry*
81. Central Utilities Plant
82. Medical Center Annex
83. Medical Education Bldg.*
84. Helen Wood Hall*
85. University Park*
86. Valentine Tower*
87. de Kiewiet Tower*
88. Graduate Maisonettes*
89. Nuclear Structure Research Laboratory
90. Laboratory for Laser Energetics
- 91-92 River Road Bldgs.
91. River Road Residence*
92. River Road Laboratory*
93. Whipple Park Apartments*

1. Rush Rhees Library: Departments of History, Religion and Classics, and Film Studies; principal library for the River Campus.

2. Morey Hall: Departments of English and Art and Art History, Frederick Douglass Institute for African and African-American Studies, Department of Naval Science, Office of Vice President and University Dean of Students, Office of Minority Student Affairs, Higher Education Opportunity Program, and International Student Office.

3. Lattimore Hall: Graduate School of Education and Human Development, Office of the Dean and College Center for Academic Support of the College of Arts and Science, Career Services and Placement Center, Counseling and Psychological Services, College Center for Interdisciplinary Studies, Learning Assistance Services, Orientation Office, Susan B. Anthony Center, a 153-seat auditorium, and classrooms and seminar rooms.

4. Strong Auditorium: Two halls, seating 1,060 and 480 persons, used for lectures, films, stage productions, and concerts.

- 5. Schlegel Hall:** William E. Simon Graduate School of Business Administration M.B.A. Program, Computing Center, placement offices, Executive Development Program, and classrooms.
- 6. Dewey Hall:** Administrative offices of the College of Engineering; Department of Electrical Engineering; William E. Simon Graduate School of Business Administration administrative offices and faculty.
- 7. Hoyt Hall:** Center for Audio-Visual and Technical Services, and 350-seat auditorium for lectures, meetings, and conferences.
- 8. Bausch & Lomb Hall:** Department of Physics and Astronomy.
- 9. Meliora Hall:** Office of Admissions, Office of Financial Aid, Department of Psychology, Center for Visual Science, River Campus Copy Center, Student Employment Office, administrative offices, and general classroom facilities.
- 10. Harkness Hall:** Offices of the Departments of Anthropology, Economics, and Political Science.
- 11. Gavett Hall:** Offices, classrooms, and laboratories of the Department of Chemical Engineering, and laboratories of the Department of Mechanical Engineering.
- 12. Carol G. Simon Hall:** Teaching laboratories of The Institute of Optics; Department of Foreign Languages, Literatures, and Linguistics; Department of Philosophy; William E. Simon Graduate School of Business Administration faculty and Ph.D. Program
- 13. Hopeman Engineering Bldg.:** Offices, classrooms, and laboratories of the Departments of Electrical Engineering and Mechanical Engineering.
- 14. Taylor Hall:** University Computing Center terminal facility.
- 16. Wilmot Bldg.:** Offices, seminar rooms, and laboratory facilities for The Institute of Optics.
- 17. Hylan Bldg.:** Classrooms, conference rooms, commons rooms, seminar rooms, offices of the Departments of Mathematics and Statistics, and Office of Research and Project Administration.
- 18. Hutchison Hall:** Classrooms, lecture halls, laboratories, offices, and commons rooms of the Program in Biology and Medicine, the Departments of Biology, Chemistry, and Geological Sciences, and a greenhouse complex.
- Hubbell Auditorium:** 483-seat auditorium in Hutchison Hall for lectures, special meetings, and conferences.
- Lander Auditorium:** 148-seat auditorium in Hutchison Hall.
- 19. Computer Studies Bldg.:** Offices, classrooms, and laboratories of the Departments of Computer Science and Electrical Engineering, and Carlson Library.
- 20. Administration Bldg.:** University administrative offices and Offices of the Registrar and the Bursar.
- 21. Interfaith Chapel:** Center for campus religious activities and chaplains' offices.
- 22. Todd Union:** Noteworthy as one of the first student unions in the United States, essentially replaced by Wilson Commons. Houses the offices of the River Campus Music Department, Office of University Community Affairs, a U.S. post office, a bank, Todd Theater, and two student radio clubs, WRUR-AM and FM and K2ZWI (Amateur Radio).
- 30, 31. Medieval House and Drama Center:** Residence-and-study houses with regular programs of public lectures, readings, and special events.
- 38. Wilson Commons:** The campus center, opened in 1976, with student organization offices, a recreation center, lounges, meeting and performing facilities, dining services, the Common Ground Cafe, William H. Stackel Meeting Room, Hartnett Art Gallery, Arthur J. May Multi-Purpose Room, Samuel M. Havens Lounge, Fred Gowen Room, Ruth Merrill Student Organization Center, and George Graham Smith Plaza.
- 39. Frederick Douglass Bldg.:** A student dining center, meeting rooms, University bookstore, and Faculty Club.
- 40. Alumni Gymnasium:** Office of Sports and Recreation, squash and racquetball courts, calisthenic and weight rooms.
- 41. Alexander Palestra:** Home site for University intercollegiate basketball and volleyball, with permanent seating capacity of 2,500.
- 42. Field House:** 12,000-square-foot indoor playing surface covered by artificial turf, and a one-eighth-mile running track around the perimeter.
- 43. Zornow Sports Center:** Offices for the Department of Sports and Recreation, Speegle-Wilbraham Aquatic Center, four indoor tennis courts, three combination basketball-volleyball courts, nautilus room, meeting room, locker rooms, and 12 lighted rooftop tennis courts.
- 44. Fauver Stadium:** 5,000-seat, concrete-and-brick stadium with artificial turf and lights. Also houses coed training room, and has a 400-meter track encircling playing field. Site of intercollegiate field hockey, football, lacrosse, track and field, and soccer. At the south end of the stadium building are located the River Campus Security and Parking offices and University Computer Sales.
- 44-49. Susan B. Anthony Halls:** Undergraduate residence and dining center, infirmary, and Services Division offices.
- 50. Spurrier Hall:** Dance studio, music rooms, and Employee Assistance Program.
- 51. Sage Art Center:** Teaching and studio facilities for visual arts programs.
- 67. Towne House:** East Wing—Medical and hospital services offices, University Security, Properties and Real Estate Management. Center Wing—Residence Hall. West Wing—University computing and systems center.
- 71, 85-88, 93. University Apartments:** George Washington Goler House, de Kiewit Tower, Valentine Tower, Graduate Maisonettes, University Park, Whipple Park.
- 73-74, 76-80, 83. University Medical Center:** School of Medicine and Dentistry, School of Nursing, Strong Memorial Hospital.
- 84. Helen Wood Hall:** Program for Pediatrics, Department of Community and Preventive Medicine, Department of Family Medicine, and classrooms.
- 91. River Road Residence:** Housing facilities.
- 92. River Road Laboratory:** Includes River Road Auditorium. General University use.

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ABBREVIATIONS

| | | | |
|------|--|-------|--|
| AAS | African and African-American Studies | GSBA | William E. Simon Graduate School of Business Administration |
| ACC | Accounting | GSEHD | Graduate School of Education and Human Development |
| AH | Art History | HEB | Hebrew |
| ANT | Anthropology | HIS | History |
| AST | Astronomy | IDE | Interdepartmental Engineering |
| BCH | Biochemistry | IND | Interdepartmental |
| BME | Biomedical Engineering | IT | Italian |
| BIO | Biology | JPN | Japanese |
| CAS | College of Arts and Science | LA | Liberal Arts |
| CEAS | College of Engineering and Applied Science | LAW | Business Law |
| CHE | Chemical Engineering | LIN | Linguistics |
| CHI | Chinese | LIT | FLLL/Literature |
| CHM | Chemistry | LTN | Latin |
| CIS | Computers and Information Systems (GSBA) | MBI | Microbiology |
| CLA | Classical Studies | ME | Mechanical Engineering |
| CLT | Comparative Literature | MKT | Marketing |
| COG | Cognitive Science | MTH | Mathematics |
| CSC | Computer Science | MUR | Music |
| CVS | Center for Visual Science | NS | Naval Science |
| EAS | Engineering and Applied Science | NSC | Neuroscience |
| ECO | Economics | NUR | Nursing |
| EDA | Education Administration | OMG | Operations Management |
| EDC | Curriculum and Foundations of Education | OPT | Optics |
| EDG | Education—Interdepartmental and General | PHL | Philosophy |
| EDH | Counseling, Family, and Worklife Studies | PHY | Physics |
| EE | Electrical Engineering | PM | Preventive Medicine |
| ENG | English | PPA | Public Policy Analysis |
| FIN | Finance | PSC | Political Science |
| FLLL | Foreign Languages, Literatures, and Linguistics | PSO | Physiology |
| FR | French | PSY | Psychology |
| FS | Film Studies | REL | Religious and Classical Studies |
| GEO | Geology | ROM | Romanian |
| GER | German | RUS | Russian |
| GRK | Greek | SA | Studio Arts |
| | | SOC | Sociology |
| | | SP | Spanish |
| | | STT | Statistics |
| | | WST | Women's Studies |

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