1966-1967

OFFICIAL BULLETIN | UNIVERSITY OF ROCHESTER

UNDERGRADUATE STUDIES ▪ COLLEGES OF: ARTS AND SCIENCE ▪ BUSINESS ADMINISTRATION ▪ EDUCATION ▪ ENGINEERING AND APPLIED SCIENCE ▪ DEPARTMENT OF NURSING ▪ SERIES 61 ▪ NUMBER 3 ▪ MAY 1966

The University of Rochester
is interested in discovering the ways
in which man's knowledge can be
advanced, in applying those techniques
to the important intellectual
questions of our day, and in
teaching its students the methods and
fruits of this inquiry.

The University is committed
to no dogma except that knowledge
is important for mankind,
and to no technique except that
all ideas merit serious consideration.

CALENDAR

FALL 1966

September 15, Thursday
Registration begins

17, Saturday
Last day for payment of undergraduate tuition

19, Monday
Classes begin

November 23, Wednesday
Thanksgiving recess begins at noon

28, Monday
Classes resume

December 21, Wednesday
Christmas recess begins after last class

January 3, Tuesday
Classes resume

14, Saturday
Classes end

SPRING 1967

January 13, Friday
Last day for payment of undergraduate tuition

February 1, Wednesday
Classes begin

March 25, Saturday
Spring recess begins after last class

April 3, Monday
Classes resume

May 3, Wednesday
Dandelion Day

19, Friday
Classes end

June 4, Sunday
Commencement

CONTENTS

AN INTRODUCTION TO THE UNIVERSITY OF ROCHESTER

WE HOPE THAT the information about the University of Rochester presented herein will tell you a bit more about what life on the Rochester campus is like.

The University of Rochester was founded in 1850 as a small liberal arts college for men. It is now a coeducational, independently supported, nonsectarian institution.

The University consists of seven colleges and schools. On the River Campus are the College of Arts and Science, which offers degree programs in twenty-five fields; the College of Engineering and Applied Science, with programs in chemical engineering, electrical engineering, mechanical and aerospace sciences, and optics; the College of Education, with programs in elementary and secondary school teaching; the College of Business Administration; and University School of Liberal and Applied Studies.

The University Medical Center, adjoining the River Campus, houses the School of Medicine and Dentistry, including the Department of Nursing; Strong Memorial Hospital, including the Wing R Psychiatric Clinic and the Rehabilitation and Diagnostic Clinic; and the Atomic Energy Project, conducted by the Department of Radiation Biology and Biophysics under contract with the Atomic Energy Commission.

The University's Eastman School of Music, in downtown Rochester, has it own academic buildings and a residential campus which it shares with the University's Memorial Art Gallery.

The College of Arts and Science is the heart of the River Campus complex. It will be the center of your academic life during your first two years at the University. If you plan to take a professional program in engineering, education, business, or nursing, you will enter the appropriate professional unit at the start of your junior year. Those of you who enter nursing will change your residence from the River Campus to the Medical Center. If you are eventually going to concentrate on the humanities, the social sciences, or the natural sciences, all four years of your undergraduate work will be done in the College of Arts and Science. Every

college or school of the University demands through its curriculum and the quality of its faculty, the highest standards of performance from you.

You will find a 931,000-volume* central library—supplemented by departmental and college libraries—offering you vast resources for perusal, study, and research.

You will be studying at an institution where both undergraduate and graduate work is pursued; where the search for new knowledge is as important as the dissemination of existing knowledge; where new facts, new theories, and new discoveries frequently may be discussed in your seminars long before they are published.

You will find that a number of the University's professors are among the nation's most eminent men in their respective fields. And, because a University setting brings together persons from many different fields, you will find a breadth of interest and background that is exciting and rewarding, as well as an awareness of the interdisciplinary approach that characterizes much of today's higher education.

You will find your classmates to be among the best students graduating from their secondary schools, for this is the caliber of student admitted to the University of Rochester. Full-time undergraduate enrollment on the River Campus currently totals some 2800 students, and intellectual competition is vigorous and keen.

Your fellow students will come from all parts of the United States and many parts of the world. Many of them will have plans and career interests different from yours; their experiences, backgrounds, attitudes, and training will be different. In your residence hall, fraternity house, or in the recreation center, you will live, eat, and talk with your undergraduate colleagues and graduate students as well. They will be studying comparative religions and political systems, biophysics, geography, chemistry, optics, investment management, nuclear physics, brain research, magnetohydrodynamics, modern art, educational psychology, narrative writing, Canadian studies, mathematical logic, Russian and Chinese—to name but a few.

Because you will be admitted to the University of Rochester as a student of some maturity, you will be treated as such, responsible for your own actions, activities, and work. Advisers, counsellors, deans, professors, instructors, and specialists will be available to help you, but they won't "oversee" you.

You will be given more responsibility for independent study than you have ever had before. Your required reading will be anywhere from three to five times greater than that expected of you in secondary school. You will be responsible for the amount and quality of work you do, and how you budget your time.

Budgeting of time will not always be easy for you. You will be encouraged to explore interests other than your area of major study, whether these

*Exclusive of manuscripts, government documents and other special materials.

interests be at the University's Memorial Art Gallery or at the Eastman School, at the Medical School, the Institute of Optics, or the Computing Center. You will find more extra-curricular activities going on than your time allows: an extensive program of intra-mural and inter-collegiate athletics; frequent coffee hour meetings with faculty members and visiting guests; symposia on the arts, sciences, and international affairs; colloquia in music, medicine, and the sciences; conferences on religion, poetry, and United States foreign policy; festivals of music, art, and the theatre; student government and fraternity meetings; concerts and plays.

The "mechanics" of your education will be different, too. For the most part, your work each semester will consist of only four courses; this is to enable you to concentrate intensively on each subject area. Some of your classes—certainly during your freshman year—will be taught in lecture fashion, with as many as 150–300 students in the class; for in this manner, the University can enable every student, rather than just a portion of the class, to hear outstanding lecturers. Smaller discussion sections will supplement the lectures. The discussion sections will be conducted by instructors—and, in some cases, graduate assistants—who will expect you to have done all of the assigned reading and to have thoroughly assimilated your lecture notes.

If you continue in the College of Arts and Science you may have an opportunity to participate in the University's Honors Program beginning in your sophomore or junior year. The Honors Program is offered by nine departments: Anthropology, Economics, English, Fine Arts, Foreign and Comparative Literature, History, Philosophy, Political Science, and Sociology, and is of special interest to those students desiring a high degree of intellectual challenge.

You also may find yourself in a situation to study at a foreign university during your junior year, for at the University of Rochester the rewarding opportunity for such study is available to superior students.

In short, your life as an undergraduate at the University of Rochester will be different, demanding, and multi-faceted. But throughout that life, you will be a member of an intimate, tightly-knit college community. You will be governed by a College Cabinet whose members you will help elect. You will be kept informed of campus affairs by your own student newspaper and radio station. You will live on a residential, self-contained, and attractive campus—one that has an "in the country" atmosphere, yet is within a ten or twelve minute drive from downtown.

You will be a student at a University which has distinctive features and unusual strengths. It is for you to evaluate those features and strengths in terms of your needs and in terms of what you want to get out of your college education. We hope that you will want to apply for admission to the University of Rochester. We hope, too, that your application will be a reflection of your decision that the University of Rochester is *the* institution offering you the best chance of achieving the goals you have set for yourself.

THE ACADEMIC UNITS

THE UNIVERSITY OF ROCHESTER is accredited by the Middle States Association of Colleges and Secondary Schools and is a member of the Association of American Universities.

A brief description of the University's major divisions follows; information on undergraduate courses appears on pages 96 to 168.

COLLEGE OF ARTS AND SCIENCE, oldest of the University's academic units, provides undergraduate and graduate courses in the humanities, the natural sciences, and the social sciences. It offers degree programs in twenty-five fields. Undergraduate programs lead to either a Bachelor of Arts or a Bachelor of Science degree; graduate programs, to a Master of Arts, Master of Science, or Doctor of Philosophy degree.

COLLEGE OF BUSINESS ADMINISTRATION offers, on a broad base of two or more years of study in the liberal arts, professional courses leading to a Bachelor of Science with a major in accounting, business economics, or management science. Graduate study leads to a Master of Business Administration (M.B.A.), Master of Science (M.S.) or Doctor of Philosophy (Ph.D.).

College of Education provides undergraduate and graduate courses in teacher education. Degrees offered are Bachelor of Science with majors in elementary or secondary education, Master of Education, Master of Arts in Education, Doctor of Education, and the Certificate of Advanced Study for completion of Specialist in Education programs.

College of Engineering and Applied Science, a professional upper-division and graduate-level college, offers work leading to the Bachelor of Science, Master of Science, and Doctor of Philosophy degrees with a major in chemical engineering, electrical engineering, mechanical engineering, and in optics. The College has a broad range of research activities and an organized program of service to industry via consultation, seminars, and conferences.

School of Medicine and Dentistry, located in the University Medical Center, offers a four-year program leading to the Doctor of Medicine degree; undergraduate and graduate programs in nursing; programs of postdoctoral medical education including internships and residencies in medicine and dentistry; postdoctoral programs in preclinical and clinical sciences, occupational medicine and dentistry; graduate studies in the preclinical sciences; radiation biology, and health physics.

Department of Nursing (School of Medicine and Dentistry) offers study leading to the Bachelor of Science with a major in nursing and Master of Science with a major in nursing education.

EASTMAN SCHOOL OF MUSIC, which has its own academic buildings and residential campus, offers programs leading to the degrees Bachelor of Music, Master of Arts in Music, Master of Music, Doctor of Philosophy in Music, and Doctor of Musical Arts. The Eastman School participates with the College of Arts and Science in a program leading to the Bachelor of Arts with a major in music. Students of other divisions of the University also may elect music courses at the School.

UNIVERSITY SCHOOL OF LIBERAL AND APPLIED STUDIES provides university training to persons who cannot attend one of the other schools of the University, or whose needs are not met by the programs of such schools. Most classes are held in the late afternoon, the evening, or on Saturdays. Courses not generally given in the College of Arts and Science are available in University School to students of the College. University School also provides courses leading to a Bachelor of Science degree with a major in general studies, and a master's degree with a major in industrial statistics or applied mathematics.

GRADUATE STUDIES

The first graduate degree in course, Master of Arts, was voted by the Board of Trustees of the University in 1851. With the establishment of the Schools of Medicine and Music, the expansion of University library facilities and the provision of equipment and fellowships for research in the College of Arts and Science, graduate work developed rapidly during the 1920's. Following the steady expansion of graduate work at the University during the next three decades, it was decided in 1957 to decentralize much of the administrative control of work leading to advanced degrees. Currently each college or school in the University is responsible for recommending candidates for master's degrees. The work for the degree Doctor of Philosophy is under the general control of the University Council on Graduate Studies which recommends to the Board of Trustees the candidates for this degree. Each school of the University has an Associate Dean charged with the responsibility of administering graduate work.

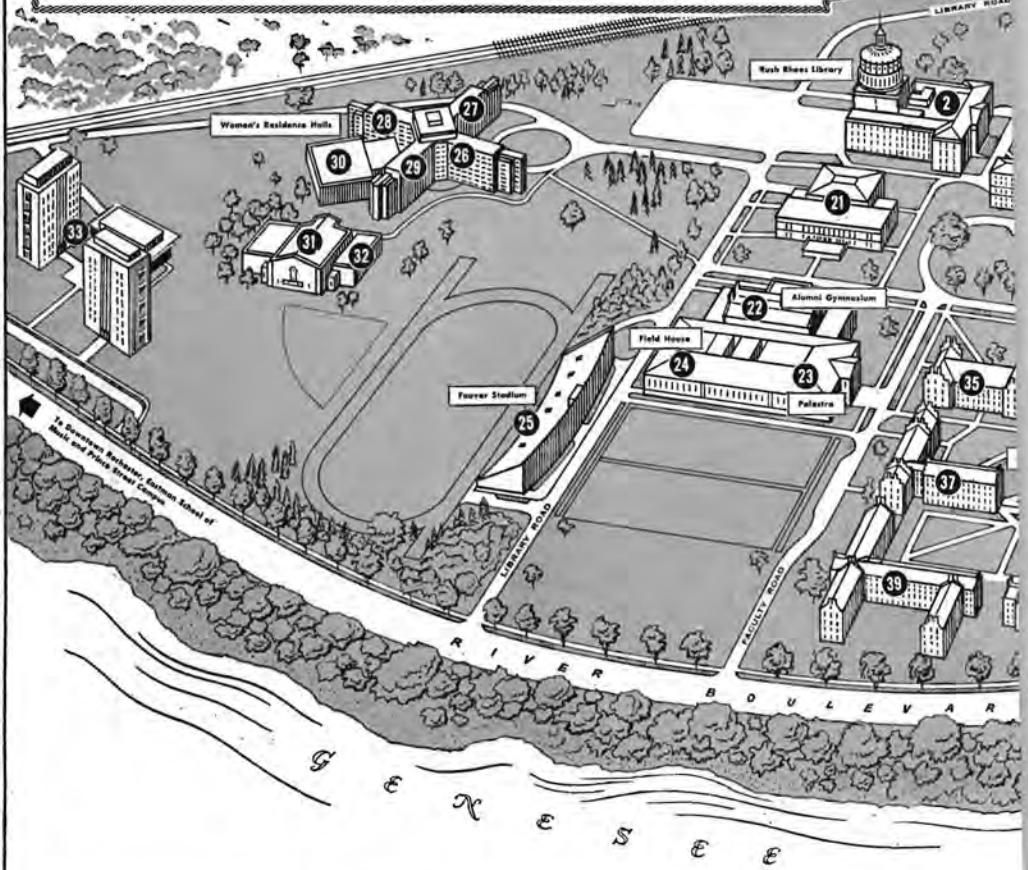
EVENING AND SUMMER SESSIONS

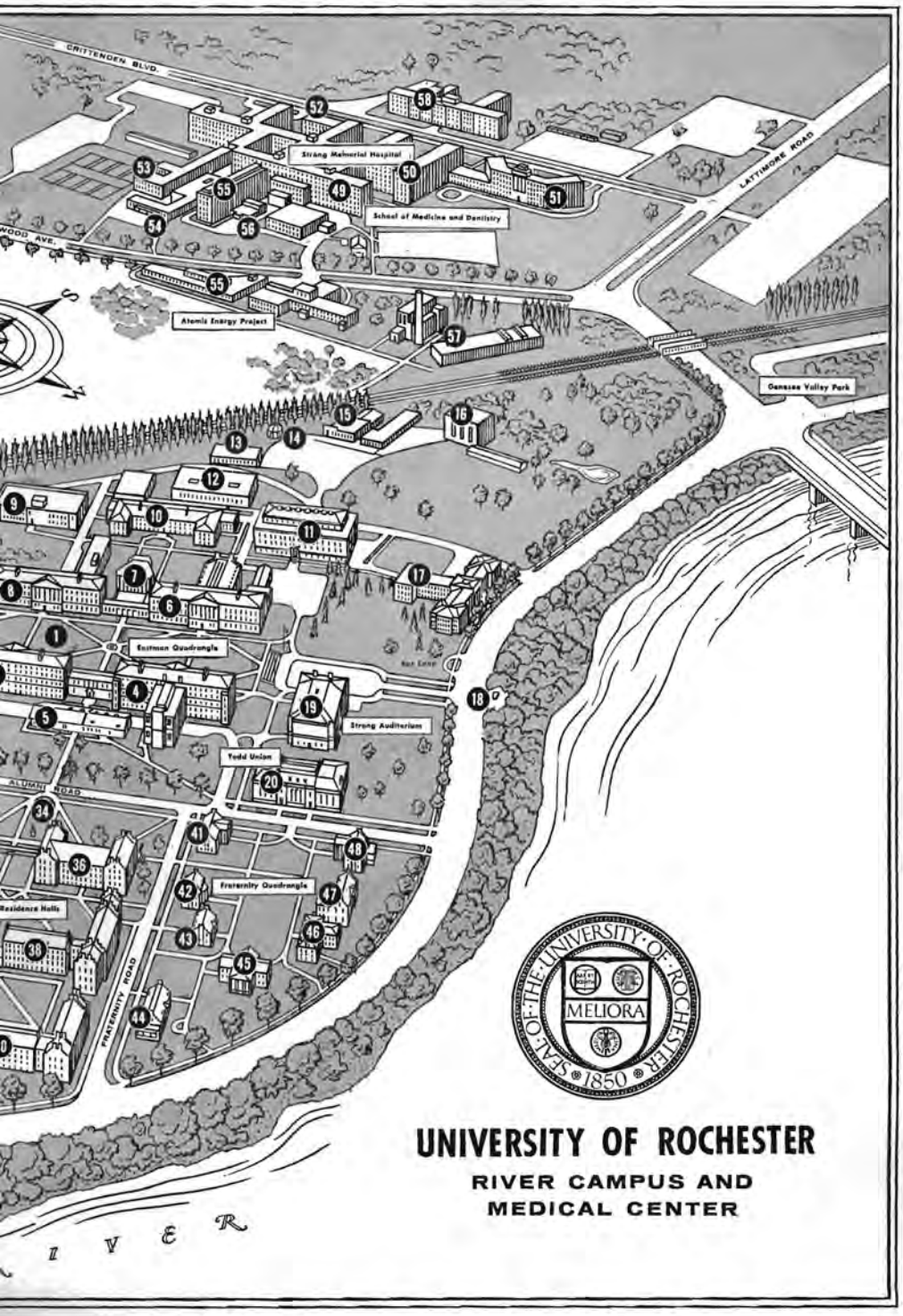
Evening Session provides offerings primarily designed for part-time students. Six academic units participate in the River Campus Evening Session. The College of Arts and Science and the College of Engineering and Applied Science give programs leading to the master's degree. The Colleges of Business Administration and Education and the Department of Nursing offer both undergraduate and graduate instruction. Part-time students planning to earn bachelor's degrees in one of the University's professional colleges are registered in the University School of Liberal and Applied Studies until admitted to the school or college of their choice.

Summer Session classes, first held in 1921, are offered on the River Campus and at the Eastman School of Music. Undergraduates at the University of Rochester and from other colleges and universities may take summer instruction and transfer credits earned to their own institutions. River Campus undergraduates may complete requirements for a degree in less than four years by attending Summer Session. Courses of interest to teachers, nurses, and others who desire to do regular college work during the summer are included in the River Campus summer offerings.

KEY

1. Eastman Quadrangle and Eastman Centennial
2. Rush Rhees Library
3. Morey Hall
4. Lattimore Hall
5. Brain Research Center
6. Dewey Hall
7. Hoyt Hall
8. Bausch & Lomb Hall
9. Harkness Hall
10. Gavett Hall (Engineering)
11. Hopeman Engineering Building
12. Taylor Hall
13. Particle Physics Building
14. Observatory
15. Cyclotron Control Building & Laboratory
16. Cyclotron (240,000,000 volt)
17. Administration Building
18. Swinburne Boulder & River Walk
19. Strong Auditorium
20. Todd Union
21. Men's Dining Hall
22. Alumni Gymnasium
23. Palestra
24. Field House
25. Fauver Stadium
26. Anthony Hall
27. Morgan Hall
28. Hollister Hall
29. Gannett Hall
30. Danforth Hall
31. Women's Gymnasium
32. Alumnae Swimming Pool
33. The Towers—Undergraduate Residence Halls
34. Martin Brewer Anderson Statue
35. Crosby Hall
36. Burton Hall
37. Hoeing Hall
38. Loveloy Hall
39. Gilbert Hall
40. Tiernan Hall
41. Delta Upsilon Fraternity
42. Phi Epsilon Pi
43. Sigma Chi
44. Theta Delta Chi
45. Psi Upsilon
46. Theta Chi
47. Alpha Delta Phi
48. Delta Kappa Epsilon
49. School of Medicine & Dentistry
50. Strong Memorial Hospital
51. Wing "R" Psychiatric Clinic
52. Rehabilitation & Diagnostic Center
53. Staff House
54. University Supplies & Accounts Bldg.
55. Atomic Energy Project (Wing "O")
56. Radiation Therapy Center
57. Power Plant
58. Helen Wood Hall—Dept. of Nursing Dormitory





UNIVERSITY OF ROCHESTER

RIVER CAMPUS AND MEDICAL CENTER

RIVER CAMPUS FACILITIES

*2. ***Rush Rhees Library,*** center of the University Library system, houses the bulk of the University's total 931,000-volume** collection. Located in other campus buildings, as indicated below, are five other college or departmental libraries covering engineering and scientific fields. Together with Rush Rhees, these libraries contain approximately 700,000 of the University's total book collection and receive 7,500 of the 9,000 periodicals subscribed to by all University libraries.

The Department of Special Collections in Rush Rhees contains several outstanding manuscript collections including the papers of William H. Seward, Thurlow Weed, Kenneth B. Keating, and Thomas E. Dewey. Its Treasure Room houses the rare book collection. Also located in Rush Rhees Library are the Business Administration-Education, Fine Arts, East Asian and South Asian Libraries. Here also are the Department of History and some offices of the Departments of Psychology and English.

Other University libraries are the Sibley Music Library at the Eastman School of Music, the Memorial Art Gallery Library, and the Edward G. Miner Library at the School of Medicine and Dentistry. All libraries are under a central administration. Faculty and students may use materials of any library subject to its particular rules of usage.

3. ***Morey Hall*** contains the classrooms and offices of several of the liberal arts departments, the office of the Dean of Students, the administrative offices of the College of Arts and Science, and the Laboratory of Psychology.

4. ***Lattimore Hall*** houses the Department of Chemistry, the Chemistry Library, and the national editorial offices of the *Journal of the American Chemical Society.*

5. ***The Brain Research Center*** houses 20 research and training laboratories, graduate seminar rooms, and animal quarters for research activities.

6. ***The Chester Dewey Building*** is shared by the Departments of Biology and Geology and Geography, and the College of Business Administration. Also located here are the Life Sciences Library and the Geology-Geography Library.

7. ***The Elizabeth Hoyt Hall*** provides special facilities for science demonstrations, lectures, and special meetings and conferences.

8. ***The John J. Bausch-Henry Lomb Memorial Laboratory,*** housing the Department of Physics and Astronomy, has special facilities for research including a cyclotron capable of producing eight-million-volt protons for nuclear research. A new building adjoining the main physics building provides space for programs in physics, astronomy, mathematics, and optics and for a library serving these areas.

*Numbers refer to location on Campus map on pages 14 and 15.

**Exclusive of manuscripts, government documents and other special materials.

9. ***Harkness Hall,*** the naval and air science building, contains classrooms, a practice range, naval reference library, and other facilities for the instruction of the Naval Reserve and Air Force Officers' Training Corps units, and offices of the Departments of Anthropology, Economics, Political Science, and Sociology.

10. ***Gavett Hall,*** of the College of Engineering and Applied Science, houses the dean's offices and engineering library. Here are classrooms, laboratories, offices, and shop facilities for instruction and research in chemical and mechanical engineering and for instructional and research programs in optics. In addition to the large inventory of instruments and equipment required by a modern College of Engineering and Applied Science, the laboratories at Rochester include such specialized equipment as a zero-power nuclear reactor, 48 amplifier analog computer, shock tube, X-ray diffraction apparatus, and spectrophotometer. Gavett Hall also houses a modern energy conversion laboratory which includes facilities for magnetohydrodynamics and hypersonic gas dynamics studies.

11. ***Hopeman Engineering Building*** is the four-story headquarters for all offices and laboratories of the Department of Electrical Engineering and more than half of the facilities for the Department of Mechanical and Aerospace Sciences. Facilities provided for electrical engineering by this new building include: seven major research laboratories (such as a communications, an acoustics, a microwave, a servomechanisms and two special project laboratories), nineteen faculty offices, fourteen research laboratories for graduate students, and five graduate study rooms. Facilities provided for mechanical and aerospace sciences include: research laboratories for fundamental studies in energy conversion, gas dynamics, materials science, and related projects. Some areas of the Hopeman Building are occupied by the College of Education. One such area is a new science education laboratory for use by area science teachers and the University's education students.

12. ***Taylor Hall*** is headquarters of the College of Education and of the Computing Center.

13. A research building for the particle physics-cosmic ray program was constructed in 1958 with funds from the Atomic Energy Commission.

15–16. A large cyclotron and an associated laboratory are used for producing 240-million-volt protons and investigating nuclear phenomena at these energies. An additional building providing augmented research facilities for the cyclotron program was completed in 1957. This project is supported by the United States Atomic Energy Commission.

17. ***The Administration Building,*** facing on River Boulevard, houses the central University administrative offices, offices of the University registrar and bursar, and the headquarters of University School of Liberal and Applied Studies.

19. ***The Henry Alvah Strong Auditorium*** contains a large hall used for many University functions, and an organ given by Mrs. Henry Alvah Strong. On a lower floor is a lecture room accommodating 500 persons. These two halls are used for assemblies, lectures, Chapel, stage productions, concerts, and other events.

20. ***Todd Union,*** facing the men's residential area, is the student center. It has offices and meeting rooms for extra-curricular groups such as religious organizations, the campus newspaper, the campus radio station, glee clubs, and student government.

21. ***The Men's Dining Hall's*** first and second floor facilities include a spacious students' lounge and a main student dining hall with three small rooms. The University Bookstore is located on the first floor. The third floor houses seminar and meeting rooms and the quarters of the Placement Office. The fourth floor of this building is occupied by the University Faculty Club.

22–24. ***Alumni Gymnasium*** for men houses facilities for the Department of Physical Education. These include the main gymnasium, a natatorium seating 500 and containing a seventy-five by thirty-foot swimming pool, a basketball palestra seating 2,200, a large field house, handball and squash courts, and wrestling rooms.

25. ***Fauver Stadium*** is a permanent grandstand at the main athletic field. It seats 6,000 spectators and provides accommodations for contestants in football and other intercollegiate sports. The Sculpture Studio and offices of the Department of Languages and Linguistics are located in the building.

26–30. ***The Women's Residence Halls*** consist of residential facilities for 630 women and a connecting gymnasium with swimming pool. The residence center is divided into four wings, each of which is a separate unit with its own lounges, dining hall, and head resident. This arrangement provides an intimate and informal atmosphere. The four dining halls are so planned that they may be opened into one large area for dances or all-college suppers. A music room and a library are included in each of the units, and each lounge opens on a terrace. Other facilities are a large game room for coeducational use, snack bar, floor lounges, and a clinic and infirmary.

33. ***Anderson Tower and Wilder Tower,*** two nine-story buildings, house about 500 upperclass students, men and women. Women students live on floors four, six, and eight in each building; men occupy the other floors. Apartments for faculty families are located on the main floor and floors four and seven in each hall. Accommodations for students living in the Towers are arranged in six-person suites, with a lounge, individual rooms and a bath for each unit. An adjacent dining room accommodates the residents of the buildings. The office of the Honors Program and a lounge area for students are located in the Solarium of Wilder Tower.

35–40. ***Crosby, Burton, Lovejoy, Hoeing, Tiernan, and Gilbert Halls*** form a pleasant men's residence area adjacent to Fraternity Quadrangle with accommodations for approximately 1,100 students.

41–48. ***Fraternity Quadrangle*** is comprised of houses built by eight national fraternities under a restricted agreement with the University. They are Alpha Delta Phi, Delta Kappa Epsilon, Delta Upsilon, Kappa Nu, Psi Upsilon, Sigma Chi, Theta Chi, and Theta Delta Chi. Not pictured is a ninth fraternity house, recently opened by Sigma Alpha Mu.

Recently completed are a graduate residence complex and a nuclear structure laboratory. A limited number of undergraduate living facilities are available in the graduate center, which is located a ten-minute walk from the River Campus. The nuclear structure laboratory, erected on the University's South Campus, is expected to be in operation by the fall of 1966.

THE MEDICAL CENTER

THE UNIVERSITY MEDICAL CENTER is located on a 60-acre tract adjacent to the River Campus. It contains some 1,000,000 square feet of floor area and was one of the first medical units in the country to house both medical school and hospital in a single building. Strong Memorial Hospital has a total bed capacity of 700 and provides unusual facilities for clinical teaching. Current enrollment at the Medical School is 290 students.

The principal units of the center are:

Strong Memorial Hospital, with a capacity of 700 beds, is a teaching hospital. It is devoted to the care of the sick in internal medicine, surgery, pediatrics, obstetrics-gynecology, and psychiatry.

Wing R Psychiatric Clinic, opened in 1948, is concerned with the study and care of patients whose illnesses promise improvement under modern therapy.

Helen Wood Hall contains academic and residence facilities of the Department of Nursing of the School of Medicine and Dentistry.

Rehabilitation and Diagnostic Center is a new self-contained unit with equipment and specialists on hand for treatment of the chronically ill. Facilities include areas for physical therapy, occupational therapy, an evaluation clinic, and speech and hearing clinics. Located on the third floor of the Center is the Children's Rehabilitation Unit which contains 15 beds and a full appointment of services for the rehabilitation of children.

The Atomic Energy Project, a center for research on medical aspects of atomic energy, is conducted by the Medical School's Department of Radiation Biology and Biophysics under contract with the United States Atomic Energy Commission.


WILSON HALL

THE EASTMAN SCHOOL OF MUSIC

The Eastman School's academic buildings in downtown Rochester contain facilities for instruction, research, practice, and performance. The main building, a five-story structure, and its eleven-story annex house classrooms, studios, practice rooms, and offices. The 500-seat Kilbourn Hall auditorium and the 3,355-seat Eastman Theatre, both integral parts of the School, are used for performances by Eastman School groups, by the community's major orchestras, and by visiting artists and ensembles. The School's Sibley Music Library is believed to house the largest collection of music literature and source materials of any music school in the world.

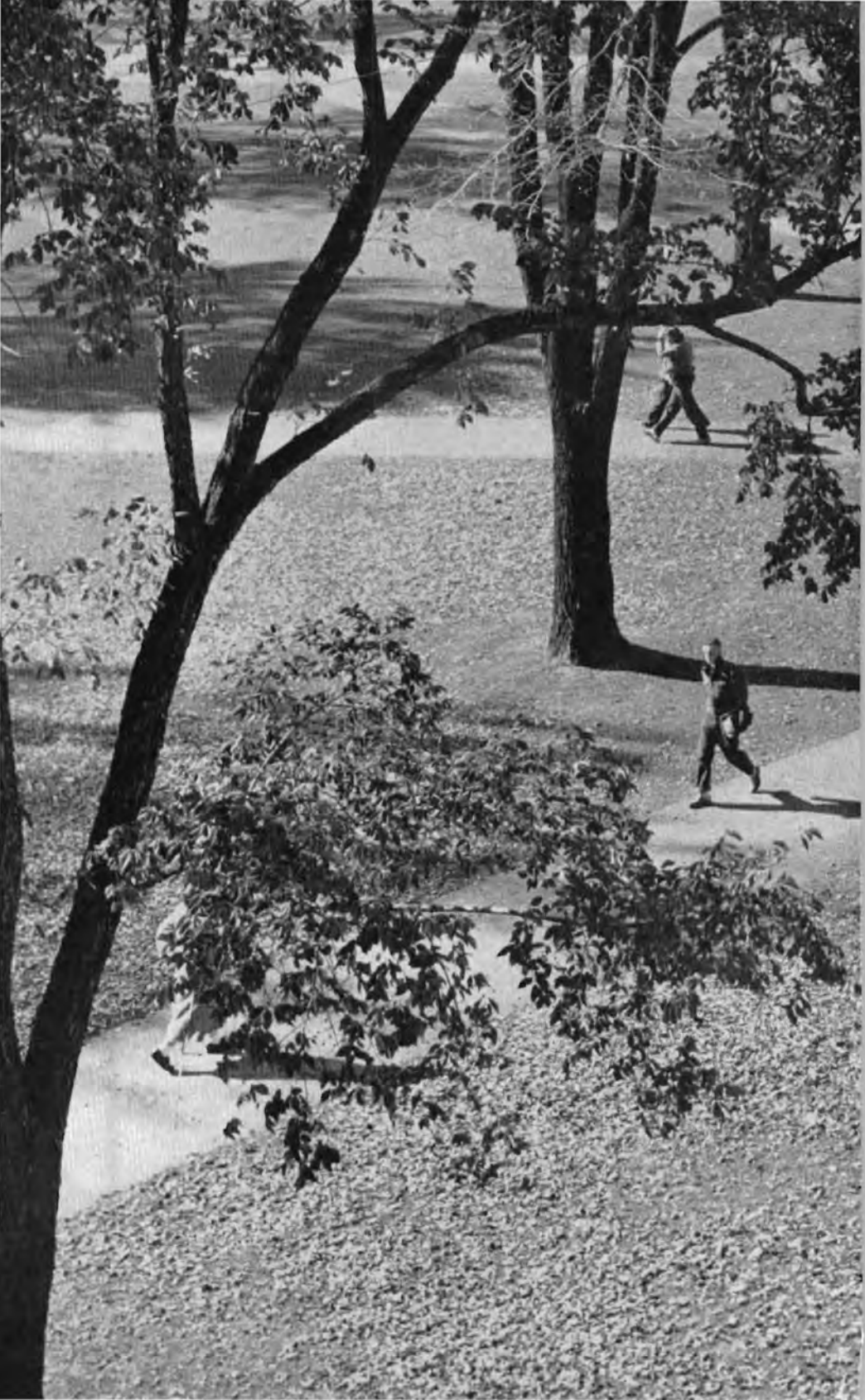
The residential campus on Prince Street, within easy walking distance of the School, contains men's and women's living centers, a student union, and recreational facilities. Eastman School has a current enrollment of approximately 410 undergraduate students and 200 graduate students.

THE MEMORIAL ART GALLERY

The Memorial Art Gallery, art center for students and for the entire area, shares the Prince Street campus with the Eastman School of Music. Its increasingly important permanent collection totals 40,000 works in a $4,000,000 collection of paintings, sculpture, frescoes, tapestries and other art treasures. These serve as invaluable teaching aids to the University's Fine Arts Department. Outstanding among its possessions are paintings by El Greco, Rubens, Matisse, Picasso, Strozzi, Delacroix, Courbet, Gilbert Stuart, Winslow Homer, Monet, Degas, Renoir, John Marin, Jackson Pollock, and Hans Hofmann, and sculptures by Henry Moore, Calder, and Noguchi.

Educational services of the Art Gallery include scholarships for underprivileged children, special classes for the handicapped and aged, a lending library of more than 300 original art works, and lectures and demonstrations both at the Gallery and at schools, hospitals, industrial plants and other institutions. The Gallery also presents a varied schedule of visiting exhibitions throughout the school year. The annual Clothesline Show is one of the nation's largest outdoor art shows.

The Gallery's Creative Workshop, consisting of more than ninety classes, has an enrollment of 1500 people, both children and adults, in painting, sculpture, ceramics, weaving, enameling, jewelry and print-making classes.



ADMISSIONS

GENERAL STATEMENT

THE University seeks young men and women of character, ability, and promise who have a capacity for intellectual growth and the motivation to achieve. Careful consideration is given to all the evidence presented by a candidate for admission including the quality of the secondary school record, the results of College Board tests, the school's recommendation, and the student's participation in school and community affairs. A conscientious effort is made to select a class varied in interests, talents, goals, and in social and economic background.

Admission to undergraduate programs of study is under the direction of the Committee on Admission.

Recommended Subject Preparation

The quality of the applicant's secondary school record is of greater importance than any prescribed pattern of courses. Sound preparation includes the study of English with continued practice in writing, social studies, foreign languages, mathematics, and the laboratory sciences. Additional weight is given to secondary school courses generally known as enriched, honors and Advanced Placement.

Applicants for admission to engineering and science programs should include as much mathematics and laboratory science work as possible within the limits of their secondary school offerings.*

Application Procedure

All applicants are required to make application on forms which are provided on request. These forms must be accompanied by an application fee of $15.00, which is non-refundable. Included with all application forms for admission is a sheet of instructions outlining steps to be taken in completing the application for admission.

Applications should be submitted by January 15 of the final year in secondary school. Applicants are required to take the College Entrance Examination Board Scholastic Aptitude and Achievement Tests. It is to the advantage of the applicant to take either December or January tests *(see section on Scholastic Aptitude and Achievement Tests below)*.

Applicants for the degree Bachelor of Arts with concentration in music should request application forms from the Director of Admissions of the River Campus Colleges. The forms for this program will include a supplementary résumé of musical training as well as reports by music teachers. All parts of the application (except music teacher report forms) should be returned to the Director of Admissions of the River Campus Colleges. Applicants should also communicate directly with the Director of Admissions of the Eastman School of Music to arrange for an audition or recording. Decisions on applications for admission to this program will be made after the musical qualifications of the candidate have been evaluated by the Eastman School of Music Admissions Committee. These applicants pay the regular $15.00 application fee.

*Chemistry is required as preparation for the B.S. degree in Chemistry, Chemical Engineering and Biology. Physics is required for the B.S. degree in Physics and Astrophysics and recommended for all departments in the College of Engineering and Applied Science.

Personal Interview

Applicants are encouraged to arrange a personal interview on campus whenever possible. Although not a requirement for admission consideration, such an informal conference is usually very helpful in making college plans. It affords the applicant an opportunity to gain a first-hand impression of the college. There is no adequate substitute for this in determining a college choice. Applicants are urged to arrange appointments during the summer and fall months and to avoid February, March and early April when applications are being processed. Appointments may be made by letter or telephone.

The Admissions Office is open for appointments on weekdays from 9 a.m. to 5 p.m. and on Saturdays from 9 a.m. to noon. The office is closed on Saturdays from the middle of June to the middle of September.

Scholastic Aptitude and Achievement Tests

All applicants for admission as freshmen are required to take the Scholastic Aptitude and Achievement Tests, offered several times a year by the College Entrance Examination Board at centers throughout the world. The dates on which the tests are given are shown below:

December 3, 1966	May 6, 1967
January 14, 1967	July 8, 1967
March 4, 1967	

Applicants for admission should take the Scholastic Aptitude Test in December or January (preferably December) of their senior year in secondary school.

The Achievement Tests should be taken in English Composition (preferred to the Writing Sample, which may be offered as a substitute) and in two other fields related to those which the student will probably study in college. For example, an appropriate test pattern for engineering and science candidates is English composition, mathematics, chemistry or physics. Applicants may offer achievement tests in either the junior or senior year. *Ordinarily, students will find it to their advantage to take these tests in December or January of the senior year in continuing subjects (English, foreign language, and mathematics) and in May of the junior year or in July in subjects completed that year.* Application to take these tests should be made to the College Entrance Examination Board at least three weeks before the scheduled date.

Application forms for the tests and a Bulletin of Information may be secured from secondary schools or the College Entrance Examination Board, Box 592, Princeton, New Jersey 08540, or the Pacific Coast Office of the Board, Box 1025, Berkeley, California 94701.

Notification of Action on Applications for Admission

Applicants will be notified of action taken on their applications for admission and, where appropriate, for financial aid by the middle of April. No action will be taken on an application until it is complete in detail.

Candidates' Reply Date

The University of Rochester subscribes to the Candidates' Reply Date. This procedure has been established to provide ample time for students to reach a decision on college choice. Admitted students are required to notify the University of acceptance of admission on or before the Candidates' Reply Date. (In 1967 the date is May 1.)

Early Decision Program

Exceptionally well-qualified applicants for admission who have reached a firm decision that Rochester is the college of their choice may apply for an early decision upon their application for admission.

To be eligible for such early action the applicant must:

1. Submit formal application for admission prior to November 1 including scores of the Scholastic Aptitude Test.

2. Submit scores of any Achievement Tests taken prior to November 1. If the applicant has not taken three Achievement Tests, he should do so by March of his senior year in secondary school.

3. Present certification by the secondary school that application is being made only to the University of Rochester.

Applicants admitted under this program will be notified not later than December 1 and are expected to make formal acceptance of the offer of admission by January 1. Those applying for financial aid should file the Parents' Confidential Statement by November 1. Notification of action taken will be mailed by December 15.

Not more than 25% of the class is accepted under this program. Those not accepted will be notified and their applications will be considered under the regular admission procedure later in the year.

Advanced Placement and Advanced Standing Credit

The University of Rochester participates in the Advanced Placement Program of the College Entrance Examination Board. Students desiring consideration for such placement or credit through Advanced Placement courses taken in secondary school should take the College Board Advanced Placement Examinations given in May of each year. Upon receipt of the scores of these examinations and other evidence presented in this procedure, action will be taken and notification sent to the applicant, usually in August preceding enrollment.

Admission of Transfer Students

Students from other colleges or universities are ordinarily admitted only for the fall term beginning in September. Candidates for transfer must meet the admission requirements* of the particular college or department to which they are applying. Ordinarily, a student admitted to the College of Arts and

*Students following the Two-College Program in engineering are guaranteed admission if they are making satisfactory progress in the prescribed program.

Science must be in residence for a minimum of two years before he shall be considered eligible for the Bachelor's degree; summer school and University School shall not be regarded as residence. The College of Business Administration, the College of Education, and the College of Engineering and Applied Science require a minimum of one year in residence. Credentials must include a statement of honorable dismissal and evidence that previous academic work has been of distinctly high quality. Credit for work done at other institutions will include only those subjects which can reasonably be accepted as the equivalent of work in the course the applicant plans to pursue at Rochester. Transfer applications are reviewed after May 10 and notification is sent to candidates as soon as circumstances permit. For best consideration completed applications should be filed no later than July 15.

A limited amount of financial aid is available to transfer students. Preference for financial aid is given to students who will enter the professional programs at Rochester (Business Administration, Education, Engineering, Nursing) and to students who will enter from two-year colleges. Application forms for financial aid are available from the Office of Admissions and Student Aid.

Students admitted with advanced standing from other colleges and universities are required to report for a brief orientation program to assist them in adapting to a new college environment.

SPECIAL STUDENTS

Students desiring to pursue a special course not leading to a degree are admitted only for extraordinary reasons. Ordinarily special students are limited to persons holding a degree from a recognized college. Special students are subject to all general regulations and pay a tuition fee of $62.50 per semester hour and all incidental fees attached to any course they take.

FRESHMAN WEEK

Freshman Orientation involves a testing program of two days which is run on four separate occasions during the summer and a fall program one week before regular instruction begins. This period is devoted to counseling and testing to help the new student select the most meaningful program. The objectives of the program are planned by the Orientation Committee of the College Cabinet, an advisory committee comprising faculty and students, and the Dean of Students and her staff.

Through the Orientation period entering students learn about the nature and aims of college study, personnel services available to students, and extracurricular activities. Residence Halls meetings enable students to become acquainted with the Directors of Residence Halls and their staffs.

Detailed information on the summer program is mailed to freshmen in May. Fees for the week, including meals, are about $30.00. The Fall Orientation mailing is in August.

EXPENSES

General Statement

At Rochester, as at other private colleges and universities, only part of the full cost of education is borne by students and their parents through tuition charges. The tuition at Rochester covers approximately 60 per cent of educational costs. The remaining costs are met through income from endowment, and through support from individuals, foundations, corporations, and government sources. Thus, every student benefits from the generosity of donors past and present, without whose support educational costs would be higher or educational opportunities reduced.

Tuition charges have increased over the past decade and probably will increase in the next decade. This increase reflects the steadily mounting costs of quality education, and general economic trends. Because the University seeks to enroll students of varied economic and social backgrounds, changes in educational costs at Rochester are accompanied by adjustments in the financial aid program. In fact, increases in scholarship and loan funds and other forms of student aid have kept pace with, and in some ways have surpassed, increases in costs. Student aid is available to able and needy students; therefore, no qualified student should hesitate to apply for admission and financial aid.

Tuition and Laboratory Fees

Tuition for the 1966–67 academic year is $2000, or $1000 per term, including laboratory fees. Under the four-course program of studies* this is equivalent to the rate of $62.50 per credit hour and except for the special situations noted below is applicable to all students enrolled in daytime River Campus programs.

1. Students enrolled in B.S. programs which specify more than four courses in certain terms as part of the degree requirements will not be charged tuition for the additional courses.

2. In exceptional cases, A.B. students who desire to enrich their programs may, with the specific approval of the Dean of Students, enroll in a fifth academic course in a given term up to a maximum of four such courses in their degree programs without additional tuition charges.

3. A student who audits a course with the specific approval of the instructor will not be charged tuition for that course.

4. Students who enroll in a fifth academic course for the purpose of accelerating their programs will be charged for the fifth course at the rate of $62.50 per credit hour in the term in which the course is taken.

*See page 81 for the definition of a course.

5. Students who, with the specific approval of the Dean of Students, take less than the normal program of four courses in any term will be charged tuition at the credit hour rate of $62.50.

6. Students admitted as special, non-degree candidates will be charged tuition at the credit rate of $62.50 per credit hour.

Application Fee

An application fee of $15 must accompany all applications for admission. This fee is not refundable.

Health Service Fee

A health service fee of $35 is paid by all students. A description of the services covered is given on page 53.

Student Activity Fees

An activity fee is paid by all students. The fee varies slightly from year to year in accordance with the budget prepared by the Finance Board of the College Cabinet. For the year 1966–67 the fee is expected to be $29.

Women students and all freshman men pay an additional fee of $5 for support of the social program of the residence halls.

Other Fees

There are no extra laboratory fees. These fees are included in the tuition of $2000.

Laboratory breakage deposits are charged in all chemistry and some biology courses. Unused balances are refunded.

Resident students rent mail boxes from the River Campus Station Post Office at the annual rates of $.50 to $1.80 through the U. S. Post Office.

At the discretion of the Dean of Students, a special fee of $5 shall be assessed against all students missing a term examination through carelessness.

A special fee of $50 is charged to students who retain their status as Rochester undergraduates while they participate in a junior-year-abroad program.

A transcript fee of $1 per copy is charged for certified copies of a student's record, except for the first copy, which is furnished free. Usually transcripts are not issued during the last two weeks of a term.

Fees for Students Enrolled for Courses in the Eastman School of Music

(1) Students who are concentrating in music pay the regular tuition fee of the College of Arts and Science, which covers the courses in music required for concentration as outlined on page 141. For any additional music subjects there is a further charge.

(2) Other students may elect courses at the Eastman School of Music without paying an additional fee. An extra fee will be charged, however, if the course constitutes an overload or if the student requests a specific teacher in applied music. All resident students in applied music are charged a practice room fee.

ESTIMATED STUDENT EXPENSES

Because of fluctuations in cost of living, tuition and fees are subject to change. In the figures used below, estimates for room and board are based upon costs prevailing at the time of publication of this bulletin, but under any circumstances the cost of a year at college is variable, depending largely upon the student's own budgeting of personal expenditures.

ITEMS

Tuition	$2000
Student activity, and social fee for women and freshman men	34
Health fees	
Medical Service	35
Insurance Premium—Extended Medical Care	17
Books and supplies	80
Residence hall room (including linen service)	450
Board	550
	$3166

Expenditures for personal necessities, organization dues, recreation, and travel vary from one individual to another. Students who watch their expenditures closely report amounts ranging from $250 to $450 a year for these items. The minimum annual cost, including board and room in the usual type of college residence hall, may be estimated at $3500. The average annual expenditure is approximately $3650.

Full information regarding residence hall accommodations will be supplied by the Director of Residence Halls.

Day students who live in their homes in the city report total expenditures of approximately $2800. Such students, in planning their budgets, will naturally deduct the items of residence hall room and board from the figures given above, but they should include an average of $150 for lunches and $200 for transportation.

FINANCIAL AID

The University believes that its resources should be available to students at all economic levels on the basis of their developed ability and promise for future success. To this end, a strong program of financial aid is maintained to provide scholarship funds, loan funds and part-time jobs for students who could not attend Rochester without such assistance. No student should be deterred from applying to Rochester because he is of limited financial means.

Although the total amount of aid is large, it is not possible to assist all deserving students who apply and are offered admission. Very thoughtful and careful selection of recipients of financial aid is, therefore, necessary.

Basis for Scholarship Selections

Special conditions are attached to some of the scholarships, such as nomination by persons outside the University, residence in a particular place, or specific qualifications of the holder. In most cases selections for award are based upon the relative merits of the candidates, including character, personality, maturity of purpose, and high scholastic aptitude and achievement. The amount of the stipend granted in each case is determined solely by the financial need of the recipient. All applicants for freshman scholarships are required to take the Scholastic Aptitude and Achievement Tests offered by the College Entrance Examination Board. (See page 28.)

Procedure for Making Application

Applicants for scholarships should file a complete application for admission no later than January 15. They are also required to submit financial statements to the College Scholarship Service, Princeton, N. J., in which the University of Rochester is one of the participating colleges. Detailed information and forms for this purpose are available in the secondary schools. A candidate for scholarship aid will be considered for any scholarship for which he is eligible and which meets his requirements.

Applications for scholarship aid from students already in college must be submitted on dates specified by the Committee on Student Aid.

Renewals of Scholarships

Holders of all University scholarships are required to apply for annual renewal. Certain scholarships, such as Rochester National, Centennial Prize, Rochester Prize, Bausch & Lomb, Genesee, Alumni Memorial, Casey-Long, Rochester City, and other prize scholarships as well as some other scholarships granted on nomination of persons outside the University are normally continued from year to year provided the record, conduct, and financial circumstances of the holders justify such continuation. Annual financial statements are required.

All other scholarships, however, are granted for an academic year. The holders of such scholarships must therefore make application at the times announced for such renewal application if they desire to have their scholarships renewed. Annual scholarships normally are renewed if renewal conditions are met. The usual conditions under which annual scholarships may be renewed

are that the holder continue to need financial assistance, that he have no failures recorded against him, and that his academic performance for the preceding year be well above minimum satisfactory progress toward a degree. Renewal applications should be made on a form provided for the purpose, and must be returned to the Office of Student Aid not later than May 10, or date to be posted.

Scholarship Regulations as Applied to Students Receiving Other Forms of Aid

Recipients of scholarships granted outside the jurisdiction of the University may be eligible to hold University scholarships. In such cases the amount of the stipend granted under such scholarships will be adjusted to the individual student's actual needs.

All students are eligible for loan fund help if they meet the established requirements.

New York State Financial Aid

The University of Rochester is an approved university in which New York State Scholarships, Scholar Incentive awards, and New York Higher Education Assistance Corporation loans may be used. It is important that students seeking such aid obtain full information and meet promptly each application deadline.

(1) *Scholar Incentive Program:* Applications should be filed before July 1 for each academic year, but will be accepted up to December 1. Applications for the spring semester only have an April 1 deadline. Annual application is required.

(2) *Regents College Scholarships for Undergraduates:* Candidates should seek directions from their secondary school principal or guidance counselor.

Information on the above may be obtained by writing: Regents Examination and Scholarship Center, New York State Education Department, Albany, New York 12201. Students seeking New York State guaranteed loans should apply through their local banks or the New York Higher Education Assistance Corporation, 111 Washington Avenue, Albany, New York 12201.

Federal Financial Aid

Among the forms of Federal financial aid which some undergraduates may receive are NROTC grants (see p. 76) and War Orphans benefits. In recent years Federal legislation has provided loans, grants and part-time job funds to college students whose family financial circumstances meet eligibility requirements. The Federal loan programs are described on p. 43. Economic Opportunity Grants and College Work-Study assistance are awarded to eligible students who are also financial aid applicants for University funds. Students may secure details about the Federal programs through their schools. No special application procedure is required other than that described on p. 43.

Additional Regulations

Scholarships are granted only to students who are pursuing one of the regular courses for a degree.* If a scholarship holder becomes subject to disciplinary action, he may forfeit his scholarship during the continuance of the discipline.

Statements of the conditions of award of the various types of scholarships begin on the following page.

*Holders of Baptist Education Scholarships may be freed from the operation of this regulation, on request of the Secretary of the Society.

SCHOLARSHIPS OPEN TO MEN AND WOMEN

THE ROCHESTER NATIONAL SCHOLARSHIPS, of which there are approximately nine available in each entering class, six for men and three for women, have an adjustable stipend ranging from $100 to $2000 a year for four years. Criteria for award include character, motivation, stability, physical vigor and qualities of leadership as well as evidence of superior academic achievement and promise.

THE CENTENNIAL PRIZE SCHOLARSHIPS, of which there are several available in each class, have an adjustable stipend, ranging from $100 to $1800 a year for four years. These scholarships are granted to students of exceptional intellectual promise, maturity of purpose, good character, good health, and personal qualities which should enable their possessor to work happily with his or her associates.

THE ROCHESTER PRIZE SCHOLARSHIPS, of which there are a number available in each class, have an adjustable stipend, ranging from $100 to $1800 a year for four years. These Scholarships are awarded upon the same basis as the Centennial Prize Scholarships described above.

HONORARY PRIZE SCHOLARSHIPS may be awarded without stipend to a limited number of applicants who meet the qualifications for award and merit this distinction but who have no need for financial assistance.

THE GENESEE SCHOLARSHIPS, each yielding a maximum of $1200 a year, are granted by the Trustees for the benefit of graduates of secondary schools located at a distance from the City of Rochester. Awards are made on the basis of high scholarship, character, personality, and need.

RUSH RHEES SCHOLARSHIPS were founded in memory of Rush Rhees, President of the University from 1900 to 1935. In making awards, consideration will be given to the candidate's financial need in addition to his personal qualifications, achievements, and aptitude for leadership. These scholarships are awarded for two years contingent upon satisfactory conduct and are renewable for the remaining two undergraduate years if the recipient's general performance and financial circumstances warrant.

THE ROCHESTER-MONROE COUNTY SCHOLARSHIPS are granted from University funds to graduates from public or private secondary schools in Monroe County. A maximum of twenty such awards will be granted for each entering class. Selections for awards, which may be held for four years, are based on criteria of academic achievement and promise, personal qualifications and financial need. Stipends range from $100 to $2000 per year. The University welcomes nominations from secondary schools but the absence of such nominations will not eliminate eligible students from consideration.

THE GEORGE ABBOTT SCHOLARSHIPS are awarded through the George Abbott Foundation. Criteria for award include character, academic achievement, aptitude, industry and need for financial assistance. Stipend depends on the financial need of the student.

THE AMERICAN SOCIETY FOR METALS SCHOLARSHIP IN METALLURGY is endowed by the Rochester Chapter of the American Society for Metals. Awarded to a senior engineering student who is studying in the metallurgy option, it is based on personal qualifications, academic promise and financial need.

BAUSCH AND LOMB SCIENCE SCHOLARSHIPS, of which there are several available for each entering class, have adjustable stipends based upon the financial need

of the recipient. The Science Scholarships are open for competition among students who win the Bausch and Lomb Honorary Science Award Medal presented each year in secondary schools of the United States and its possessions to the graduating students with the highest scholastic standing in scientific subjects.

THE GEOFFREY BROUGHTON MEMORIAL SCHOLARSHIP is provided by income from endowment. Eligibility is limited to students in chemical engineering. Criteria for award include character, academic promise, and need for financial assistance.

THE ELLEN HAWKINS CARLSON SCHOLARSHIP FOR XEROX PEOPLE is provided in memory of Mrs. Carlson by her son. Eligibility is restricted to sons and daughters of Xerox employees with three or more years of service. Criteria for award include personal qualifications, evidence of general promise for successful college work and financial need.

THE PROFESSOR DONALD R. CHARLES SCHOLARSHIP FUND, established through the generosity of Mr. and Mrs. Joseph L. Noble, creates income for awards to well qualified, needy students in biology.

MILTON S. COMFORT SCHOLARSHIPS were endowed by the late Frances B. Comfort. Stipends are determined in each individual case by the Committee on Student Aid.

THE PROFESSOR WILLIAM J. CONLEY SCHOLARSHIP FUND, endowed by a gift of Mr. and Mrs. Joseph L. Noble, provides income for stipends to be awarded to deserving students in mechanical engineering.

THE ENGINEERING WOMEN'S CLUB SCHOLARSHIP is awarded to an engineering student entering his junior or senior year. Criteria for award include motivation for a career in engineering, academic promise and achievement. Preference is to be given to a qualified woman engineering student; in the absence of such the award may be held by a man.

THE GENERAL MOTORS SCHOLARSHIPS are provided by the General Motors Corporation and are awarded to students with distinctly high academic promise, achievement and personal qualifications. The adjustable stipends are based upon the financial need of the recipient.

THE EMMET BLAKENEY GLEASON SCHOLARSHIPS for students in engineering are provided through the generosity of the Emmet Blakeney Gleason Memorial Fund Incorporated in memory of Emmet Blakeney Gleason. Criteria for award include academic promise, motivation for a career in engineering, and financial need.

THE SAMUEL M. HAVENS PRIZE SCHOLARSHIPS are awarded to promising candidates for any of the colleges or schools of the University who are residents of the State of Illinois and who are in need of financial assistance. The stipends are determined by the appropriate committee on awards.

THE KATY B. HOFHEINZ FRESHMAN SCHOLARSHIP, endowed in 1939 by a gift from Mrs. Rudolph Hofheinz, will be awarded upon entrance to that freshman man or woman, who, in the opinion of the Committee on Student Aid, combines most clearly high scholastic attainments and promise, character, and maturity of purpose, with financial need. This scholarship is tenable only during the freshman year.

THE GEORGE WINTHROP JOHNSON MEMORIAL SCHOLARSHIPS are awarded to those students whose scholastic attainments, financial need and character are consistent with the University's standards of awards.

THE PROFESSOR WILLARD R. LINE SCHOLARSHIP FUND, the income from which is to be awarded to able and needy students in chemistry, is provided by Mr. and Mrs. Joseph L. Noble.

THE FRED S. AND ELLA F. MILES SCHOLARSHIP FUND, the income from which is to be used by the University in assisting needy students, either boys or girls, from Rochester, New York, is awarded upon recommendation of the Superintendent of Schools of the City of Rochester.

THE PFAUDLER PERMUTIT SCHOLARSHIP is contributed by the Pfaudler Permutit Inc. for the financial assistance of a promising entering student. The scholarship will be awarded alternately to a student in engineering and liberal arts and may be held for four years of undergraduate work contingent upon the maintenance of scholarship requirements and a need for financial assistance.

THE PROCTER AND GAMBLE SCHOLARSHIPS are contributed by the Procter and Gamble Fund. Criteria for award include academic achievement and aptitude, personal qualifications and need for financial assistance.

THE HENRY SCHWARM SCHOLARSHIPS are awarded to students with high academic promise, achievement and suitable personal qualifications. Preference is given to graduates of West High School in Rochester, New York. Stipends are based on financial need.

ROCHESTER SECTION OF AMERICAN INSTITUTE OF CHEMICAL ENGINEERS SCHOLARSHIP is provided by annual grants made by the Section for a deserving student in chemical engineering.

ROCHESTER SOCIETY FOR QUALITY CONTROL SCHOLARSHIP is provided by annual contributions from the Society for students who have demonstrated interest or potential in the quality control field. The academic record and financial need are also considered.

THE JOHN F. WEGMAN FOUNDATION SCHOLARSHIPS are provided through annual grants from the Foundation. Eligibility is restricted to residents of Monroe County and preference is given to candidates of underprivileged racial or minority backgrounds.

THE JOSEPH R. WILSON SCHOLARSHIP FOR XEROX PEOPLE is provided by gifts of executives of the Xerox Corporation. Eligibility is restricted to sons and daughters of Xerox employees with three or more years of service. Selections will be made by the Committee on Student Aid and will be based upon the academic and personal qualifications of the candidates as well as financial need.

THE KATHERINE UPTON WILSON SCHOLARSHIP FOR XEROX PEOPLE is provided through gifts of members of the Wilson Family. Eligibility and method of selection of recipients are the same as for the Ellen Hawkins Carlson and Joseph R. Wilson scholarships described above.

THE ALUMNI REGIONAL SCHOLARSHIPS are sponsored by the Alumni of the University. The stipends are adjustable, depending upon the financial need of the recipient. The stipend range is from $100 to $2500. Candidates for these awards are nominated by regional clubs of:

Baltimore, Maryland
Boston, Massachusetts
Buffalo, New York
Capital District (Albany, Troy area), New York
Chicago, Illinois
Cincinnati, Ohio
Dallas-Fort Worth, Texas
Everglades, Florida
Finger Lakes (Geneva, Canandaigua) New York
Genesee Area (Batavia), New York
Greater Detroit, Michigan
Houston, Texas
Ithaca, New York
Long Island, New York
Mohawk Valley (Rome-Utica), New York
New Mexico
Metropolitan New York City
Niagara Falls, New York
Northern New Jersey
Northeast Ohio
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Rocky Mountain Area (Denver, Colorado)
St. Louis, Missouri
San Francisco Bay Area
Schenectady, New York
Seattle, Washington
Southern California (Los Angeles)
Southern Tier (Elmira-Corning), New York
Susquehanna Valley (Binghamton), New York
Syracuse, New York
Twin Cities (Minneapolis-St. Paul)
Washington, D. C.
Wayne County, New York
West-Fair (Westchester County, N.Y., Fairfield County, Conn.)
Wilmington, Delaware

One scholarship may be awarded for each regional club.

Nominees may also be considered for other scholarship awards for which they may be eligible. Criteria for award include academic achievement and aptitude, character, personality, and participation in secondary school and community activities. Application may be made through the Admissions Office or through the regional club presidents (whose names may be obtained through the Office of Alumni Relations). Nominations for Alumni Regional Scholarships should be forwarded not later than February 1, and the applications of the nominees must be complete and on file in the Admissions Office by February 1. Nominees for Alumni Regional Scholarships are not required to file duplicate applications or any special forms.

College Scholarships and Other Special Scholarships are provided by donors or from general funds. Unless special stipulations have been made by the donors, the income from endowments is granted for scholarship aid on the basis of need as well as upon superior qualifications of character and personality, maturity of purpose, and high scholastic attainment. If a donor who has reserved the right to designate a recipient fails to do so, the scholarship may be awarded by the University. A proportion of the sum available for these scholarships is set aside for entering students; the remainder is used for the three upper classes.

SCHOLARSHIPS FOR MEN

The following Prize Scholarships are awarded in competition upon the basis of literary and scholastic ability and attainments, qualities of manhood, force of character, leadership, and interest in student activities:

The Alumni War Memorial Scholarships, one to be awarded in each class, are supported by Alumni in memory of Alumni and undergraduates of the University who gave their lives in the service of their country. These scholarships are awarded on the basis of academic achievement, personal qualifications, promise and financial need.

THE JOHN BRADLEY SCHOLARSHIP, endowed by the late Inez A. Bradley, indicates the recipient be chosen by the President of the University in such manner as to him seems best.

THE CHARLES A. BROWN PRIZE SCHOLARSHIP, endowed by the late Charles A. Brown of Chicago, A.B., 1879, is awarded every four years to a candidate in the Chicago district.

THE MICHAEL L. CASEY-T. RICHARD LONG ALUMNI SCHOLARSHIPS, one to be awarded in each class, are awarded on the same basis as the Alumni War Memorial Scholarships described above.

GENESEE VALLEY DELTA UPSILON FOUNDATION SCHOLARSHIP is awarded to a student on the basis of achievement, promise, and financial need. Members of the fraternity are given preference.

THE ROCHESTER GAMMA PI OF SIGMA CHI FOUNDATION SCHOLARSHIP is awarded to a student on the basis of the general criteria of award used by the University in granting scholarship assistance. Preference is given to a member of the Gamma Pi Chapter of the fraternity.

THE GRAFLEX PRIZE SCHOLARSHIP IN MECHANICAL ENGINEERING, endowed by Graflex, Inc., is awarded to a student at the beginning of his junior year in mechanical engineering on the basis of personal qualifications, achievement and aptitude in this field. Preference is given to a child or grandchild of an employee of the company.

THE SOL HEUMANN SCHOLARSHIPS, endowed by the late Sol Heumann, select recipients in equal numbers from each of three faiths: Protestant, Roman Catholic and Jewish.

THE LUTHER EMMETT HOLT PRIZE SCHOLARSHIP is endowed by the late Francis R. Welles, A.B., 1875, in memory of his classmate, Dr. Luther Emmett Holt, and awarded every four years to a candidate from Chicago or New York who intends to follow a premedical course.

THE WILLIAM JUDSON HOWE PRIZE SCHOLARSHIPS, also known as THE ALUMNI PRIZE SCHOLARSHIPS, were endowed by the late Ella G. Howe. Two are awarded in each class to outstanding students with superior extracurricular records.

THE MARTIN F. TIERNAN PRIZE SCHOLARSHIPS, supported by a gift from Martin F. Tiernan, A.B., 1906, provide that some awards may be made partly in the form of loans. (See the Martin F. Tiernan Loan Awards.)

THE WELLES PRIZE SCHOLARSHIPS, five in number, endowed by the late Francis R. Welles, A.B., 1875, are awarded to candidates resident in the Chicago district.

THE RAY HILL WHITE MEMORIAL SCHOLARSHIP is endowed in his memory by his widow, Frances French White. He was a graduate of the College in the Class of 1901.

Other special scholarships are awarded only to men who meet the qualifications prescribed by the donors.

SCHOLARSHIPS FOR WOMEN

THE ALUMNAE SCHOLARSHIPS, contributed annually by the Alumnae Association of the University of Rochester, are given preferably to the daughter of an alumna needing financial assistance.

The Augusta Laney Hoeing Scholarship is awarded through contributions of the Alumnae of the Alpha Sigma Sorority and Mrs. Charles Hoeing, an honorary member of the sorority. Preference is given to members of the Alpha Sigma Sorority.

The Susan Huntington Hooker Scholarship honors Mrs. Horace B. (Susan Huntington) Hooker, daughter of Elon Huntington, a founder and trustee of the University, who was widely known and loved for her cultural and civic interests and activities in Rochester over a long lifetime. In providing for this scholarship the donor expresses the hope that it will be of assistance to a woman undergraduate or graduate who gives promise of comparable service in her own community.

The Livingston Park Seminary Alumnae Scholarship, endowed by alumnae of the Livingston Park Seminary in commemoration of that institution, is awarded to a woman from Rochester on the basis of ability, achievement, character and need. The award may be held for four years, subject to renewal requirements.

The Rida S. Moore Scholarship, endowed by the late Mrs. Clarence King Moore, is awarded every four years.

The Margaret Parkhurst Morey Scholarship is contributed by Alumnae of the Alpha Sigma Sorority in honor of Mrs. William C. Morey, an honorary member of the sorority.

New York Alumnae Chapter Scholarship is contributed by Alumnae residing in the New York City area and awarded every four years to a candidate residing in the metropolitan district. Preference is given to the daughter of an alumna.

The Rush Rhees and Harriet Seelye Rhees Prize Scholarship, contributed annually by the Alumnae Association of the University of Rochester in honor of Dr. and Mrs. Rhees, is awarded on the basis of high intellectual ability and attainment, strength of character, personality, and qualities of leadership.

The Frances Smith Rogers Scholarships are awarded to two women students in the Department of Nursing. Criteria for award include academic achievement, personal qualifications and financial need.

The Sigma Kappa Upsilon Scholarship, endowed by the Alumnae of Sigma Kappa Upsilon Sorority, is awarded annually to a woman undergraduate. Preference is given to the daughter of an alumna of the sorority.

The Hazel Wilbraham Memorial Scholarship, named for an alumna and former professor of physical education, is provided by gifts from her former students.

STUDENT LOANS

Loan funds, including National Defense Education loans, are available to aid students to whom scholarships are not granted; and, in many cases, loans are made in addition to scholarship grants. The basis for the selection of students to whom loans are made is the same, in principle, as for the selection of scholarship holders. Loans may be made, however, to students whose academic standing is somewhat lower than that required for a scholarship. Ordinarily loans are not granted to students whose point-hour ratio is less than 2.0. The ability of the student to repay what he borrows receives careful consideration in all cases before a loan is granted.

Loan Applications

Students are urged to discuss with the Committee on Student Aid their probable needs for some time in advance. Loan applications are, however, received at any time. Forms for application are available at the Office of the Director of Admissions and Student Aid. When the Committee on Student Aid approves a loan, the applicant receives an authorization which, upon presentation to the University Student Loan Office in the Administration Building, is recognized as the basis for the applicant's signing a promissory note and receiving the loan.

Interest and Repayment

All arrangements regarding the payment of interest and repayment of principal must be made at the University Student Loan Office where the loan is secured. Some University of Rochester Loan funds may require the payment of interest before graduation; however, such interest will be credited toward the principal of the loan when the student graduates. After graduation the interest on all loans from University Regular Funds is five percent.

Repayment of part or all of a note may be made before the date of maturity. Funds received from the repayment of loans become immediately available for loans to other students. Arrangements for repayment of loans must be made with the University Student Loan Office before the student leaves the University.

LOAN FUNDS

The following loan funds are available to undergraduates in River Campus Colleges and the Department of Nursing:

National Defense Student Loans

The specific purpose of the Student Loan Program, established under the National Defense Education Act, is "to stimulate and assist in the establishment at institutions of higher education of funds for the making of low-interest loans to students in need thereof to pursue their courses of study in such institutions."

While making the loans available to needy students in any field of study in an institution of higher education, the Act, as amended, specifies that in the selection of students to receive loans special consideration should be given to students with a superior academic background.

University of Rochester Regular Fund

Loans from this fund are usually for amounts not exceeding $500 and do not carry interest until the student receives a baccalaureate degree from the University or ceases to be a full-time undergraduate. After graduation the interest is five percent. The Regular Fund is a revolving fund in that funds received in repayment become available for loans to other students.

The Martin F. Tiernan Loan Awards

This loan fund, established through the generosity of Martin F. Tiernan, A.B., 1906, is available to men who meet the University's standards for character, academic work and promise, and eligibility for loan aid.

These awards, which are limited to students who are earning a part of their own college expenses, are made for the freshman year in the first instance, but may be renewed for succeeding years by the Committee on Student Aid, at its discretion. Each recipient of an award from this fund shall prepare his personal budget in advance of each college year, and shall keep an accurate account of his personal expenses through each year submitting these to the Chairman of

the Committee on Student Aid for approval at stated intervals. Recipients of awards from this fund shall be known as "Martin F. Tiernan Scholars."

Nursing Student Loan Fund

The purpose of the Nursing Student Loan Fund, established under the Nurse Training Act of 1964, is "to increase the opportunities for the training of nurses through the establishment in professional schools of loan funds from which low interest loans may be made to students in need thereof to pursue their courses of study."

An essential condition of an applicant's eligibility for a Nursing Student Loan is that she be in need of the requested loan in order to pursue the full-time course of study in which she is enrolled.

The Act provides that a portion of the loan and interest may be cancelled following graduation in the event that the borrower is employed full time as a professional nurse in a public or non-profit private institution or agency. The cancellation for employment shall be at the rate of 10 percent of the amount of the loan which was unpaid on the first day of such service for each complete year of employment up to a maximum of 50 percent of the total loan.

Kellogg Loan Fund for Students in Nursing

This fund is available through the generosity of the W. K. Kellogg Foundation for the use of students in the Department of Nursing of the School of Medicine and Dentistry. Interest is charged at the rate of two percent per annum.

Clare Dennison Loan Fund

The purpose of this loan fund shall be to assist students in the Department of Nursing with financial aid for education.

The Professor Horace W. Leet Loan Fund

A fund established by students in honor of Professor Leet's thirty-nine years of devoted service on the engineering faculty. This fund is available to any student in the engineering college without involvement in formal channels. The office of the Assistant Dean of the College of Engineering and Applied Science should be contacted for details.

WORK SCHOLARSHIPS

A number of Work Scholarships are available to financial aid applicants. A recipient is required to earn $350 in one or more campus positions from September to June. He will be credited with $550 at the Tuition Office ($275 per semester) of which $200 will be a grant (scholarship) and the remainder will be $350 of earnings.

STUDENT EMPLOYMENT

Each student is expected to devote full time to his academic work, but under certain circumstances arrangements can usually be made whereby he may earn a limited amount of money to help defray college expenses. It is important, however, that a student have enough money on hand or in sight upon entering college to meet the expenses of at least his first year. If work is needed, application may be made at the Office of Admissions and Student Aid concerning opportunities for part-time employment on or off campus. Ordinarily part-time

work schedules should not exceed fifteen hours per week. Each year students obtain part-time employment on the campus in a variety of places—the library, the book store, departmental offices, laboratories, residence halls, dining halls, fraternity houses—and off-campus in retail and industrial firms, restaurants, hotels, and private homes. The University also places students in part-time employment under the provisions of the College Work-Study Program.

COMMERCIAL TUITION PAYMENT PLANS

Commercial loans for college expenses are available from several sources. These can be divided into two general categories: (1) commercial banks, and (2) lending institutions specializing in college loans. Generally, commercial loan plans provide payments either to the school or the individual or both, with repayment in equal monthly installments. The length of repayment schedules varies, from the duration of the semester in which the loan is made, through six years in cases where an overall plan for the entire undergraduate program is established. A particularly attractive aspect of many commercial loan plans of this type is the life insurance feature, which assures the uninterrupted availability of funds for the student to complete his planned education in the event of the disability or death of the income producer.

While the University does not endorse any specific finance company or bank, we are listing a few you may wish to investigate.

All of the companies listed below have life insurance available and some have disability insurance.

Each company has various plans to offer depending on the line of credit desired by the person and the length of time the loan is needed. Normally, advances are made on the loan at the beginning of each term either to the borrower or to the University. Repayments are made by the borrower on a monthly basis to the loaning agency.

Local Rochester Banks

Genesee Valley Union Trust Company
Midland Time Plan Department
19 Main Street West
Rochester, New York 14614

Lincoln Rochester Trust Company
Consumer Credit Department
(Educational Loan Plan)
183 Main Street East
Rochester, New York

Educational Finance Companies

Education Funds, Inc.
10 Dorrance Street
Providence, Rhode Island

Funds for Education, Inc.
319 Lincoln Street
Manchester, New Hampshire

Richard Knight Agency
6 St. James Avenue
Boston, Massachusetts 02116

Tuition Plan, Inc.
One Park Avenue
New York, New York

Life Insurance Plan*

Insured Tuition Plan
38 Newberry Street
Boston, Massachusetts

*This plan is a repayment plan which is designed to give life insurance coverage for a college education rather than to grant loans.

UNDERGRADUATE PRIZES

For information regarding these prizes, consult the School, College or Department concerned.

Accounting

THE FINANCIAL EXECUTIVES CAREER AWARD is donated annually by The Rochester Chapter, Financial Executives Institute. Its purpose is to recognize individual student achievement and create interest among students and faculties in the career opportunities of Industrial Accounting and Controllership. The recipient is selected from the senior class of the College of Business Administration on the basis of scholarship, citizenship, and personal characteristics.

THE HASKINS & SELLS FOUNDATION annually presents an award of $500 for scholastic excellence in accounting to a senior of the College of Business Administration. It is made to an accounting major and is based upon scholastic excellence as well as personal traits. The purpose of the award is to stimulate higher academic achievement on the part of students majoring in accounting and to encourage talented students to major in this field.

THE SUPERIOR SCHOLARSHIP AWARD is granted annually by the New York State Society of Certified Public Accountants to a senior majoring in accounting in the College of Business Administration. This award is based on two considerations: the highest academic standing in all accounting courses and apparent potential for success in the profession of certified public accountancy.

Biological Sciences

THE DONALD R. CHARLES MEMORIAL AWARD, originating from funds subscribed by students, colleagues and friends of Professor Charles, is given annually to a worthy student who, in the judgment of the Department of Biology, shows promise of a kind which Professor Charles so regularly encouraged and aided. The award provides a sum to cover limited expenses or tuition costs for an undergraduate or graduate student who wishes to carry on advanced studies, or some special project, during the summer months. In special cases the award may be made for a period within the academic year.

THE CHESTER A. DEWEY SCHOLARSHIP of $150, awarded for proficiency in biological work, provides free tuition at the summer session of the Marine Biological Laboratory at Woods Hole, Massachusetts, or at any other recognized biological laboratory.

THE RIGBY WILE PRIZE IN BIOLOGY is awarded to a member of the freshman or sophomore class for proficiency in Biology 101 and/or 102.

Business Administration and Engineering

THE QUALITY CONTROL AWARD carries a stipend of $150 and is awarded annually to a student of the Colleges of Business Administration or Engineering and Applied Science who has demonstrated exceptional ability and interest in the field of Quality Control. The award is contributed by the Rochester Society of Quality Control.

Economics and Business Administration

THE WILLIAM MORSE HASTINGS PRIZE is awarded each year for the best essay or thesis upon some topic on the history of industry, to be selected by the

Chairman of the Department of Economics and the Dean of the College of Business Administration.

Economics

THE JOHN DOWS MAIRS PRIZE is awarded annually to the member of the junior class who has done the best work in concentration in economics.

THE SHERMAN FELLOWSHIP, awarded in alternate years, was endowed by Isaac Sherman of New York as a graduate fellowship in the Department of Economics. The award is made to the student who has shown the highest ability in the work of the Economics Department and who has completed not less than eighteen hours in that department. The sum is payable upon approval of the President of the University after the recipient has registered for a year of graduate study in economics.

Engineering and Applied Science

THE EMIL KUICHLING PRIZE is awarded annually to that man of the junior class in mechanics who has shown the greatest proficiency in the work of the course.

THE CHARLES L. NEWTON PRIZE is awarded to a student in the "Department of Applied Sciences who shall show a special proficiency in some subject connected with that department, either in oral or in written examination or by thesis."

THE MARIE PETZ LEHMANN PRIZE of $50 is awarded annually to the full-time mechanical engineering major who has shown the most improvement from his freshman through his junior year.

THE TAU BETA PI PRIZE of $25, donated by the Rochester Alumnus Chapter, is awarded each year to the senior engineering student who, in the opinion of the Faculty of the College of Engineering and Applied Science, through academic achievement, proven leadership and sterling character has excelled and inspired his fellow students.

English

THE ALUMNAE PRIZE of $10, provided by the Alumnae Association, is awarded annually to the woman in the sophomore class who has done the best work in English during her sophomore year.

THE CHARLES ELLIS CALDWELL PRIZE is awarded annually to the man of the senior class who in his college work has shown the greatest proficiency in the Department of English.

THE DAVIS PRIZES, founded in 1864, are open annually to the two men in the graduating class whose original expository or persuasive speeches exhibit the highest excellence in content, organization, style and delivery. Currently $35 and $25.

DEAN'S PRIZES IN CREATIVE WRITING. The College of Arts and Science awards prizes annually for the best undergraduate short fiction, drama, and poems. The Department of English of the College administers the competitions for all undergraduates of the University.

THE DEWEY PRIZES, founded in 1866, are open annually to the two men in the sophomore class who offer the most excellent delivery, *memoriter*, of a

speech by a character in a work of literature, or by an actual person, living or dead. Currently $20 and $15.

THE HULL PRIZE is awarded to the man in each senior class concentrating in English who has done the best work in English studies.

THE SUSAN B. ANTHONY PRIZE, first offered in 1955, is awarded to the undergraduate woman who has demonstrated the greatest excellence in acting in the current academic year. Currently $35.

THE PEARL SPERLING EVANS PRIZE IN CREATIVE WRITING, established in 1964, is awarded annually to that undergraduate woman who shall have demonstrated the greatest promise in creative writing.

THE WILLIAMS MEMORIAL PRIZE is awarded to the woman in the senior class concentrating in English who has done the best work in that department.

Fine Arts

THE ELIZABETH M. ANDERSON PRIZE is awarded annually to that senior who shows the highest proficiency in some subject connected with art.

French

THE NEIL C. ARVIN MEMORIAL PRIZE, established by the students, colleagues and friends of Professor Arvin, is awarded annually to the student in the senior class who has excelled in French during his undergraduate course.

Geology

THE LATTIMORE PRIZE SCHOLARSHIP FOR GEOLOGY FIELD STUDY, awarded to a deserving Geology student, carries a stipend of $150 to defray summer field study expenses. Eligible students should confer with the Geology department adviser.

German

THE E. P. APPELT MEMORIAL PRIZE in German of $100, provided annually by the Federation of German-American Societies of Rochester, is awarded each year to a student of German in the University of Rochester for progress toward over-all proficiency in spoken and written German.

THE KREYER PRIZE in German is awarded for facility in spoken German.

Greek

THE RUSSELL MUMFORD TUTTLE PRIZE is awarded each year to a male student for proficiency in the study of Greek.

History

THE N. B. ELLISON PRIZE is awarded to the man in the senior class concentrating in history who has done the best work in that department.

THE HUGH MACKENZIE PRIZES, provided from income from the Hugh MacKenzie Memorial Fund raised by friends, colleagues, alumnae, and alumni to honor the memory of Professor MacKenzie, are awarded each year to the woman student who has shown the highest achievement and interest in History 101–102 and to the woman student who has shown the greatest improvement in the same course.

Mathematics

THE STODDARD PRIZES in mathematics are awarded annually to two men pursuing the course in analytic geometry and calculus.

Physics

THE STODDARD PRIZE is awarded to the man in each graduating class who shall present the best thesis on some assigned topic of investigation in physics.

Political Science

THE JAMES D. MCGILL MEMORIAL PRIZE, established by former students and friends of Professor McGill, is awarded annually to that undergraduate student who is deemed to have shown the greatest interest and demonstrated the highest achievement in the field of political science. The names of annual recipients will be recorded on a plaque hung in the classroom where political science classes meet.

THE TOWNSEND FELLOWSHIP of $700, awarded in alternate years, was endowed by Charles John Townsend of Lockport, New York, as a graduate fellowship in the Department of Political Science, in memory of his father, John Pomeroy Townsend, LL.D., who founded the fellowship in 1876 and supported it by annual payments for many years. The award is made to the student who has shown the highest ability in the work of the Department of Political Science and who has completed not less than eighteen hours in the Department of Political Science or History.

General

THE ANDREW FRIED MEMORIAL PRIZE. This prize is given in the memory of Andrew Norman Fried of the Class of 1962 by his family and friends. The prize is awarded by the Dean of Students to that man who, upon completion of his freshman year, has shown outstanding qualities of character, superior moral judgment, and interest in serving his fellow students. In making the award, emphasis is placed upon that student who, in the judgment of residence advisers and selected fellow students, has shown himself to be a true and effective counselor to individual classmates and who plans to spend his future life in a vocation emphasizing social service, medical care or teaching.

THE DELNO G. SISSON PRIZE of $25 is awarded annually to the freshman who in the opinion of the faculty has shown the most improvement not only in college work but in adjusting himself to university life and the student body.

THE FANNIE R. BIGELOW AWARDS, silver trays bearing the insignia of the University, endowed by a fund contributed to the University in Mrs. Bigelow's memory by members of her family, are presented to an undergraduate woman on Susan B. Anthony Day, and to an alumna by the Alumnae Association. These awards are given in recognition of the importance of the contributions made by women to the cultural, intellectual, and civic life of their communities.

THE GAMMA PHI PRIZE of $25 is awarded each year to the sophomore woman who has contributed most to the general advancement of the River Campus.

THE JANET HOWELL CLARK PRIZE of $40 is awarded yearly in recognition of the esteem held for Dr. Clark, former Dean of the College for Women, by the Class of 1953. This Prize is given yearly to the senior woman who has shown the greatest promise in creative work in one of the following fields—Physics,

Chemistry, Biology, Astronomy—and who has shown outstanding versatility in the mastery of allied fields. She is chosen by the Dean of Students upon recommendation of the Chairmen of the Departments of Physics and Astronomy, Chemistry, and Biology.

THE JESSE L. ROSENBERGER PRIZE is awarded to the man in the junior class whose work has shown the greatest improvement during the freshman and sophomore years.

THE JOSEPH A. O'CONNOR GRADUATE STUDY ENDOWMENT FUND, endowed by a bequest from Evelyn O'Connor, is awarded annually to a woman in the graduating class who has shown marked ability in original writing, in English literature, in classical languages and literature, or in archaeology. A committee composed of the Dean of Students, the Chairman of the English Department, the Chairman of the Foreign Language Department, Miss Eleanor Gleason, and Mrs. Alling Clements selects the recipient.

THE JOSEPH P. O'HERN SCHOLARSHIP for travel and study in Europe was endowed by the late Joseph P. O'Hern, of the Class of 1892. This scholarship is awarded to a graduate who has been elected to Phi Beta Kappa, and who wishes to prepare for a career in teaching. A committee, composed of the Dean of Students as chairman and the President and Secretary of the New York Iota Chapter of Phi Beta Kappa, selects the recipient.

THE LOUIS A. ALEXANDER ALUMNI AWARD, in the form of a trophy, is presented annually to a male member of the senior class who has made an outstanding contribution to student life through his significant achievements in athletics and general student activities; and whose character and leadership qualities have been a wholesome influence on his fellow students.

THE PERCY B. DUTTON PRIZE is awarded each year to the male member of the graduating class who in the opinion of the Dean of Students shall have excelled all his men classmates in wholesome, unselfish, and helpful influence among his fellow students.

THE SUSAN COLVER ROSENBERGER PRIZE is awarded to the woman in each junior class whose work has shown the greatest improvement during her freshman and sophomore years.

THE TERRY PRIZE is awarded annually to that man of the senior class who by his industry, manliness, and honorable conduct has done most for the life and character of the men of the River Campus.

THETA ETA PRIZE of $50 is awarded annually to the senior woman who, through her participation in campus life and by her influence, personality and achievement, has contributed most to the River Campus.

THE ROCHESTER CITY PRIZES of $50 are awarded each year to three men and two women (graduates of Rochester public high schools) who obtain the highest averages for the first term of the freshman year among men and women respectively.

SCHOLARSHIP CUPS, one for men and one for women, are awarded annually to that fraternity and to that sorority whose average scholarship for the preceding year has been the highest.

SPECIAL SERVICES

THE aim of the Office of the Dean of Students is to provide each student with an opportunity to develop to his fullest intellectual, spiritual, and social capacity. The student services are coordinated in the staff of the Office of the Dean of Students, which includes Associate Deans for Student Life and for Special Services, Director of Residence Halls, Director of Student Activities, and a staff of Counselors.

Service is provided to students through a variety of persons and agencies, many of which are described elsewhere in this bulletin. Each student, upon admission, is assigned to a member of the faculty who serves as his academic adviser during his first two years, and is available to counsel him on non-academic matters as well. Students are often referred by their advisers to other members of the staff of the University for assistance. During his last two years each student is assigned a faculty member in the department of his field of concentration for academic guidance. The staff of the Office of the Dean of Students will counsel juniors and seniors who seek assistance in non-academic matters.

Counseling, Testing, and Placement Services

The counseling program supports and supplements the services provided by the faculty, faculty advisers, religious advisers, and deans.

Emphasis is placed upon counseling initiated by the individual student and every effort is made to assist each individual in accepting responsibilities for his decisions and actions. The program ranges from helping the freshman make the adjustment to college to assisting seniors to develop wise post-graduate plans. The placement function is broadly conceived to be all post-graduate planning and is an integral part of the counseling program.

Special attention is given to study skills, reading difficulties, and vocational and educational planning through a complete testing service, which aids in appraising students' aptitudes, interests and personality traits, and related factors. Group activities for men and women are sponsored by students, counselors, and alumni, including discussion meetings on job placement opportunities and graduate study, special programs for selecting a major sponsored by the Office of the Dean of Students and departments, opportunity for individual and group meetings with area alumni in various professions.

Contacts are maintained with business firms, governmental agencies, and educational and social institutions for the purpose of obtaining information concerning the general employment situation and specific opportunities open to seniors and graduates. Students register with the Placement Office early in their senior year to take advantage of both the on-campus and off-campus opportunities that may be available to them before and after graduation.

Placement credentials are compiled in the senior year which are kept in a permanent file for use by potential employers of seniors and alumni. Students who desire assistance in obtaining summer employment may register with the campus Placement Office. Whenever it is possible, summer placements are made with the aim of helping the student gain work experience in line with his career objective.

Testing functions include administration of major university group and individual testing programs, assisting faculty in preparation, scoring, and analysis of examinations, administration of a modest test, scoring and statistical analysis for area schools and colleges, and administering such national programs as the Graduate Record Examination, Medical College Admissions Test, Law School Admission Test, National League for Nursing Test, Navy College Aptitude Test, and National Selective Service Test.

Additional counseling services are available to students in the following persons or agencies: Student Health officers, members of the Department of Physical Education, Director of Religious Activities, advisers to the University Protestant Fellowship, adviser to Jewish students, adviser to Catholic students, Directors of Student Aid.

HEALTH SERVICE

The health of the student body is under the care of the physicians of the Student Health Service. The out-patient department for all students is located in the medical office in the Morgan Wing of the Women's Residence Hall. Infirmary facilities for both men and women are located in the same area one floor above the medical office. The infirmary is staffed by the department's physicians and by registered nurses and is open twenty-four hours daily for the treatment of all types of illness. In case of serious illness or injury students are referred to Strong Memorial Hospital directly or transferred from the infirmary on the recommendation of the Student Health physicians. Short term psychiatric care and consultation are available in the medical office on campus.

All full-time students are entitled to the services of the physicians and to such out-patient and infirmary care as may be thought necessary by the physicians. If referred by the Student Health Service, the student may be hospitalized for ten days in Strong Memorial Hospital at semi-private rates and is eligible for $250 in extra charges either as an in-patient or in the out-patient clinics of Strong Memorial Hospital. Elective surgery, refractions, and dental care are not provided under the program. It is expected that students will pay for medications which are not stocked by the Student Health Service. If a student

prefers to go to a private physician or to a hospital other than Strong Memorial Hospital, the cost of such treatment and care becomes his responsibility.

In addition to the Basic Student Health Benefits as described above, all full-time students of the University are required to carry health insurance to protect them not only in case of catastrophic illness or injury throughout the year but also to provide coverage while they are not in attendance at the University, during vacation periods. The University sponsors such a supplemental insurance plan at a premium of $17 per year for single students. Entering students will be contacted about this plan prior to matriculation.

All entering students must be vaccinated or submit evidence of recent successful vaccination. Before matriculation a preliminary medical examination is required and the correction of remediable defects is urged.

STUDENT LIFE AND INTERESTS

STUDENT LIFE on the River Campus centers around the student's place of residence and the student activities building. A flexible program of activities is encouraged to meet the varying interests of the student body. This program offers opportunities to develop both vocational and avocational interests, to learn leadership skills, to foster friendships, and to promote wider acquaintance between faculty and students.

Todd Union, the student activities building, provides a popular gathering place for students in its snack bar and main lounges. The center of the organized activities program, it houses offices of student government, college publications, the campus radio station, and other groups, and is the headquarters for dramatics, music and religious organizations. Rooms are available for scheduling meetings and social events. Student mail boxes are located in Todd Union, which houses a branch of the United States Post Office.

The Women's Residence Center includes an attractive coeducational recreation room and snack bar as well as lounges for use of groups and individuals.

Students Association

Every full-time student on the River Campus is a member of the Students Association which is governed by an executive committee of five and a cabinet of twenty-four elected student delegates. The Students Association has general responsibility for the development and supervision of the extracurricular activities and for the maintaining of high standards of student life. The government bodies in the residence halls are the Interhall Council for men, the Women's Residence Halls Government and the Towers Association. The Interfraternity Council and the Intersorority Council handle the special problems of the fraternities and sororities. The Associated Women Students concerns itself with special problems of interest to all women students.

In addition to the opportunities for participation in extracurricular life through the student government program, there are many areas in which individual interests and skills can be fostered.

In publications, students obtain editorial, business and advertising experience. Publications include the CAMPUS TIMES, a semi-weekly newspaper; CONTRAST, a biweekly publication featuring news in depth; INTERPRES, a yearbook edited by the Junior Class; PROLOGUE, a semi-annual literary magazine; UGH, a semi-annual humor magazine; a directory; a handbook; calendar; and the ROCHESTER INDICATOR, the publication of the engineering students published four times a year.

Drama groups include the Stagers, an organization under the direction of a faculty member, which presents two plays yearly; an experimental theatre group under student directorship; Co-Kast, a student group which produces a recent Broadway musical show each fall; and Jesters, a student-written, student-directed musical comedy presented in the spring.

The Forensic Society has one of the most active intercollegiate debating seasons of any college in the Northeastern United States. Debaters typically attend tournaments at such wide-ranging places as Chicago, Boston, and Washington, D.C. The Society also holds the annual Gannett Invitational Debate Tournament, which has earned a reputation as one of the finest Eastern tournaments.

Social service and other organizations provide a wide range of outlets for the individual student's personal interests. Departmental clubs give students the opportunity to become acquainted with faculty and other students having similar academic interests.

Athletics

Ample provision is made for athletic interests. Intercollegiate sports for men include baseball, basketball, football, golf, soccer, tennis, swimming, track, wrestling, squash, and sailing. Intramural contests are an important part of the program.

> *The athletic policy of the University of Rochester has been developed to further the best interests of the students who participate in intercollegiate athletics.*

The definite objectives are to afford as many men as possible experience in intercollegiate sports; to devote only as much time to athletics as is necessary to give the participants all the worthwhile values that are derived from such participation, with as little interference with their scholastic endeavors as is possible; to arrange schedules, the playing of which entails only a minimum loss of time from classes, and, as far as practical, with teams of approximately the same ability, representing institutions not only of about the same enrollment of men but also of similar educational standards and athletic ideals; to have the membership of all varsity teams composed of students successfully carrying a full program of work and who play for recreation.

To this end, the University does not subsidize its teams. Members of all athletic squads must meet the same entrance requirements and scholarship standards required of the student body in general, and they enjoy the same privileges as are granted other qualified students.

Women's sports, sponsored by the Women's Recreation Association, include archery, badminton, baseball, basketball, dancing, fencing, hockey, skiing, swimming, tennis and volleyball. Women students participate in Play Days with women's groups from other colleges. Modern dance is an important part of the program and is sponsored through a Dance Club.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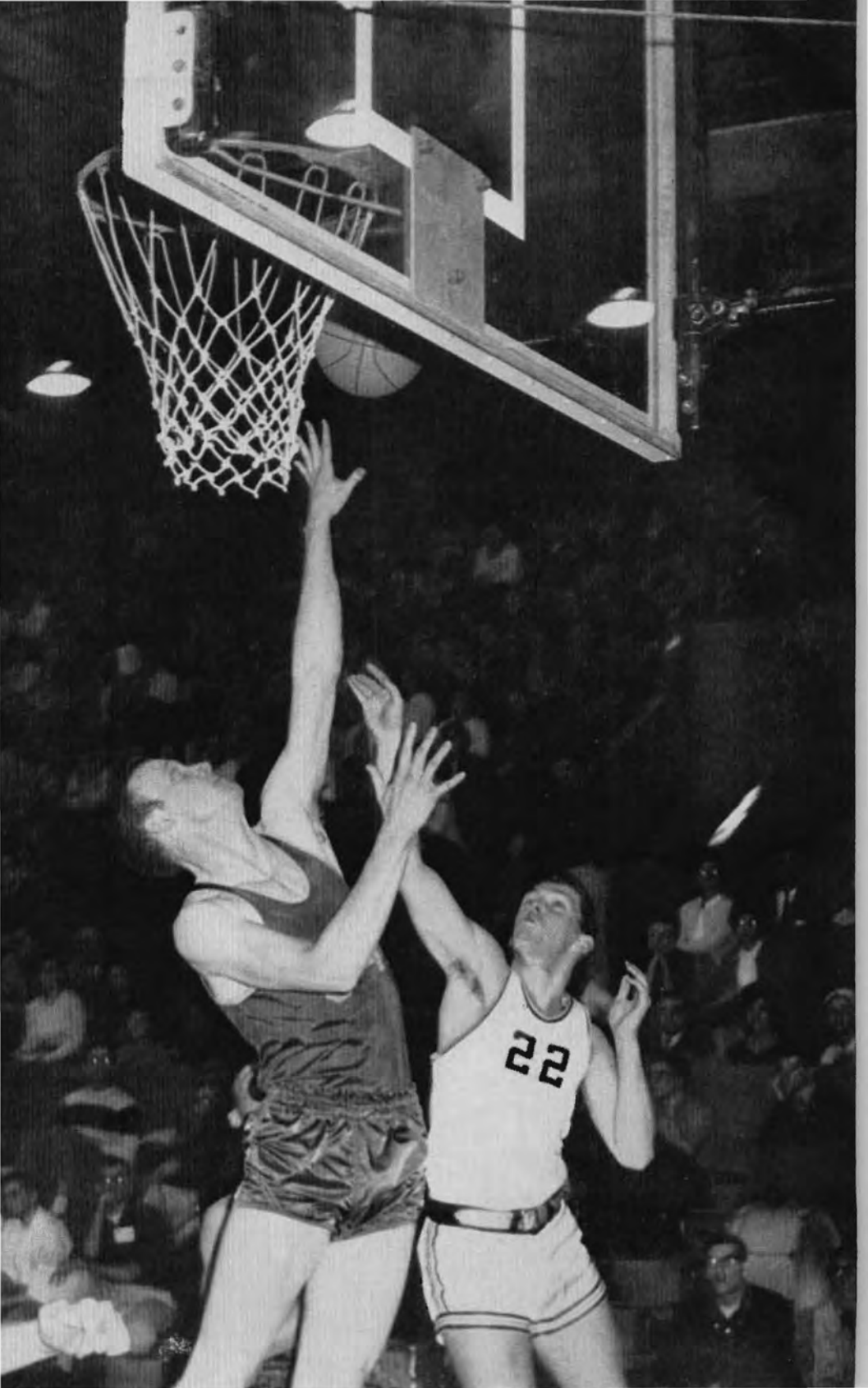
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Honorary Societies

Honorary societies include Phi Beta Kappa, Sigma Xi, Tau Beta Pi, Beta Gamma Sigma, Delta Phi Alpha and Phi Sigma Iota. There are, in addition, the following local honorary organizations: Marsiens for senior women, Keidaeans for senior men, Mendicants for junior men, Yellow Key for sophomore men and D'Lions for sophomore women.

Fraternities, Sororities

There are fourteen social fraternities for men and four for women. Twelve of the fourteen men's fraternities are national; the other two and all sororities are local groups. The fraternities are Alpha Delta Phi (1851), Alpha Kappa Phi (1965), Delta Upsilon (1852), Delta Kappa Epsilon (1856), Psi Upsilon (1858), Alpha Epsilon Pi (1961), Theta Delta Chi (1867), Phi Epsilon Pi (1911), Theta Chi (1920), Beta Delta Gamma (1926), Sigma Chi (1932), Tau Kappa Epsilon (1954), Sigma Alpha Mu (1954), and Chi Phi (1966). The sororities are Theta Eta (1903), Alpha Sigma (1903), Theta Tau Theta (1906), and Gamma Phi (1909). The Interfraternity Council and the Intersorority Council deal with the common interests of the respective groups.

MUSICAL ACTIVITIES

The program of musical activities on the River Campus is designed to contribute to the artistic and aesthetic development of the participating and listening student body. Active choral and instrumental organizations provide opportunity for those with musical interests and talents to develop these abilities under capable direction.

The University Chorus

The University Chorus prepares oratorios and other large works for chorus and orchestra, appearing in concert with the All-University Symphony Orchestra and the Rochester Philharmonic Orchestra.

The Men's Glee Club

The Men's Glee Club, founded in 1875, enjoys an ever-increasing, enviable reputation. The men sing at numerous functions of the University and make a significant contribution to the cultural life of the city of Rochester through their appearances with the Rochester Philharmonic Orchestra; in concerts for high schools, local industries, and service clubs; and on television programs. Spring tours take the Glee Club to cities all over this country and Canada.

The Women's Glee Club

The Women's Glee Club appears locally and at special University events. The Club also participates in exchange concerts with men's choruses from other Eastern Universities.

The University Chapel Choir

The University Chapel Choir functions primarily in connection with the Protestant Chapel services and is open to students from all schools and colleges of the University. In addition, the Choir presents special musical programs taken from the finest *a cappella* music of the sixteenth century, the great cantatas and oratorios of the masters, and contemporary sacred compositions. Membership is limited to 50 singers selected by audition.

The All-University Symphony Orchestra

The All-University Orchestra draws its membership from the student bodies, faculties, and alumni of all schools and colleges of the University. Outstanding soloists are featured in concerts, all of which are presented in Strong Auditorium.

The Marching Band

The Marching Band, open to both men and women, provides music at "half-time" spectacles for home football games. The band accompanies the football team to at least one out-of-town game.

The Symphonic Band

The Symphonic Band begins rehearsals at the close of the Marching Band season and prepares musical presentations for University functions and civic organizations. The repertoire includes original music for band and arrangements of the symphonic masterpieces.

The Yellowjackets

The Yellowjackets, a group of twelve singers selected from the Men's Glee Club, perform on programs with the glee club and provide light entertainment for campus functions. The group also makes appearances at colleges and schools throughout the area.

The Baroque Ensemble

The Baroque Ensemble provides opportunity for students to learn and perform music for the small chamber orchestra under faculty direction. The group appears in concert on campus several times each year.

RELIGION

The University of Rochester was founded by men of strong religious convictions. Although the school has no relationship to the church, it recognizes the importance of religion in campus life.

A Chaplain and Director of Religious Activities is appointed by the University to counsel students and to coordinate the activities of all religious groups. He serves as Chaplain to Protestant students on an inter-denominational basis, assisted by Chaplains or advisers to Protestant denominational groups and by full time Chaplains for Roman Catholic and Jewish students, provided by their own organizations.

Religious Organizations

Voluntary student religious interest finds its expression through the activities of various campus organizations. Protestant students are organized through a University Protestant Fellowship which sponsors discussions, study, social service, and fellowship programs. Working closely with it and operating as parts of its total ministry are the Episcopal Church on campus and the Lutheran Student Association. A Christian Science group, a Unitarian-Universalist group, and an Inter-Varsity Fellowship meet during the month.

Catholic students are organized through a Newman Program which provides regular lectures, study groups, annual retreats, daily Mass, and social fellowship. The Newman Oratory at 561 Mt. Hope Avenue provides a center for off-campus activities as well as a residence for the Catholic Chaplain. Jewish students are organized through the B'nai B'rith Hillel Foundation, which serves to transmit the Jewish heritage to the Jewish student through educational, religious, cultural, social, and counseling services.

All of the religious groups on campus are represented on an inter-religious council which coordinates programs and sponsors joint activities, such as study groups, coffee hours, and the Campus Conference on Religion. It also takes an active interest in campus life, social service, and international affairs.

Worship

University Protestant Chapel services are held each Sunday morning at 11 o'clock in Strong Auditorium. The University Chaplain preaches at all services except one each month when a distinguished clergyman, recognized for national leadership, is invited to bring the message. The University Chapel Choir sings at these services.

Mass is celebrated each Sunday morning at 9 and 11 o'clock in the West Lounge of Todd Union, as well as daily at 4:30 in Upper Todd.

Jewish services are held on Friday evening in the Upper Lounge of Todd Union at 7:15 p.m., followed by a discussion or Oneg Shabbat.

Religious Center

Offices for the Director of Religious Activities and for the various chaplains are on the second floor of Todd Union. A lounge and other facilities of Todd Union are available for group meetings.

STUDENT RESIDENCE

FULL-TIME STUDENTS on the River Campus, except local students who live with their parents or legal guardians, must live on campus unless excused by the Dean of Students. Freshmen must live in the residence halls; upperclassmen, in the residence halls or fraternity houses. Students who reside in or near the city and wish to live on campus will be accommodated to the extent that space is available. There is a compulsory board plan for all resident students.

The Towers

Anderson Tower and Wilder Tower, two newly-constructed, nine-story buildings, house about 500 upperclass students. Facilities are provided for both men and women. Emphasizing the concept of community living, these halls also permit the University to provide housing for a few faculty families.

Accommodations for students are arranged in six-person suites providing a lounge, individual rooms, and a bath for each unit. Men and women students live on separate floors. Faculty apartments are located on the main floor and on floors four and seven in each hall.

An adjacent dining room serves all residents of the Towers. The dining hall is designed to permit small group dining. It is expected students will dress in good taste for meals: coats and ties for men and dresses for women.

Men's Residence Halls

Undergraduate men from outside the Rochester area are provided with housing in Men's Residence Halls and the fraternity houses on the River Campus. Six residence units provide living quarters for about 1,100 students. Freshman men are housed in two of these units. About 230 upperclassmen live in nine fraternity houses.

Each residence hall operates as a unit. The students in each residence unit plan and participate in a social program within the hall. Student government is largely responsible for both social life and conduct. Within the Men's Residence Halls are recreation rooms, a snack bar, and lounges for the use of residence groups and individuals. Other facilities include typing rooms,

kitchenettes, and laundry equipment. Dances, student-faculty coffee hours, intramural sports competition, ping-pong tournaments, and group discussions of current issues are typical of the social-educational program within the residence units. Through activity of this sort each student is given experience in group living.

Selected graduate students live in the residence halls as head residents. They are aided by a group of upperclassmen who also serve as resident advisers. Close contact is maintained between the residence advisers and other counselors. It is the duty of the residence hall advisers to help individual students with their problems, direct students to other advisory agencies in the University, and develop the individual halls as social units which will reflect the social and intellectual spirit of the University. The advisory program within the halls is coordinated by the Associate Director of Residence Halls.

Student rooms are equipped with desks, lamps, desk chairs, lounge chairs and beds. Linens (two sheets, one pillow case, two bath towels) are furnished and a weekly exchange provided. Students furnish their own blankets, bedspreads and draperies. Students receive their mail in Todd Union.

Room rental in the residence halls is $450 per academic year. Most rooms are doubles. A limited number of single rooms are available.

The Men's Dining Hall is located across the street from the residence quadrangle. Dining facilities are provided for residents of the Men's Residence Halls and their guests. Breakfast and lunch are served cafeteria style; when student waiters are available, dinner is served family-style. Additional meeting rooms as well as the Faculty Club are housed in the building.

Special facilities for men students are provided in the Men's Residence Halls. City students affiliate themselves with a Residence, have full use of the city men's lounge and locker room, and take full part in all the activities and social functions of the Residence. All non-resident freshmen participate in these programs as well as upperclassmen who wish to do so. Several rooms are provided in the Residence for non-resident men. These rooms are furnished with bunk beds and dressing facilities. Commuting students may stay overnight in these rooms any time at a cost of fifty cents per night, with linen furnished for an additional fifty cents.

Detailed information regarding the residence halls will be sent with the room application which is mailed upon payment of the entrance deposit fee. Any questions concerning the residence halls should be addressed to the Associate Director of Residence Halls for Men, River Campus.

Women's Residence Halls

Excellent accommodations for women students are provided in the Women's Residence Halls. Many attractive features for student living and social activities are offered in the Women's Residence Halls. There are spacious lounges and terraces on the main floor, music rooms, and a dining room which may be divided into four smaller dining rooms for a more intimate atmosphere. On the ground floor there is a coeducational recreational room with a snack bar. Situated on the seventh floor is a modern automatic laundry, solarium and sun-deck for the use of women residents.

Student rooms are spacious and fully furnished with desks, beds, chairs, lamps, bookcases, chest of drawers, and built-in closet units for each occupant. The interiors of the rooms are furnished in contemporary style, decorated in warm colors, and highlighted by large picture windows with harmonizing draw-curtains or shades.

Students furnish their own blankets, bedspreads and pillows. Freshman women are advised to wait until they arrive on campus to purchase bedspreads.

Linens (2 sheets, 1 pillow case, 2 bath towels) are furnished on a weekly exchange basis and included in room rent.

Double rooms and some single rooms are provided. Room rental is $450 per academic year. All undergraduate women from outside the Rochester area are expected to live in residence. Students who reside in or near Rochester will be accommodated to the extent that space is available.

All residents of the Women's Residence Halls are expected to take their meals in the residence dining room. The board plan includes all meals during the week except Sunday evening supper. Breakfast and lunch and Sunday dinner are served cafeteria style; dinner is served by student waitresses. A snack bar is open in the residence Sunday evening for students wishing to buy supper on the campus.

The advisory system of the residence halls is under the administration of an Associate Dean of Students, and includes the Director of Residence Halls and staff, Head Residents, and student assistants. Their duties include the supervision of the four wings of the residence hall, personal counseling, advising of women students in their activities and social affairs, and supervision of the coeducational recreation program in the halls. Specially selected upper class women serve as advisers and live on the freshman corridors throughout the year.

The social program of the Residence Halls is planned and carried out mainly by the Women's Residence Halls Government and its standing committees, and includes a variety of women's activities and coeducational events. Throughout the year there is a full calendar of social occasions such as traditional women's college suppers, conferences, faculty coffee hours, formal and informal dances and parties, teas and receptions, pajama parties, picnics, open houses, and game nights.

All phases of community living, standards and regulations for women are under the jurisdiction of the Women's Residence Halls Government, which is the legislative and administrative body in the Women's Residence Halls. This Council is made up of an executive board, elected corridor representatives, and standing committees. Women students in the Women's Residence Halls make and enforce their own rules in matters of conduct and community life, and every woman is considered to be a participant in this form of government. Administration of these standards is under the jurisdiction of the Women's Judicial Board.

Facilities for non-resident women students are provided in the Women's Residence Halls. City students affiliate themselves with the Residence, have full use of all social areas in the building, and take part in all the activities and social functions of the Residence. Sleeping quarters are provided in the Residence for the use of non-resident women. Bunk beds are furnished. Non-resident women may stay overnight at a cost of fifty cents per night; linen is furnished for an additional fifty cents. Non-resident women are welcome in the dining room at all times and may buy their meals on a cash basis.

Further information will be sent with the application for a room, or may be had by writing to the Associate Director of Residence Halls for Women, River Campus.

A $60.00 application fee must accompany all applications for rooms. A full refund will be granted if cancellation is received prior to August 1. Cancellations received between August 1 and Sept. 1 will receive refunds of one half of the fee. After Sept. 1, no refunds will be made. This application fee will be credited to the term bill upon occupancy.

GENERAL REGULATIONS

General Responsibility

Each student is expected to abide by such rules as the University and its faculties may enact. The student also assumes the responsibility to conduct himself in a manner consistent with accepted standards of good citizenship, honesty, propriety, and with proper regard for the rights of others and the obligations of a member of the academic community. At its discretion, the University may delegate to student groups certain judicial and disciplinary responsibilities and the student must abide by the decisions of such groups as if made by the University itself.

Terms and Vacations

Terms and vacations of the college year are indicated on the calendar printed on page 4.

Absence From Class

(Trips, activities)—Travel with an authorized extra-curricular group does not constitute an automatic excuse from classes. Students should make their own arrangements with instructors. Coaches and other group advisers may, if they wish, utilize some sort of form letter testifying to the fact that the student is traveling semi-officially. This procedure emphasizes both the autonomy of the classroom instructor and the responsibility of the individual student.

Students who are under the care of the Health Officer for two or more consecutive days will receive a statement from the Health Officer certifying the dates of illness.

Report of Illness

Absence from any college exercise on account of illness should be promptly reported to the Medical Officer even though the student is under treatment by another physician.

Marriage

If a student plans to be married during an academic year, the Office of the Dean of Students should be notified at least two weeks in advance. It is also expected that parents or guardians will notify the Office of the Dean of Students that they are aware of the proposed marriage.

A student in the residence halls who marries during an academic year must obtain permission from the Director of Residence Halls in order to retain a room in the residence halls. Marriage and withdrawal from the residence halls do not release a student from a room contract.

Residence Policy

See page 63.

Residence Requirement

The minimum residence requirement for the bachelor's degree is one full academic year, according to the requirements of the New York State Department of Education. Ordinarily, a student admitted to the College of Arts and Science must be in residence for a minimum of two years before he shall be considered eligible for the bachelor's degree; summer school and University School shall not be regarded as residence.

Dropping of Courses

1. During the first seven weeks of any semester a student may change his registration without penalty if he has the consent of the instructors of the respective courses.

2. Changes in registration which involve either an underload or an overload shall be submitted to the Dean of Students for approval.

3. After the seventh week of each semester, no changes in registration shall normally be permitted. Exceptions to this rule may be made if recommended by the adviser and instructor and approved by the Dean of Students.

4. A permanent grade of E will be recorded for the student in a course dropped after the first seven weeks, unless otherwise recommended by the adviser and instructor and approved by the Dean of Students.

5. Students who are permitted to withdraw from the University may drop their courses with or without penalty at the discretion of the academic adviser and the Dean of Students.

Junior Year Abroad

Superior students who receive the permission of their departments of concentration and of the Administrative Committee may apply for admission to a foreign university for study abroad in the junior year or for admission to one of the foreign-study programs conducted by an American college or university. Students who study abroad under this plan are retained on the rolls of the University of Rochester and receive full credit for work successfully completed abroad provided the student's registration has been approved in advance by the University. Students interested in the program of study abroad must apply to the Office of the Dean of Students early in the autumn of the sophomore year. A fee of $50 is charged students who retain their status as Rochester undergraduates while studying abroad.

Marking System

A student's work in any course will be rated in accordance with the following definitions: Grade A, Excellent; Grades B+ and B, Good; Grades C+ and C, Fair; Grades D+ and D, Poor; Grade E, Failure; I—incomplete; X—absent from examination; W—drop without penalty; DE—drop with penalty, failure in course.[1]

Students with Incompletes or X (absent from examination) must remove the deficiency prior to the end of the next academic term or a final grade of E will be recorded. Requests for an extension of time must be approved by the instructor and the Dean of Students, with notification to the Registrar's Office.

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[1]See p. 86 for additional option for the College of Arts and Science.

Hours of Credit and Points of Credit

Two units are employed in fixing the total requirements for graduation, the hour of credit and the point of credit. The hour of credit represents a passing grade (D or higher) in a course of one hour a week for one term. For the undergraduate student each course is considered to carry four credit hours for purposes of this computation. For each hour of credit the student will receive four points of credit if his grade is A; three and one-half points of credit if his grade is B+; three points of credit if his grade is B; two and one-half points of credit if his grade is C+; two points of credit if his grade is C; one and one-half points of credit if his grade is D+; or one point of credit if his grade is D. A minimum cumulative point hour ratio of 2.0 is required for the degree Bachelor of Arts or Bachelor of Science.

In laboratory courses at least two hours of attendance in laboratory are required to gain one hour of credit.

Examinations and Failure

A student whose work during the term has not been satisfactory to the instructor in charge may, at the discretion of the instructor, be excluded from the final examination, and be reported as *failed*.

The instructor's report at the close of the course includes a grade indicating the combined result of term work and examination. Any student who is absent from a regular examination through causes beyond his control may, by special permission of the Dean of Students, be allowed to take a make-up examination at a time appointed by the instructor.

Requirements for Bachelor's Degree with Distinction

The Bachelor degrees are awarded in three grades of distinction: with *distinction*, with *high distinction*, and with *highest distinction* in departmental major.

This award is based primarily on a point-hour ratio: at least 3.25 for distinction, 3.60 for high distinction, and 3.85 for highest distinction. However, a piece of creative work or a paper (critical or creative, or a report of the results of original research) may be offered in support of a recommendation for a distinction award not more than one level higher than would be indicated by the point-hour ratio. Students interested in submitting such a project should consult their departmental counselors not later than February 1 of the year in which they plan to graduate.

Except in unusual cases, no student shall be considered for a degree with distinction who has not had at least two years of academic work at the University of Rochester. Ordinarily nothing higher than a degree *with distinction* will be given in such cases.

In the College of Arts and Science students interested in receiving degrees with distinction or honors should inquire at the department office before November 1 of their Senior Year. Departmental recommendation is required for any of the above designations.

Deficiency in Academic Work

The Committee of Faculty Advisers and Deans periodically reviews the academic records of first and second year students; departmental counselors review the records of juniors and seniors. Students who do not make satisfactory progress toward the completion of requirements for a degree may be placed on probation or dropped from college.

It is not the policy of the University to apply rigid numerical criteria in determining when probation or dismissal action is warranted. All students are expected to maintain a cumulative point-hour ratio of 2.0 (C average) or better. An upperclass student may be placed on probation for an exceptionally poor term record, even though his cumulative record is 2.0 or better. All factors relevant to a student's academic progress are considered in making decisions regarding academic action.

Probation means that the student's academic performance is unsatisfactory.* Neglect of academic responsibility by a student who is on probation may result in his being dropped by the Dean of Students prior to the end of a term. A student who at the end of a period of probation has failed to show significant improvement in his academic record may expect to be dropped from the University.

Academic Honesty

Two of the chief purposes of education are to develop the intelligence of the student and to instill in him a sense of moral responsibility for his own actions. Fundamental to the accomplishment of both of these purposes is the duty of the student to perform *all* of his required work without illegal or unauthorized help.

Academic dishonesty is the appropriation of the work of other people by a student who claims it as his own in order to receive a better grade in a course. Any such act of borrowing or using the work of others without admitting that it is not one's own is a deliberate act of cheating, or plagiarism, and is liable to punishment. Plagiarism includes: 1) receiving or giving oral or written information on an outside assignment, a paper, a quiz, or an examination; 2) copying the paper of another person while taking a test or exam or permitting one's own paper to be copied; and 3) copying information from a book or other written material and using it in a student paper without acknowledging the source.

Students who are academically dishonest not only are depriving themselves of the full benefit of education but are unworthy of the respect of the faculty and their fellow students. In cases of academic dishonesty, the student will be referred to the River Campus Committee on Academic Honesty, a faculty-student board, and, if found guilty, he will be punished by losing credits, having grades lowered, having a notation of plagiarism placed on his permanent college record, or being expelled.

Withdrawal

The continuance of each student upon the rolls of the University, the receipt by him of academic grades, his graduation, or the conferring of any degrees or the granting of any certificate, shall be strictly subject to the discretionary powers of the University. The University expressly reserves the right, and each student expressly concedes to the University the right, to require his withdrawal at any time for any reason; no reason for requiring such withdrawal need be given.

Students who desire to withdraw on their own initiative should consult the Dean of Students. If a student withdraws on his own initiative while his academic standing is unsatisfactory, he may be recorded as *dropped*. A student who withdraws early in a college term may be excused from payment of a part

*For the purpose of faculty action "unsatisfactory" would normally include a cumulative or term PHR below 2.0 or failure(s) in required courses.

of his tuition for that term. After five weeks the student must pay full tuition. Up to that time he pays a percentage of his tuition based on the length of his attendance.

Student Cars

Students driving cars on campus are required to register them. Freshmen and sophomore resident students are not permitted to bring cars to the University.

Firearms

The following regulations apply to the possession and use of firearms:

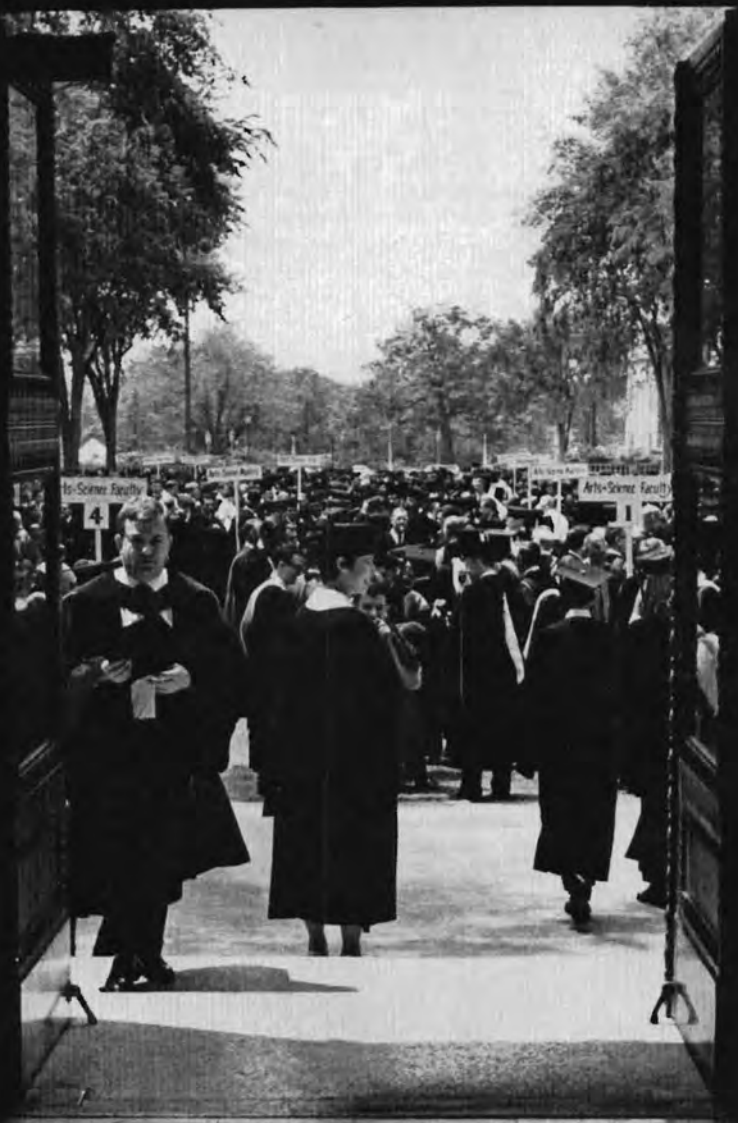
1. No student may possess a firearm or airgun on the River Campus without registering his weapon in the Office of the Dean of Students within twenty-four hours after it is brought on campus.
2. Weapons registered with the Dean of Students must be deposited with the appropriate dormitory head or fraternity president. If such deposit is inconvenient the student may retain the firearm but deposit a major operating piece of the mechanism such as a bolt or a cylinder with the dormitory adviser or fraternity president.
3. No student may fire a rifle, shotgun, pistol or airgun on the River Campus except in places specifically designated for this purpose, i.e., the rifle range.
4. Students who are found with an unregistered firearm (including an airgun) in their possession or who are apprehended shooting a firearm or airgun on the River Campus or riverbank adjacent thereto are subject to expulsion from the University.

Master Keys

The unauthorized possession or use of a key to a University lock is forbidden, and students violating this regulation are subject to a fine and/or expulsion.

Soliciting Funds

Student groups engaged in any type of fund raising activity must restrict their efforts to the River Campus. Exceptions to this rule which would permit a group to contact the community at large are rare and must be approved by the Office of the Dean of Students.


Arts-Science Faculty
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Arts-Science Faculty

DEGREE PROGRAMS

UNDERGRADUATE

THE UNDERGRADUATE DEGREE programs of the River Campus colleges first introduce students to the provinces of intellect: the humanities, the social sciences, and the natural sciences; and secondly, give them a thorough competence in the subject or area of their choice.

Some students will regard their undergraduate education as terminal. Others will go on to graduate and professional studies. For all, however, the University believes a broad, common education in the basic areas of human knowledge is essential. Generally, the major problem of specialization is the gap it creates between specialists. The first two years of college aim at developing the materials and techniques of intellect that span this gap. These same materials and techniques, drawn from the disciplines of the liberal arts, are the foundation of specialization as well as the foundation of an adequate and effective conduct of life.

Liberal studies, within the College of Arts and Science, are the basis of the undergraduate's first two years. The student then may complete his education within that college, or transfer to the College of Business Administration, the College of Education, the College of Engineering and Applied Science, or the Department of Nursing. Students planning to transfer to one of these units should consult both the Arts and Science section of this *Bulletin* and the section for their special college to be certain their course selection is acceptable.

COLLEGE OF ARTS AND SCIENCE

The College offers the Bachelor of Arts with the following majors:

Anthropology
Astrophysics
Biology
Chemistry
Chinese (Literature)
Classics (Literature)
Economics
English
Fine Arts
French (Language or Literature)
General Science
Geography
Geology
German (Language or Literature)
History
Linguistics
Mathematics
Music
Philosophy
Physics
Political Science
Psychology
Russian (Language or Literature)
Sociology
Spanish (Language or Literature)

Students may earn the Bachelor of Arts within the Program of Honor Studies in the following majors:

Comparative Literature
Economics
English
History
Philosophy
Political Science

The Bachelor of Science is offered for the following majors:

Astrophysics
Biology
Chemistry
Geology
Physics

COLLEGE OF BUSINESS ADMINISTRATION

The College offers courses leading to the Bachelor of Science in the following majors:

Accounting
Business Economics
Industrial Management

COLLEGE OF EDUCATION

Course of study leading to the Bachelor of Science with the following majors:

Elementary Education
Secondary Education

COLLEGE OF ENGINEERING AND APPLIED SCIENCE

The College offers the Bachelor of Science in the following majors:

Chemical Engineering
Electrical Engineering
Mechanical Engineering
Optics

EASTMAN SCHOOL OF MUSIC

The Eastman School offers the Bachelor of Music with majors in various instruments, public school music, conducting, theory, composition, voice, church music, and the history of music.

The School also offers a Bachelor of Music with a minor in humanities and a Bachelor of Arts with a major in music.

SCHOOL OF MEDICINE AND DENTISTRY

The Department of Nursing offers a Bachelor of Science with a major in nursing.

UNIVERSITY SCHOOL OF LIBERAL AND APPLIED STUDIES

The School offers a variety of courses and programs leading to the Bachelor of Science degree.

GRADUATE STUDIES

THERE ARE over 1,500 students engaged in full-time graduate study or research throughout the University. Each school or college in the University is responsible for recommending candidates for master's degrees. The work for the Doctor of Philosophy degree is under the general control of the University Council on Graduate Studies. Each college has an Associate Dean to administer Graduate studies.

The College of Arts and Science offers graduate work leading to the degree of Doctor of Philosophy in the following departments: Anthropology, Biology, Chemistry, Economics, English, Foreign and Comparative Literature (French Literature), Geology, History, Languages and Linguistics (Linguistics), Mathematics, Philosophy, Physics, Political Science, and Psychology. The degrees Master of Arts and/or Master of Science also are given for work in these departments. The Master of Arts is given in the Fine Arts Department of the College.

The College of Engineering and Applied Science offers work leading to the Doctor of Philosophy and the Master of Science degrees in Chemical Engineering, Electrical Engineering, Mechanical and Aerospace Sciences, and Optics.

The College of Education offers work leading to the degrees Master of Education, Master of Arts in Education, Doctor of Education, and the Certificate of Advanced Study upon completion of Specialist in Education programs.

The College of Business Administration offers work leading to the degrees Master of Science with a major in Business Administration, Master of Business Administration and Doctor of Philosophy with a major in Business Administration.

The Eastman School of Music offers work leading to the degrees Doctor of Philosophy, Doctor of Musical Arts, Master of Arts, and Master of Music.

University School of Liberal and Applied Studies offers programs leading to Master of Arts and Master of Science degrees.

The School of Medicine and Dentistry offers programs of study leading to the degrees Doctor of Medicine, Doctor of Philosophy, and Master of Science. Information on the program for the degree Doctor of Medicine may be obtained from the Dean of the School of Medicine and Dentistry, University of Rochester, Rochester, New York 14620.

Detailed information on the University's graduate programs is given in the bulletin "Graduate Studies," which may be obtained from the Associate Dean for Graduate Studies in each school. Students requesting application forms should write to the Secretary of Graduate Admissions, Administration Building, University of Rochester, Rochester, New York 14627.

OFFICER CANDIDATE PROGRAMS

AIR FORCE RESERVE OFFICERS' TRAINING CORPS

The Air Force Reserve Officers' Training Corps at the University of Rochester prepares male college students to qualify for a commission in the United States Air Force following completion of degree requirements.

The training program is conducted by personnel assigned to the United States Air Force and to the University, where they are organized as Air Force ROTC Detachment 580 and the Department of Aerospace Studies.

The Professional Officer Course is available to qualified students with two academic years remaining before receipt of a degree at the baccalaureate or graduate level. The program is designed to develop skills and attitudes vital to an Air Force Officer.

Enrollment in this program is on a selective and competitive basis. To qualify, a student must: (1) be a male citizen of the United States, (2) be at least 17 years of age at the time of acceptance, (3) pass the Air Force Officers Qualifying Test,

(4) be of sound physical condition, (5) be accepted by an interview board, (6) be of good moral character, (7) complete a six-week Field Training Course at an Air Force Base (Note: Food and lodging are provided. The student receives travel pay and a payment of $120.00 for this period).

If accepted for this program the student must: (1) earn a degree, (2) agree to accept, if offered, a commission in the United States Air Force, (3) participate in three classroom hours of instruction each week for the two academic years, (4) agree to serve for a period of not less than four years on active duty (five years if an applicant for pilot or navigator training), (5) join the Air Force Reserve for a period of six years. (Note: Membership in this Reserve status is creditable toward meeting the required minimum service obligation under the Universal Military Training and Service Act. Students fully enrolled in the Professional Officer Course are classified 1D, draft deferred status.)

The Air Force additionally offers a flight instruction program to qualified applicants who are in their second year of the Professional Officer Course. This program consists of 36½ hours of flight training and 30 hours of ground training. Successful completion of this training and passage of the FAA examinations qualify the student for a private pilot's license. The flying is conducted at a local flying school under the Flight Instruction Program to determine the student's interest and aptitude for further flight training in the Air Force's flying program.

Consult the Aerospace Studies section on page 96 for a description of courses of instruction.

NAVAL RESERVE OFFICERS' TRAINING CORPS

The University of Rochester is one of fifty-three colleges or universities where a permanent Naval Reserve Officers' Training Corps Unit is established. A Department of Naval Science under a Professor of Naval Science and a staff of naval instructors is an integral part of the College of Arts and Science; a permanent building, Harkness Hall, houses the Department.

The Naval Science sequence, consisting of one course per term, complements the University's regular academic courses in arts and science. Those enrolled in the NROTC program may fulfill the requirements for a Baccalaureate degree in either arts or science, as well as the requirements for a commission in the naval service, in either eight terms or four terms plus summer school.

There are two types of students enrolled in the NROTC program:

1. *Regular NROTC Students* are subsidized by the Navy for tuition, fees, textbooks, uniforms and subsistence allowance of $600 per year. In return for these benefits, regular NROTC students obligate themselves to attend three cruises or summer training periods of six to eight weeks; to accept a commission as ensign, USN, or second lieutenant, USMC, upon graduation, and to serve on active duty at the pleasure of the President as career officers in the United States Navy or the United States Marine Corps. Depending upon the needs of the service, the Secretary of the Navy will accept resignations from those officers of the Regular Naval Service who have served a minimum period of active duty (four years at present) and who do not desire to continue on active duty as career officers.
2. *Contract NROTC Students.* Two programs, a four-year program for incoming freshmen; a two-year program for selected juniors after completion of a special six-week summer training session at a regionally selected

NROTC university. All Contract students agree to make a one-summer practice cruise; to accept a commission for three years in the Naval Reserve or the Marine Corps Reserve; to serve three years on active duty; and not to resign such commission before six years from its original date.

Regular NROTC students are selected after nationwide competitive aptitude and screening tests and certified to the University by the Navy Department.

Contract students are selected from applicants from the incoming freshman class, the number being limited to a quota set by the Navy Department.

With the approval of the Professor of Naval Science and the academic authorities, civilian students, citizens of the United States, who have not entered into any contract with the Navy may be permitted to pursue Naval Science courses. They will be designated as Naval Science students. Since they are not members of the NROTC, either as regular or contract students, they will not be eligible to make NROTC practice cruises, to be issued uniforms, to have access to classified information or to be paid any compensation or benefits. Naval Science students may become eligible for enrollment as contract NROTC students, provided they comply in every respect with the requirements for such enrollment. They may also participate in the annual competition for entrance into the NROTC as regular students.

The requirements for enrollment in the ROTC program for both regular and contract students are that they: (1) must be unmarried male citizens of the United States and must agree to remain unmarried until commissioned or disenrolled; (2) must be not less than seventeen years of age nor more than twenty-one years of age on July 1 of the year in which they enter college (contract students may be accepted at age sixteen if considered of sufficient maturity by the Professor of Naval Science); (3) must meet all of the entrance requirements of the University, and be granted admission by the University; (4) must agree to remain in college until graduation; (5) must be physically qualified.

Both regular and contract NROTC students are deferred from the draft while enrolled in the NROTC Unit. Naval Science students are not deferred from the draft by the Navy.

PLATOON LEADERS' CLASS, U.S. MARINE CORPS

The Marine Corps Platoon Leaders' Class program (PLC) is designed for the college undergraduate. Freshmen and sophomores attend two six-week training sessions during summer vacation periods. Juniors attend one ten-week session. There is no on-campus participation required while in this program.

Time spent in the program counts toward pay when commissioned and all men enrolled in the program are draft-deferred. Upon completion of the training requirements and graduation from college the PLC receives a commission as a Second Lieutenant and embarks upon a three-year tour of active duty.

For the college senior there is the Officer Candidate Course (OCC) program. The OCC is commissioned a Second Lieutenant after completion of a ten-week screening course held after graduation from college. Further information on these programs may be obtained by seeing the Marine Corps Officer Selection Officer when he visits your school or by contacting the nearest Marine Corps recruiter.

THE COLLEGE OF ARTS AND SCIENCE

THE COLLEGE OF ARTS AND SCIENCE is devoted to the values of liberal education. As defined by the faculty, liberal education consists of acquiring the knowledge and the skills adequate to conduct a rational and sophisticated search for the answers to the major questions which confront mankind. Liberal education precedes applied education and is basic to it. Thus the College of Arts and Science provides the basic knowledge on which other academic units must draw. All fields of theoretical knowledge are appropriate to the arts and sciences, and the study and teaching of these at the undergraduate and graduate levels as well as the conduct of research are the major functions of this college.

The College of Arts and Science is administered by a Dean and an Associate Dean, and includes twenty departments: Aerospace Studies, Anthropology, Biology, Chemistry, Economics, English, Fine Arts, Foreign and Comparative Literature, Geology and Geography, History, Languages and Linguistics, Mathematics,

Naval Science, Philosophy, Physical Education for Men, Physical Education for Women, Physics and Astronomy, Political Science, Psychology and Sociology. In addition, there are several special programs: Brain Research, a research and graduate instruction center focusing the skills and knowledge of numerous disciplines on the study of the central nervous system; Canadian Studies, a center for the study of Canada and Canadian-United States relations from an interdisciplinary point of view; East Asian Studies, an organized elective sequence in Chinese and Japanese language and culture; and General Science. A joint program with the Eastman School of Music enables undergraduates in the College of Arts and Science to receive an A.B. with a concentration in music. A series of courses in religion is offered in cooperation with the Colgate-Rochester Divinity School. In cooperation with the College of Engineering and Applied Science, students may plan a five-year program which leads to a B.S. in Engineering and an A.B. with a concentration in the social sciences or humanities.

Undergraduate students on the River Campus are enrolled in the College of Arts and Science for their first two years. Their courses are designed to prepare them for advanced studies and to give them the breadth essential to a liberal education. At the end of the sophomore year students who intend to complete their degrees in the College of Engineering and Applied Science, the College of Education, the College of Business Administration, or the Department of Nursing in the School of Medicine and Dentistry make formal application for admission and, upon acceptance, are transferred.

The College offers courses of study leading to the degrees Bachelor of Arts and Bachelor of Science. The Bachelor of Arts program is directed toward a broad comprehensive education with special attention to the integration of many fields of knowledge. The Bachelor of Science program emphasizes specialized training in the student's major field of study. In the Bachelor of Arts program, there is the general program and the Honors Program. The general program enables the student to concentrate in one of the important fields of knowledge with a maximum opportunity for breadth of study. The Honors Program provides a maximum opportunity for independent work.

The Bachelor of Arts program is available in the following fields: Anthropology, Astrophysics, Biology, Chemistry, Chinese, Classics, Economics, English, Fine Arts, French, General Science, Geography, Geology, German, History, Linguistics, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Russian, Sociology, and Spanish. The A.B. program with honors is available in Comparative Literature, Economics, English, History, Philosophy, and Political Science. The Bachelor of Science program is available in Astrophysics, Biology, Chemistry, Geology and Physics.

METHODS OF INSTRUCTION

The units of instruction in the College of Arts and Science consist of lecture and discussion courses, laboratory courses, and honors seminars.

Courses

The ordinary unit of undergraduate instruction is the *course*. Each course requires one quarter of the A.B. student's work time for one term. Lecture and discussion courses normally meet for three fifty-minute periods each week, with the equivalent of a fourth period provided by a block of time spent in independent study. Laboratory courses ordinarily involve four fifty-minute class

periods or their equivalent in laboratory sessions each week. Each course numbered between 100 and 299, unless otherwise stated, carries the equivalent of four hours of credit.

Freshman Preceptorial Courses

A special type of course is offered to freshmen by a number of departments in the College of Arts and Science. In addition, several departments are teaching one section of a regular course in a preceptorial manner. Each course is directed by a faculty preceptor and is open to a small number (generally 10 to 15) of selected freshmen. These students are introduced to certain problems or areas of intellectual inquiry involving one or more disciplines by means of special, intensive readings, seminar discussions, and critiques. The Freshmen Preceptorial Courses receive full credit in the College and may be applied toward the group distribution requirements as described in this bulletin. Among departments offering such courses are Anthropology, English, Fine Arts, Foreign and Comparative Literature, History, Philosophy, Political Science, and Physics.

Honors Seminar

The Honors Program is distinguished from the regular program by the seminar system and by a special system of examinations and grades. Enrollment in each seminar is limited to approximately ten students; seminars meet once a week for a three-hour session in an informal atmosphere that stimulates the exchange of ideas. The work of each student consists of independent reading, research, criticism, and analysis; oral reports or written papers form the basis of seminar discussions. The seminar system provides the discipline and training valuable to the student planning to do graduate study, but it does more than that. The excitement generated by the joint scrutiny of ideas and the cooperative search for truth in a seminar session is one of the most rewarding experiences a college education can offer.

A detailed description of other aspects of the Honors Program will be found under Degree Requirements.

DEGREE REQUIREMENTS

The degree programs in the College of Arts and Science offer each student an opportunity to choose one suited to his needs and interests. Each A.B. program includes, primarily in the first two years, work in the humanities, the social sciences, and the natural sciences. During the last two years the A.B. student studies in the field of concentration of his choice and chooses electives from other areas. The B.S. student follows a prescribed program throughout; however, each B.S. program allows for some breadth of study as well as a high degree of specialization.

Quantitative Requirement

Candidates for an A.B. must complete 32 courses or their equivalent. Candidates for a B.S. must complete between 32 and 36 courses; the exact number depends on their specific program.

Common Requirements

For all degree programs three specific requirements should be met during the first two years:

1. *English:* A course of instruction in reading and writing effective prose should be taken in the freshman year. Any English course numbered 100 (with the exception of courses numbered 120–129) may be taken to satisfy this requirement. On the basis of preliminary tests, the English Department will direct entering students in the selection of those courses particularly suitable for their individual needs. Students who have attained an exceptionally high record on Advanced Placement Tests in secondary school may be exempted from this requirement and given credit at the discretion of the department. (Note: English 111 is usually offered in the first semester only.)

2. *Foreign Language:** A student must show proficiency in a foreign language (ancient or modern). Entering students with three years of a foreign language in secondary school may take a proficiency examination during Freshman Week. The result of the examination may excuse the student from further study in the language or may require him to take from one to three courses. Most students will need to complete only one course. Students are free to meet their foreign language requirement by studying a language new to them; in such cases the satisfactory completion of three courses is required.

3. *Physical Education:* All students are required to take physical education during each of their first four terms. Physically handicapped students may be excused or given modified programs on recommendation of the university health service.

4. *In addition, students must meet the distribution requirements.* Students considering the Honors Program should plan to complete these by the end of the sophomore year.

Courses in the College of Arts and Science which may be offered toward distribution requirements are classified as follows:**

Humanities (I)—East Asian Studies, English, Fine Arts, Foreign and Comparative Literature, Languages, Music, and Religion.

Social Science (II)—Anthropology, Economics, Geography, History, Linguistics, Philosophy,‡ Political Science, Sociology.

Natural Science (III)—Astronomy, Biology, Chemistry, Geology, Mathematics, Physics, and Psychology.†

To meet the distribution requirements students in a Bachelor of Arts program must take, ordinarily in the first two years, four courses in each of the two areas other than that in which their field of concentration lies. Students in a Bachelor of Science program must take three or four courses (as specified in the curriculum synopsis) in such areas.

In satisfying distribution requirements all students are required to include at least two laboratory science courses (selected from one or more of the following departments—Biology, Chemistry, Geology, Physics and Astronomy, and Psychology) and at least two literature courses (selected from the departments of English and/or Foreign and Comparative Literature).

*Consult specific programs in Professional Schools for requirements of that college.

**The following courses may not be applied toward distribution requirements—English 111, 115, 116, 123, 124, 126, 128; language courses numbered 101–102; all courses offered by the departments of Aerospace Studies, Naval Science and Physical Education.

‡Philosophy courses classified under Humanities include 103, 104, 211, 241, and 244 etc.; all other Philosophy courses are classified under Social Science.

†Psychology courses classified under Natural Science are odd-numbered and all even-numbered Psychology courses are classified as Social Science.

The Plan of Study

A.B. students need not decide finally on their field of concentration until the second term of their sophomore year. At that time each A.B. student consults with his adviser and submits a tentative plan of study for his junior and senior years. B.S. students are assigned to the specific program of their choice when they are admitted to the College and normally follow the prescribed studies through the four years.

Students interested in the Honors Program should consult with their faculty advisers in order to include in freshman and sophomore years the recommended prerequisites for the program. Prospective Honors students should meet the distribution requirements by the end of their sophomore year and should try to include any introductory courses that might furnish useful background for the material of the seminars. The Honors Program is administered by a director and an executive committee, who review applications for admission. A grade average of B is usually considered the minimum demonstration of a capacity to do successful independent work; however, each application is judged on its own merits.

The General A.B. Program

The requirements for a concentration in the general A.B. program aim at producing a unified and, at the same time, broad and sophisticated program of study. For this reason, students concentrate their effort and course load both in the principal department of their choice and in related departments. (See page 73 for departments offering study for the A.B.) The Bachelor's degree requires a minimum of 32 courses, but may require as many as 36 courses in certain programs (A.B. or B.S.). A.B. students are required to take ten courses beyond the elementary level within the area of concentration. Six to eight of these must be in the department of concentration. Since some departments have specific recommendations and requirements, students should study the departmental statements which follow. The two to four remaining courses are selected to form a related field with the purpose of enriching the student's understanding of the field of concentration.

The College offers an interdepartmental program in General Science. Since the requirements in this field vary from the requirements for the usual departmental concentration, interested students are urged to consult the special section on this program in this bulletin.

The A.B. Program With Honors

Honors seminars are offered by nine departments: Anthropology, Economics, English, Fine Arts, Foreign and Comparative Literature, History, Philosophy, Political Science and Sociology. There is also an Honors Program in Biology. A student can concentrate in any one of these departments except Anthropology, Fine Arts, and Sociology. The Honors student is required to complete four to eight seminars for the A.B. degree.* Each Honors student will ordinarily supplement his program of seminars with a group of courses. A normal load will consist of two seminars and a course during each semester of the junior and senior years. However, a semester's program might consist of three courses and one seminar.** Every Honors student must take at least one seminar in each semester of his junior and senior years (except that students seeking to be

*Honors students in Biology are welcome in seminars, but are not required to take seminars. For the regulations governing Biology Honors see page 100.

**Two seminars alone, or one seminar and two courses are also permitted.

certified in secondary education may be excused from seminars during the first semester of their senior year, and students taking their junior year abroad may substitute the work taken at a foreign university for the seminars they would have taken during their junior year).

A concentrator may not take fewer than four nor more than five seminars in the department of concentration. During his junior and senior years an Honors student must take at least two courses or seminars from the offerings of departments other than his department of concentration. A particular department may require that its concentrators take this allied field work in seminars rather than in courses. Each department participating in the Honors Program will specify prerequisites and sequences for its Honors concentrators and for other students who wish to enter its Honors seminars. Honors students are urged to take work in a foreign literature at least through the 131, 132 level.

Qualified sophomores may enter the Honors Program. A normal load for a sophomore in Honors will ordinarily consist of one seminar and two courses. Ordinarily a student must have participated in the Honors Program for at least two years in order to be considered for a degree with Honors. Therefore, students expecting to spend their junior year abroad should plan to enter the Honors Program in their sophomore year.

Qualified students who are not in the Honors Program are permitted to register for a seminar if places are available.

The B.S. Program

Students interested in a B.S. program should consult the departmental sections which follow, where specific curricula are outlined.

Electives

The program for the B.S. degree often restricts the choice of electives; the A.B. candidate in the general program elects approximately ten courses to broaden his education in any direction that his special interest or curiosity leads him. The electives may be used to complete professional work in education if the student plans to teach in a public secondary school. (See page 184.) Other students may use their electives to complete pre-professional courses for medical or dental school. Students who wish to do so may use their electives to build a second area of concentration. Students working in the Honors Program may choose their electives from Honors seminars in addition to the four required and from lecture or laboratory courses in place of the seventh and eighth seminars.

Additional Courses

Permission to carry a fifth course, not required by the student's program, in any term after the freshman year may be granted if the student has high academic standing and is judged capable of carrying the extra work. Permission for a fifth course, not required by the student's program, is granted by the appropriate faculty adviser or departmental adviser and the Dean of Students. Students who receive such permission may take a fifth course without payment of extra tuition. The maximum number of courses to which this policy applies is 36 courses.

A student may not carry a fifth course in the freshman year, excepting only courses in Applied Music. A sixth course is not permitted in any term.

EXAMINATIONS

In addition to course quizzes and examinations, the College has two major examination systems. One is for students in the general A.B. program and the other for A.B. students in Honors.

The Comprehensive Examination

A.B. candidates are required to take a comprehensive examination in their field of concentration at the end of their senior year unless their department provides an approved substitute.* B.S. students do not normally take comprehensives.

The comprehensive consists of two to four three-hour examinations prepared by the department of concentration. The examination tests the student's knowledge of his field of concentration and his ability to correlate material from different courses. It gives the student the opportunity to evaluate the relative importance of the facts and principles presented in different courses on the basis of his wider knowledge of the general field.

The department of concentration uses the student's performance on the comprehensive, along with all other indications of his academic achievement, in recommending graduation and in awarding a degree with distinction.

If, after the failure of the comprehensive examination, the student fails another comprehensive examination and fails to complete satisfactorily any approved substitute thereof by the end of the next school calendar year, he shall be dropped without his degree.

Honors Examinations and Grades

Although Honors students write the regular examinations in lecture or laboratory courses which they take, they have a special system of annual examinations in their seminar work. At the end of the junior year Honors students take a three-hour written examination covering each of the seminars in which they have been enrolled. In the senior year the examinations are both written and oral. The examinations are set, administered and graded by a Board of Outside Examiners ordinarily drawn from the faculties of other universities and colleges. Seniors in Honors are exempted from the departmental comprehensive. For each seminar a student receives one of the following grades: Highest Honors, High Honors, Honors, Pass (credit, but not toward degree with honors), Fail (no credit).

The final ranking of seniors is made by the Committee of Examiners and, in special cases, with the counsel of seminar instructors and the Honors Committee.

Grading Option

In addition to the grading procedures outlined on page 68 students in the College of Arts and Science may elect to receive a grade of Satisfactory (S) or Fail (F) in one course per semester, to a maximum of eight courses. This option is subject to these further restrictions:

a. It must be declared at the time of registration. (For dash courses, this means Fall registration only.)

b. It may be used only for those courses falling outside the student's area of concentration.

*Approved substitutes are used by the departments of Biology, Chemistry, General Science, Geology, Mathematics, and Psychology.

c. The grade Satisfactory (S) shall be defined as embracing letter grades "A" through "D."

d. Grades of Satisfactory (S) and Fail (F) under this option shall not be reflected in a student's grade-point average.

PREPARATION FOR GRADUATE AND PROFESSIONAL STUDY

Students who intend to enter graduate or professional schools should consult with their faculty advisers, departmental advisers, and vocational counselors as early as possible in their undergraduate years to plan programs of study that will prepare them for advanced and professional training in their chosen fields.

Graduate Studies

Students interested in earning the A.M. degree should be prepared for one to two years of full-time study. The Ph.D. degree usually requires two to three years of full-time study plus an additional year to write the thesis. Students who need financial assistance in graduate school should apply early to the school of their choice.

Engineering

Engineering is unique among the professions in that a significant amount of time in the undergraduate program is devoted to professional studies. The normal engineering program at Rochester is a 2–2 experience; i.e., the student is enrolled in the College of Arts and Science for two years and then may transfer to the College of Engineering and Applied Science for his last two years. Students who complete satisfactorily this four-year sequence receive a B.S. degree.

Students seeking a broader training in the liberal arts than is provided in the regular four-year program may enroll in the 3–2, or Two-College Program. Under this plan, the student spends three years in Arts and Science before transferring to Engineering. Students who complete this five-year sequence satisfactorily may receive both a B.A. and a B.S. degree.

Details of the engineering curricula are given elsewhere in this catalog (see p. 187).

Teaching

Students who are planning to complete in their undergraduate programs the professional requirements for teaching are referred to the College of Education section of this bulletin. Students who intend to complete the professional requirements in graduate school are invited to make an appointment with the Counselor of Students in the College of Education to explore opportunities at this and other institutions.

Medicine

Students who are planning a professional career in medicine should realize that it requires a broadly educated person with a good grounding in science. Two plans of study are open:

I. Premedical students may choose a program leading to the Bachelor of Arts degree. A concentration in any department of study is acceptable, provided that the requirements for admission to medical school are fulfilled. Besides qualifying the student to enter medical schools requiring a college degree, this plan

enables concentration in a particular field of learning. Premedical students may study for the degree in the Honors Program.

II. Especially capable and mature students are admitted to some medical schools after three years of college work. The University of Rochester will accept the first year's work in an approved medical school as equivalent to the fourth year in college, provided that: (a) distribution requirements have been met; (b) at least 24 courses have been completed with an average of C+ before entrance to medical school; (c) the first year of medical school has been completed satisfactorily.

The degree granted students in this category is the Bachelor of Arts in General Science. These degrees are not automatically granted; each student is expected to make formal application.

It should be noted that completion of three years of college study and a meeting of stated requirements does not insure admission to a medical school. The program of study should be so planned, therefore, that it may be adapted after three years to the College's requirements for concentration in some department of study.

Although medical schools vary considerably in their admission requirements, the following courses represent the minimum commonly required for a premedical program: Biology, 1 year; Chemistry, 1 year each in inorganic and organic; Physics, 1 year; English, 1 year; Foreign Language. Inasmuch as a solid foundation in the sciences is required for the medical curriculum, additional courses in Biology, Chemistry and Mathematics are strongly recommended. Further, since some medical schools have other requirements beyond those mentioned above, the student should plan carefully to meet the stated requirements of those schools to which he will apply. (See catalogues of the medical schools.)

New York State residents planning to compete for the Regents Scholarships for Medicine and Dentistry should complete organic chemistry by the end of the third year of college (second year for three-year students).

The Premedical Advisory Committee assists students in preparing their programs of study and in applying for admission to medical schools. Consult the Dean of Students Office concerning advisers in this area.

Dentistry

The recommendations given above for premedical study apply also for the predental student, except that some dental schools admit students upon completion of two years of college work and the course requirements are somewhat less stringent. (See catalogues of dental schools for specific requirements for admission.) The Premedical Advisory Committee advises predental students on programs of study and application for admission to dental schools.

Law

There is no one field in which a student preparing for the study of law is advised to concentrate. Consult the Dean of Students Office concerning advisers in this area. (See catalogues of law schools for specific requirements for admission.)

Librarianship

A student preparing to be a librarian should take a wide range of subjects. The humanities, the social sciences, and the natural sciences are all valuable. Foreign languages are important, and the student should have a good reading knowledge of at least one modern foreign language.

The development of libraries devoted to special subjects has created opportunities for college graduates having specialized training in a subject in addition to training for librarianship. Those interested in becoming school librarians must meet the requirements for teaching certificates in the state where they will work.

Members of the library staff will be glad to discuss with students their undergraduate programs and plans for graduate study in library schools. Experience as a student assistant in a library is helpful, but is not a requirement for admission to a library school.

THE COLLEGE OF ARTS & SCIENCE

THE ADMINISTRATIVE OFFICERS

Kenneth E. Clark, PH.D. (Ohio State).....Dean of the College of Arts and Science

Lawrence W. Kuhl, PH.D. (Western Reserve)..Associate Dean of the College of Arts and Science

Marian A. McClintock, ED.M. (Rochester).....Executive Assistant to the Deans of the College

Miriam B. Rock, A.B. (Rochester).....Technical Associate, Office of the Dean

Janet Howell Clark, PH.D. (Johns Hopkins).....Dean Emeritus of the College for Women

Lester Oatway Wilder, A.M. (Harvard).....Dean Emeritus of the College for Men

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COURSES OF INSTRUCTION

EXPLANATION OF COURSE NUMBERING SYSTEM

1–99	Non-credit courses.
100–199	Introductory courses—usually at the freshman and sophomore level—no graduate credit.
200–289	Courses at the junior and senior level carrying graduate credit unless otherwise specified.
290–299	Undergraduate reading or research courses.
300–399	Courses in the Honors Division.
400–489	Graduate courses at the master's level or the first year of graduate study. Open to undergraduates only by special arrangement.
490–499	Master's level, reading or research courses.
500–589	Advanced or specialized graduate courses, usually at the doctoral level.
590–599	Ph.D. reading or research courses.

All courses meet three times a week unless otherwise specified.
Each course carries credit for *one course* unless otherwise specified.

HONORS SEMINARS

(Each seminar is the equivalent of two courses.)

(Note that French or German 131 and 132 are required of all students—even those concentrating in other fields—who wish to enter most seminars in Foreign and Comparative Literature.)

ANTHROPOLOGY

314. Mythology and Religion. Reading of selected mythologies of Oceania, Africa, and the Americas, and of related materials on rituals; consideration of anthropological contributions to the comparative study of myth and ritual, including the works of Malinowski, E. R. Leach, Lévi-Strauss, Kluckhohn, A. F. C. Wallace and others.

Omitted 1966–67

349. Studies in Indian Civilization. Emphasis on interrelationships between Indians and Europeans as expressed in literary texts. Various Indian traditions examined in historical context.

Omitted 1966–67

368. Problems in Social Anthropological Analysis. Consideration of current approaches to problems in social anthropology. Particular emphasis is placed on methodological and theoretical questions and on assessment of recent progress and possible lines of new development.

COMPARATIVE LITERATURE

(Adviser to concentrators: Mr. Jules Brody, 423 Morey Hall)

This concentration is available to Honors students wishing to emphasize the study of English, French, or German literature for comparative purposes. The requirements are as follows:

With emphasis on English literature. It is recommended that all students entering this program will have taken Comparative Literature 108 during their freshman or sophomore year. (1) A course in Shakespeare (English 212), one genre course (English 131, 132, or 133), and one century or period course at the 200 level. (2) French or German 131, 132 and one other course in French or German literature. (3) Four seminars in Comparative Literature.

With emphasis on French or German literature. It is recommended that all students entering this program will have taken Comparative Literature 108 during their freshman or sophomore year. (1) Five courses in one of these literatures including French or German 131, 132. (2) Five seminars in Comparative Literature.

For the above concentrations only the following seminars will be acceptable: 304, 307, 350, 351, 352, 357, 359, 367, 375. In certain exceptional cases the foreign literature prerequisite for *entrance* into certain of the seminars may be modified at the discretion of the instructor.

NOTE: It should be borne in mind by students intending to do graduate work in Comparative Literature that the requirements stated above are *minimal*. All of the better graduate programs in Comparative Literature in American universities will presuppose, and often demand, more extensive preparation in foreign literatures (read in the original) than is stipulated here. Accordingly, those planning to pursue graduate study in Comparative Literature are strongly urged to do as much additional course work as time will allow in the foreign literature chosen for their concentration. It should be further noted that M.A. and Ph.D. work in Comparative Literature demand a sound reading knowledge of *at least* one other foreign language in addition to the language of the concentration. Latin, French, and German are almost universally required by the better graduate schools.

304. Medieval Epic and Romance. Detailed study of the structure of selected medieval epics and romances, including the *Beowulf; The Song of Roland; the Nibelungenlied;* Chrétien's *Perceval, Yvain, Lancelot,* the Tristan legend; an investigation into the sensibility underlying the two types of literature; the classical and medieval Latin background. Readings in English.

310. Philosophy and Poetry. The ancient quarrel between them, their rival claims, their convergence; the philosophical and didactic poem (Hesiod, the Platonic myths, Lucretius, Dante); philosophy's use of metaphor and imagery (Plato, Aristotle, Descartes, Heidegger, Wittgenstein).

Omitted 1966–67

321. Studies in Modern Russian Fiction. Russian prose from Chekhov to Pasternak with auxiliary reading in the theater and poetry. Readings in English.

Omitted 1966–67

341. Studies in Chinese Literature and Thought. The major literary genres and schools of thought; emphasis on relationships between literature and Confucianism, Taoism, and Buddhism. Readings in English.

Omitted 1966–67

350. Literary Criticism. Studies of major literary critics from the time of Aristotle to the present.

Omitted 1966–67

351. Archetypal Analysis. The theory of archetypes (Freud, Frazer, Jane Harrison, J. Campbell, M. Eliade); application of the theory to the analysis of literary texts, classical or in the classical tradition.

Omitted 1966–67

352. Tragedy. A study of tragic themes and tragic behavior in drama and fiction with texts chosen from Aeschylus to Mann, Camus, and Brecht. Prerequisite: French or German 131, 132.

Omitted 1966–67

355. Dante and Medieval Culture. Emphasis on allegory and structure in the *Divine Comedy;* introduction, through the poem, to the spirit of the Middle Ages. Readings in English.

Omitted 1966–67

357. The Enlightenment. Critical analysis of works of major French and English authors of the eighteenth century. Prerequisite: French 131, 132.

359. Baroque Lyric and Reflective Poetry. Contemporary theories of renaissance and baroque poetry; stylistic analysis of the impact in continental Europe of Petrarchism, Cultism, Marinism. Prerequisite: French, German, or Spanish 131, 132.

Omitted 1966–67

367. The Modern European Novel. Studies in French, German and English prose fiction. Prerequisite: French or German 131, 132.

375. Problems in Comparative Literature. Confessional literature; the gradual intrusion of the novelist on his work; the problem of literary sincerity; representative writers from Rousseau to Kafka. Prerequisite: French or German 131, 132.

Omitted 1966–67

ECONOMICS

Students majoring in Economics are required to take course work in Economics 207, 209, and 231 as a substitute for one Honors seminar. Normally, Economics 207 and 231 will be taken in the fall semester of the junior year along with an Honors seminar. In the spring semester of the junior year, Economics 209 will be taken in addition to two Honors seminars.

Prerequisite: Economics 101.

307. Economic Theory. Theories of value, production and distribution, with emphasis on modern work in these areas. Analysis of market structures. Introduction to general equilibrium theory and Keynesian modern income analysis.

Omitted 1966–67

323. Labor Economics. Labor in a modern, industrial economy, with emphasis on economic analysis of such problems as wages, labor productivity, employment and unemployment. History and growth of trade unions and their relations with government.

327. Strategic Factors in American Economic Growth. Main features of American economic growth since 1800. Recent statistical studies of national product, industrial structure and capital formation are evaluated. Considerable use is made of price theory and modern growth theory.

Omitted 1966–67

329. Monetary Theory. Functions and services of money; factors governing the demand for, and supply of, money and money substitutes; the relationships between money and levels of prices, employment, interest rates and the balance of payments; the effective-

ness of monetary policy; and the coordination of monetary policy with debt management and fiscal policy.

Omitted 1966-67

337. **The Soviet Economy.** The Soviet economy will be examined as a system of economic organization. Its problems with respect to efficiency will be considered, and its performance in terms of growth will be evaluated and analyzed.

Omitted 1966-67

363. **Public Finance and Fiscal Policy.** Economic criteria for judging government policies which alter the allocation of resources and the distribution of income. Government policies to stabilize prices, reduce unemployment, and foster economic growth. Concentration on United States' policies and institutions, but student papers may be based on experience in other countries.

Omitted 1966-67

369. **International Economics.** Theory of international trade and balance of payments problems. Commercial policy in its effects on the export-import pattern, the distribution of income, and the gains from trade. A discussion of postwar monetary institutions and the problems they are designed to solve.

ENGLISH

Before beginning seminar work, English majors must ordinarily have taken English 102 and two of the following: English 130, 131, 132, 133, 141, 144 and 145. A program of concentration in English Honors will ordinarily consist of four or five Honors seminars in English and American literature and at least two seminars or courses offered by departments which give Honors seminars. Students may also take several courses at the 200 level in English and American literature. The four year program of every Honors concentrator must include a course or seminar in (1) Chaucer, (2) Shakespeare, (3) Milton.

301. **Chaucer.** A study of his chief literary works, with emphasis on *The Canterbury Tales* and *Troilus and Criseyde.*

304. **Shakespeare.** A study of his complete works.

307. **Renaissance Literature.** A consideration of the main themes in poetry and prose as expressed by the leading writers of the age.

310. **Milton.** A study of his works.

313. **Eighteenth Century Literature.** A study of poetry and prose from the Restoration to the death of Johnson with special emphasis on the literary and social criticism of the Neo-classical movement.

Omitted 1966-67

316. **Romantic Literature.** A study of the major writers.

319. **Victorian Literature.** Poetry and prose of the period.

Omitted 1966-67

322. **Modern Poetry.** Theories and techniques of modern British and American poets.

325. **American Literature to the Civil War.** A study of authors who have made important contributions to American thought with emphasis on Emerson, Hawthorne, Melville, and Whitman.

328. **American Literature from the Civil War to the Present.** Major works of chief American writers of the modern period. Novel: Mark Twain to William Faulkner; poetry: Emily Dickinson to T. S. Eliot; drama: Eugene O'Neill to Arthur Miller.

331. **The English Drama.** A study of the drama both as a social force and as artistic form from classical times to the present.

Omitted 1966-67

332. **Renaissance Drama.** A study of plays by Shakespeare's contemporaries.

336. **The English Novel.** Development of English prose fiction from Defoe to the present.

Listed under Comparative Literature courses above, but acceptable as English seminars when offered by a member of the Department of English: 350 *Literary Criticism* and 352 *Tragedy.*

FINE ARTS

300. **Mythology.** Study of the outstanding myths of the ancient Greek world, including their origin and their association with early painting, sculpture, and literature. The relation of Greek myths to those of the Orient and the Germanic peoples.

Omitted 1966-67

HISTORY

322. **The British Empire and Commonwealth.** The British Empire and Commonwealth, with particular emphasis on the period since the American Revolution. Some previous knowledge of the political and social history of Britain since the Revolution of 1688 is expected.

Omitted 1966–67

327. **Seventeenth Century.** Seventeenth century history, primarily in England; political, economic, social, intellectual, and religious aspects.

Omitted 1966–67

335. **The United States in the Twentieth Century.** Parallel evolution of American domestic and diplomatic history between 1890 and 1945, with stress on the relationship between domestic reform and the politics of American foreign policy.

Omitted 1966–67

337. **American Colonial History.** Origins of American civilization to 1789, emphasizing a comparative approach to the colonial empires in the New World and examining the emergence of a separatist movement in the North American colonies, the structure of colonial society and the era of the American Revolution.

Omitted 1966–67

338. **Early American History.** A study of selected problems in immigration, religion, politics and economics in early America. No graduate credit.

340. **American Social History.** The development of American society and culture as reflected in the observations of foreign commentators and American social critics.

Omitted 1966–67

341. **American Intellectual History.** Development of American thought from Winthrop through Melville, with emphasis on theology, philosophy, social theory, and literature.

342. **Nineteenth Century American Reform Movements.** The sources, activities, and achievements of political and religious dissenters and uplifters from the Locofocos of the 1830's to the Populists of the 1890's.

Omitted 1966–67

343. **The South Since 1800.** Development of the American South from the rise of the Cotton Kingdom to the present day.

344. **Empire and Kingdom: The Early Middle Ages.** The political and cultural implications of the reformulation of the Roman Empire; the rise and significance of the succession kingdoms of the West and the Christian Empire of the East. Reading knowledge of French or German required.

Omitted 1966–67

345. **Renaissance and Reformation.** Transition of European civilization from the later Middle Ages to modern times.

350. **Philosophy of History.** See Philosophy 340.

Omitted 1966–67

351. **Europe in the 18th and Early 19th Centuries.** European history, 1715–1815, with particular stress on the shifting balance of power, the evolution of arts and letters, the Enlightenment, and the era of the French Revolution and Napoleon.

Omitted 1966–67

356. **European Civilization in the Liberal Period.** Historical studies conducted through topical analyses of the political and social foundations and of the intellectual and cultural vicissitudes of Western Europe during the height of the last classic era of European hegemony, 1880–1910.

Omitted 1966–67

357. **Culture and Politics in the History of Modern Italy.** Studies in the interrelations between cultural change and political crisis in the making of modern Italy.

Omitted 1966–67

361. **History of East Asia in Modern Times *(China)*.** Social, political, and intellectual development of China in the last one hundred years.

362. **History of East Asia in Modern Times *(Japan)*.** Evolution of Japan as a modern state, with special emphasis on those forces which contributed to Japan's successful response to the West.

363. **The Russian Revolution.** The period 1915–1920 from contemporary accounts. No graduate credit.

Omitted 1966–67

364. **Marxism.** Its origins, significance, development and tendencies, from Marx to Mao.

Omitted 1966–67

365. **Russian Intellectual History.** A consideration of the main themes of Russian intellectual history in the 19th and 20th centuries.

Omitted 1966–67

367. **The Modern Middle East.** Rapid survey of the historical background, with stress on the period since 1800. Particular attention

is given to the genesis of Turkish and Arab nationalism, to the problems of economic development, and to the changing relations between the Middle Eastern states and the Western powers.

Omitted 1966–67

392. Modern European Intellectual History. A study of the main currents of European intellectual life since the French Revolution.

See also **Foreign and Comparative Literature 321.**

PHILOSOPHY

There is no prerequisite for Philosophy 303. Before taking any other Philosophy seminars, students should have completed Philosophy 101 *or* 104, except that 303 may be accepted as a prerequisite to 304.

303. Plato. Analysis of the early and middle dialogues, especially the *Republic,* with attention to the ethical and political doctrines. The influence of Plato upon Western thought and culture, and contemporary criticisms of his philosophy.

Omitted 1966–67

304. Aristotle. Readings in the principal works; philosophical and historical studies.

Omitted 1966–67

306. Recent Philosophy. Studies of some of the chief philosophical movements and their leading representatives.

Omitted 1966–67

310. The Structure and Scope of Knowledge. An introduction to theories of knowledge, with special emphasis upon the various views of the criteria and limits of knowledge.

315. Language and Philosophy. A study and evaluation of the claims of contemporary linguistic philosophers that a careful analysis of language will enable us to either solve or dissolve the classical problems of philosophy.

Omitted 1966–67

320. The Theory of Value. Common philosophical problems in the study of values in art, morals, religion, economics; distinction between value and factual judgments, and the possibility of confirming value judgments in these fields. Readings in important recent theorists of value.

330. Existential and Analytical Philosophy. Confrontation of two leading philosophical schools and attitudes, existentialism and analytical (linguistic) philosophy, through intensive study of the philosophical works of Jean-Paul Sartre and A. J. Ayer.

Omitted 1966–67

340. Philosophy of History. Certain explicit theories of history such as those of Marx, Spengler, Toynbee, Niebuhr and others, with a consideration of problems of historical knowledge and the views implicit in varieties of historical writing.

Omitted 1966–67

341. Aesthetics. Analysis of the problems of "truth" and "knowledge" in art: In what sense, if any, does art convey "truth" or embody "knowledge"? What is the relation between "artistic truth" and the value or greatness of the work of art? How does artistic discourse differ from scientific discourse? Concrete reference to specific works of art, particularly in literature.

Omitted 1966–67

350. Concepts of Mind. Metaphysical and psychological problem of the relation of mind and consciousness to bodily conditions; foundations of psychological theory; the concept of human freedom, and philosophical disputes about immortality. The study is based on important works in philosophy and psychology from Aristotle to Gilbert Ryle.

352. Philosophy of Science. A study of the methodology of science, and the nature of scientific proof and reasoning, designed to explain the significance of science in the modern world. No specific knowledge of science is presupposed.

Omitted 1966–67

380. American Philosophy. European and American cultural influences on American philosophical thought; philosophical tradition and innovation in American culture; the problems of philosophy as dealt with by leading American thinkers of the past two centuries.

Omitted 1966–67

390. British Empiricism. Studies in the philosophy of Locke, Berkeley, and Hume.

Omitted 1966–67

POLITICAL SCIENCE

All students registering for Honors seminars in Political Science must have completed Political Science 101 and 102 unless excused by the instructor. Students majoring in Political Science must take Political Science 210 by the end of their junior year.

300. **The Role of War in International Politics.** An examination of war as an institution and its relation to the policy-making process.

305. **The Politics of Nation Building in Tropical Africa.** An examination of the factors and problems involved in the search for national integration.

Omitted 1966–67

310. **Problems of Democratic Policy Formulation.** A study of the legislative processes as instruments of policy formulation in a democratic state.

Omitted 1966–67

315. **Positive Political Theory.** An examination of recent descriptive theories of political behavior including theories derived from the theory of games, economic models, and the theory of systems.

Omitted 1966–67

320. **Constitutional Issues.** A study in the growth of governmental power as determined by judicial interpretation of the Constitution. Emphasis will be placed upon the economic, social and political background of court cases as well as upon court decisions.

323. **The Politics of Administration.** A study of the functions of bureaucracies and administrative leadership in political systems in terms of recent theories of organizations, administrative behavior, and decision-making.

Omitted 1966–67

325. **Political Behavior.** An analysis of public opinion, voting behavior and other forms of political participation.

330. **Political Philosophy.** An examination of various approaches to the study of politics using classical and contemporary works of political theory.

Omitted 1966–67

350. **Government and Politics in Canada.** An analysis of the background, institutions, and power structure of the Canadian political system. Special attention will be focused on the role of parties, their organization and the social basis of their support. Comparative aspects will be stressed with reference to British and American experience.

Omitted 1966–67

RELIGION

300. **Belief and Unbelief.** An Honors seminar which will examine in some detail some issues in the thought of the Western religious tradition. The tension between belief and unbelief will be a dominant theme, and the readings will be both theological and literary. Not open to graduate students. Prerequisite: consent of instructor.

SOCIOLOGY

308. **Sociology of Culture.** Analysis of the roles of intellectuals, their products, and the institutions in which they work, including universities, journalism, and government.

311. **Contemporary Sociological Theories.** Rigorous and systematic examination of a few contemporary theories in sociology, with topics selected from small group research, the analysis of complex organizations, the study of social structure and models of mass behavior such as voting. Some of the specific theories which have developed in the study of crime and delinquency, mental illness, industrial behavior and social mobility are examined. With consent of instructor.

Omitted 1966–67

315. **Mass Society and Totalitarianism.** Totalitarianism and estrangement in the twentieth century as related to changes in industrial society; the confrontation of mass society theories with historical evidence, especially the German case. Reading knowledge of German helpful.

345. **Social Movements.** A theoretical and empirical examination of political movements, including Communism and Fascism, with goals of large memberships and major social change; relations between revolutions and mass movements; theories of revolution.

Omitted 1966–67

COURSES OF INSTRUCTION
in The College of Arts and Science

Aerospace Studies

Lester E. Oonk, MAJ. (USAF), M.B.A. (Indiana).....Professor of Aerospace Studies and *Chairman of the Department*

Kenneth D. Stahl, CAPT. (USAF), B.S. (University of Kentucky).....Assistant Professor of Aerospace Studies

Gust T. Tekely, T/SGT. (USAF).....Instructor in Aerospace Studies
Robert E. Harris, S/SGT. (USAF).....Instructor in Aerospace Studies
John D. Johanson, S/SGT. (USAF).....Instructor in Aerospace Studies

AEROSPACE STUDIES is a two-year Professional Officer Education Program available to students with two academic years remaining in either undergraduate or graduate status. The requirements for entering this program are discussed under the Air Force Professional Officer course on page 75.

The four 200 level courses listed below must be successfully completed to qualify for a commission as a second lieutenant in the United States Air Force upon graduation.

At the center of the Aerospace Studies curriculum is "Dialogue," the principle of instruction which imposes upon the student the responsibility of being chief agent for his quest for knowledge. Each student is helped to develop the ability to: define a problem, accumulate information, identify resources, conduct an inner-dialogue, formulate a plan, participate in inter-dialogue, make a decision, recommend action, and take responsibility for that action. This principle is applied to a variety of the standard teaching methods. Course enrollment will be controlled to provide for seminar-size sections of 12 to 17 students.

93. Flight Instruction. A student pilot ground school course of approximately 30 hours. The Sanderson Films, Inc. records and film strips are employed in this course, which includes: Pre-Flight Facts, Meteorology, Navigation, Radio Navigation, Flight Computer, and Federal Aviation Regulations. (A senior fall course) Open to a limited number of non-ROTC students.

201. Military History and Aerospace Power I. Throughout this and subsequent Aerospace Studies courses the cadet should develop the ability to speak and write with accuracy, clarity, and dignity of style. The course of study includes: (1) the nature of military conflict and the development of aerospace power into a prime security element, (2) the development of doctrine governing the employment of aerospace forces, (3) the military characteristics of aerospace power and the mission and organization of the United States Air Force, and (4) the modes of employment of aerospace forces in general war, limited war, and action short of war. (A fall course, three hours per week)

202. Military History and Aerospace Power II. A continuation of the development of the ability to speak and write with accuracy, clarity and dignity of style. The course of study includes: (1) the importance of the national space effort and how the space program evolved, (2) the known characteristics of the solar system that affect space exploration and operations, (3) the types of orbits and trajectories, including the principles and problems affecting their use, (4) the operating principles, characteristics, and problems associated with the components of space vehicle systems, and (5) the current and planned capabilities for space operations. (A spring course, three hours per week)

211–212. The Air Force Officer. A study of professionalism, leadership and management. The study includes theories of leadership, discipline, human relations, management and problem solving. These theories will be developed around Air Force subject matter and by use of sample problem-situations faced by the junior officer or the junior executive.

Anthropology

René Millon, PH.D. (Columbia) ..... Professor of Anthropology

Alfred Harris, PH.D. (Cambridge) ..... Associate Professor of Anthropology and *Chairman of the Department*

Robert S. Merrill, PH.D. (Chicago) ..... Associate Professor of Anthropology and *Associate Chairman of the Department*

Walter Hinchman Sangree, PH.D. (Chicago) ..... Associate Professor of Anthropology

Gerald Williams, PH.D. (Chicago) ..... Associate Professor of Anthropology

Edward E. Calnek, PH.D. (Chicago) ..... Assistant Professor of Anthropology

Christopher Day, M.A. (Chicago) ..... Assistant Professor of Anthropology

Arnold Green, B.A. (Antioch) ..... Assistant Professor of Anthropology

Allan Hoben, PH.D. (California at Berkeley) ..... Assistant Professor of Anthropology

Charles Morrison, M.A. (Chicago) ..... Assistant Professor of Anthropology

****Clara Millon,*** PH.D. (California at Berkeley) ..... Instructor in Anthropology

James Bennyhoff, PH.D. (California) ..... Research Associate in Anthropology

Bruce Drewitt, M.A. (Toronto) ..... Research Associate in Anthropology

*Part-time.

THE DEPARTMENT OF ANTHROPOLOGY offers work leading to a concentration for the A.B. degree.

A program of concentration for the A.B. degree will normally consist of six to eight courses taken in the Department of Anthropology beyond the introductory work.

A student, in addition, is expected to take additional courses to bring the total in his concentration to ten in the related fields of Biology, Economics, English, Fine Arts, Foreign Languages, History, Philosophy, Political Science, and Psychology.

The departmental counsellor should be consulted to determine in each student's case what courses in the department will be required for the fulfillment of the concentration requirement and to select the field outside of the department which will support and enhance his work in the department.

101. Introduction to Anthropology. The nature and development of culture; social and cultural patternings; social and cultural universals and diversities; the individual and society.

190. Preceptorial: The Images of Man. Discussion of some of the "exotic" peoples studied by European and American anthropologists; anthropological views of other societies compared with those of historians, biographers, travellers, missionaries, government officers, and writers of fiction.

201. The Development of Man, Culture and Society. Evolution of man and development of culture and society from earliest Pleistocene remains to beginnings of civilization in the Near East; development of human skill; religion and art in the Upper Paleolithic; agricultural revolution; development of cities and civilization in Southern Mesopotamia; spread of man into the New World.

202. Early Civilizations of the Old World and the New. Comparative study of Mesopotamian, Egyptian, Indus, Chinese, Middle American and Central Andean civilizations; theoretical approaches to such studies, with special emphasis on the value and limitations for the study of ancient civilizations of comparative evidence from existing societies.

209. Selected Studies in Ethnography. Examination of some of the basic descriptive studies in ethnography with particular attention to demonstrating the relation between field work and the development of method and theory in social anthropology.

210. Primitive Art. Consideration of art and the artist especially in the aboriginal societies of Oceania, Africa, and the Americas; comparison with European and Asiatic materials.

211. Systems of Kinship and Descent. The major elements of kinship and descent; critical examination of specific systems, and of different approaches to the study of them; the relations between kinship and descent and other aspects of social structure.

Omitted 1966–67

212. **Habitat, Economy and Society.** Major types of ecological adaptation; modes of subsistence, land-use, and land-tenure; ecology in relation to economic organization; ecological problems viewed as socially and culturally defined.

See Sociology 212. **Mathematical Models in Anthropology and Sociology.**

213. **Pre-Industrial Economic Systems.** An examination of exchange systems in selected non-European societies.

Omitted 1966–67

214. **Comparative Religious Systems.** Ritual practices and related beliefs of selected societies. Associated phenomena of magic, mythology and witchcraft. Examination of outstanding theoretical approaches.

Omitted 1966–67

215. **Comparative Political and Legal Systems.** An analysis of the mechanisms for sanctioning and arbitrating social behavior in selected non-European cultures.

241. **Indians of North America.** A survey of the cultures of the aboriginal peoples in America north of Mexico. Culture area concept and its applications; major types of social structure and their variations; historical problems.

Omitted 1966–67

242. **The Civilizations of Aboriginal Middle America.** Growth of aboriginal civilization in Middle America from the earliest time to the Spanish Conquest; Olmec, Zapotec, Maya, Teotihuacan, Toltec, Mixtec, Veracruz and Aztec civilizations; problem of relationship with the Old World; evaluations and comparisons; Indian Mexico since the Conquest.

244. **Indians of South America.** An introduction to the society and culture of peoples of aboriginal South America; growth of civilization in the Central Andes; Empire of the Inca; Spanish Conquest; contemporary Indian peoples.

Omitted 1966–67

246. **Peoples of Africa I.** Major culture areas of Negro Africa; detailed ethnographic studies; nature and diversity of indigenous social structure.

247. **Peoples of Africa II.** Selected problems in social anthropology and ethnography as they relate to the peoples of Africa or particular regions in Africa.

249. **Peoples of India.** Ethnology of South Asia with emphasis upon the relationship between tribal and village cultures and the high civilizations of the area.

261. **Cultural and Social Change.** Problems of cultural diffusion; analysis of types of culture contact and cultural interchange; the nativistic movement; the charismatic leader and the legitimization of authority.

Omitted 1966–67

263. **Society, Culture and Personality.** Relation of culture and social structures to the development of personality; analysis of national character; relation of sub-cultures and personality traits.

Omitted 1966–67

265. **The Study of Complex Societies.** Problems and theoretical approaches in the study of complex societies and civilizations; emphasis is on contemporary pre-industrial societies, and on selected ancient civilizations.

267. **Theories of Culture and Society I.** Thought, research and writings of major theorists and schools of anthropology until 1930.

Omitted 1966–67

268. **Theories of Culture and Society II.** Thought, research and writings of major theorists in anthropology from 1930 to the present.

Omitted 1966–67

269. **Dynamics of Culture and Society.** Problems in methodology and theory of selected aspects of society and culture.

Omitted 1966–67

271. **Language and Culture.** The roles of linguistics in anthropology. Language differences and cultural differences. Language in society; the reflection of social organization in the formal aspects of verbal behavior. Anthropology 101 or Linguistics 205 prerequisite.

Omitted 1966–67

293. **Problems in Anthropology.** The investigation, under guidance, of a special problem in selected areas of anthropology and sociology. By special permission of instructor only.

416. **Anthropological Linguistics I.** Training in linguistic analysis as applied to the description of the second systems of language, with particular emphasis on the uses of such analysis in anthropological fieldwork.

417. **Anthropological Linguistics II.** Training in linguistic analysis as applied to the description of grammatical systems, with special stress on anthropological fieldwork.

Astronomy

(See page 149)

Biology

Allan McCulloch Campbell, PH.D. (Illinois) ..... Professor of Biology
Ernst Wolfgang Caspari, PH.D. (Göttingen) ..... Professor of Biology
Johannes Friedrich Karl Holtfreter, PH.D. (Freiburg, Germany) ..... Tracy H. Harris Professor of Zoology
Arnold Warren Ravin, PH.D. (Columbia) ..... Professor of Biology
Wolf Vishniac, PH.D. (Stanford) ..... Professor of Biology and *Chairman of the Department*

Thomas T. Bannister, PH.D. (Illinois) ..... Associate Professor of Biology
Jerram L. Brown, PH.D. (California) ..... Associate Professor of Biology and Assistant Professor in the Center for Brain Research
George E. Hoch, PH.D. (Wisconsin) ..... Associate Professor of Biology
Jerome Sidney Kaye, PH.D. (Columbia) ..... Associate Professor of Biology
William Breuleux Muchmore, PH.D. (Washington) ..... Associate Professor of Biology
**Babette Brown Coleman*, PH.D. (Cornell) ..... Associate Professor of Botany and Research Associate in Botany
**James Charles Peskin*, PH.D. (Columbia) ..... Associate Professor of Biology and Optics

Conrad Alan Istock, PH.D. (Michigan) ..... Assistant Professor of Biology
Uzi Nur, PH.D. (California) ..... Assistant Professor of Biology

Jakov Krivshenko, D.SC. (Ukraine) ..... Senior Research Associate in Biology

Minna B. Rotheim, PH.D. (Rochester) ..... Research Associate and Assistant Professor of Biology

Paul Butler, PH.D. (Leeds) ..... Research Associate in Biology
Kuo-Chun Chen, PH.D. (Columbia) ..... Research Associate in Biology
Margaret Weiss, PH.D. (Southampton) ..... Research Associate in Biology
Charles R. Weston, PH.D. (Princeton) ..... Research Associate in Space Biology
**Alice del Campillo Campbell*, PH.D. (Michigan) ..... Research Associate in Biology
**Rachel McMaster Kaye*, PH.D. (Columbia) ..... Research Associate in Biology

Gary M. Kayajanian, PH.D. (Rochester) ..... Postdoctoral Trainee in Biology
Doris Zallen, PH.D. (Harvard) ..... Postdoctoral Trainee in Biology

John Pearman, M.A. (Cambridge) ..... Assistant Chairman and Technical Associate

*Part-time.

THE DEPARTMENT OF BIOLOGY offers work leading to the A.B., B.S., M.S., and Ph.D. degrees.

Biology 101 is prerequisite.

A.B. Program

The A.B. program, while preparing students adequately for graduate work in Biology, provides a somewhat broader opportunity for study in non-scientific fields than the B.S. program.

Students planning a concentration program towards the A.B. degree in Biology should take ten semester courses of advanced work in Biology and allied fields beyond Biology 101 and introductory courses in the allied fields. Of these advanced

courses, at least six but not more than eight should be in Biology. There are no specific course requirements (except for prerequisites as indicated in the course descriptions).

Students planning a concentration towards the A.B. degree in Biology should obtain a broad background in chemistry, physics and mathematics during their first two years. Freshmen should take two from among the introductory courses in Biology (1 term), Chemistry (2 terms) and Mathematics (2 terms). Chemistry should be elected if the student has not had chemistry in secondary school. If possible, the student should acquire a reading knowledge of a foreign language: French, German or Russian.

At least two and not more than four semester courses should be advanced courses in one or more of the allied fields: Chemistry, Geology, Mathematics, Physics, Psychology.

Seniors in Biology are required to take the Senior Seminar, Biology 285–286. This course takes the place of the comprehensive examination for the A.B. degree.

B.S. Program

Two programs lead to the B.S. degree in Biology. Plan A is intended for students whose interests tend toward the genetic, evolutionary and developmental aspects of Biology. Plan B serves the needs of students wishing to specialize in the functional and analytical aspects of biology, such as physiology, biophysics, and biochemistry. Plan B requires that the student develop a more extensive background in Physics and Mathematics than Plan A. Synopses for the course requirements for the B.S. degree under Plans A and B are given below.

Honors Program in Biology

Students who have demonstrated to the Department's satisfaction a high level of competence may, at the end of their sophomore year, elect Honors in Biology. A faculty member must be willing to guide the student in his Honors work during his junior and senior years. The Honors work will consist of the following:

a. Biology 291, Readings in Biology, will be taken in the first semester of the third year. Either Biology 291 or Biology 293, Problems in Biology, will be taken in the second semester of this year. The purpose of these courses is to prepare the student for some specific piece of research.

b. Biology 293 will be taken in each semester of the fourth year. Under this registration the student will carry out the research project for which he has prepared.

c. At the end of the fourth year the student will prepare a paper describing the results of his research and will defend it in an oral examination before an outside examiner.

d. Also at the end of the fourth year, the student will take a written examination, which will be read by the outside examiner.

PLAN A

FIRST YEAR

1. Biol. 101 General Biology I	1. Biol. 125 or Biol. 132
2. Chem. 123 General Inorganic	2. Chem. 124 General Inorganic
3. Math. 161 Analysis I	3. Math. 162 Analysis II
4. English Requirement	4. Foreign Language*
Physical Education	Physical Education

SECOND YEAR

1. Biol. 122, Biol. 131, or Biol. 241	1. Biol. 221 Genetics
2. Chem. 161 Organic Chemistry I	2. Chem. 162 Organic Chemistry IA
3. Math. 110 Elementary Statistics	3. Group II (or I)
4. Group I (or II)	4. Elective
Physical Education	Physical Education

*Most students can complete the foreign language requirement with one term of college work. Those who need more than one term must take the necessary courses as electives.

THIRD YEAR

1. Biol. 220 Cytology
2. Chem. 142 Quantitative Analysis
3. Phys. 101 General Physics
4. Group I (or II)

1. Biol. elective
2. Chem. 152 Chemical Principles
3. Phys. 102 General Physics
4. Group II (or I)

FOURTH YEAR

1. Biol. 265 Cell. Physiol. and Metabolism
2. Biol. 222 Evolution
3. Group I (or II)
4. Elective
   Biol. 285 Senior Seminar

1. Biol. elective
2. Group II (or I)
3. Elective
4. Elective
   Biol. 286 Senior Seminar

PLAN B

FIRST YEAR

1. Biol. 101 General Biol. I
2. Chem. 123 General Inorganic
3. Math. 161 Analysis I
4. English Requirement
   Physical Education

1. Biol. elective[1]
2. Chem. 124 General Inorganic
3. Math. 162 Analysis II
4. Foreign Language[2]
   Physical Education

SECOND YEAR

1. Biol. elective
2. Chem. 161 Organic Chemistry
3. Math. 163 Analysis III
4. Phys. 115 Physics I
   Physical Education

1. Group I
2. Chem. 162 Organic Chemistry
3. Math. 164 Analysis IV
4. Phys. 116 Physics I
   Physical Education

THIRD YEAR

1. Biol. 220 Cytology
2. Biol. elective
3. Phys. 125 Physics II
4. Group I

1. Biol. 221 Genetics
2. Chem. 142 Elem. Quant. Analysis
3. Phys. 126 Physics II
4. Group II

FOURTH YEAR

1. Biol. 265 Cellular Physiol. and Metabolism
2. Chem. or Phys. elective
3. Group II
4. Elective
   Biol. 285 Senior Seminar

1. Biol. 272 Comp. Microbiology
2. Chem. or Phys. elective
3. Group II
4. Elective
   Biol. 286 Senior Seminar

[1]Students are urged to consult with their advisers concerning the choice of electives.
[2]Most students can complete the foreign language requirement with one term of college work. Those who need more than one term must take the necessary courses as electives.

JOINT BIOLOGY-GEOLOGY B.S. PROGRAM

FIRST YEAR

1. Geol. 101 Geologic Processes*
2. Biol. 101 General Biology I
3. English Requirement
4. Math. 161 Analysis I
   Physical Education

1. Geol. 224 Intro. Mineralogy
2. Biol. 125 Comp. Chordate Anatomy
3. Foreign Language 103 or 105
4. Math. 162 Analysis II
   Physical Education

SECOND YEAR

1. Geol. 201 Evolution of the Earth
2. Biol. 122 Invertebrate Zoölogy
3. Chem. 121 or 123 Inorganic Chem.
4. Group I or II
   Physical Education

1. Geol. 221 Principles of Paleontology
2. Biol. 221 Genetics
3. Chem. 122 or 124 Inorganic Chem.
4. Group I or II
   Physical Education

*Geology 201 is open to students with at least one course in secondary school earth science with permission of instructor.

THIRD YEAR

1. Biol. 131 Plant Kingdom
2. Biol. 222 Evolution
3. Phys. 101 General Physics
4. Chem. 161 Organic Chemistry

1. Geol. 235 Stratigraphy
2. Math. 110 Elementary Statistics
3. Phys. 102 General Physics
4. Chem. 162 Organic Chemistry

FOURTH YEAR

1. Geol. 277 Paleoecology
2. Group I or II
3. Group I or II
4. Elective
   Senior Seminar

1. Biol. elective
2. Group I or II
3. Group I or II
4. Elective
   Senior Seminar

101. General Biology I. Principles unifying modern biological knowledge. Introduction to the structure and physiology of cells. Principles of development, genetics and evolution. The laboratory introduces the students to the methods of observation and experimentation from which our present concepts of Biology have been derived. The course serves as a prerequisite to all more advanced courses in Biology, and is intended to form the basis for knowledge of the present state of general Biology for students wishing to include Biology in their cultural and intellectual education. Prerequisite: At least one course in high school or college chemistry.

Three lectures and one three-hour lab a week.

102. General Biology II. A continuation of Biology 101, especially designed for students not intending to take advanced courses in Biology. Understanding of the problems facing Biology at the present time, particularly at the level of the organism. Interactions between organisms of the same and of different species and modern aspects of the theory of evolution are considered. Biology 101 prerequisite.

Three lectures and one three-hour lab a week.
Omitted 1966–67

122. Invertebrate Zoölogy. Anatomy, physiology, behavior, life histories and evolution of animals constituting the principal groups of invertebrates. Biology 101 prerequisite.

Three lectures and one three-hour lab a week.

125. Comparative Chordate Anatomy. Structural changes in the line of descent leading from primitive jawless fish to modern mammals. Background for the understanding of human anatomy. The structure of fossil vertebrates and the development and structure of modern chordates are dealt with by laboratory observation, dissection or lecture. Biology 101 prerequisite.

Three lectures and one three-hour lab a week.

131. The Plant Kingdom. General biology of plants. Survey of the plant kingdom. The structural, developmental, and ecological adaptations of plants are examined, and provide the basis for an understanding of the evolution of plants, of their distribution, and of their roles in the organic world. Biology 101 prerequisite.

Three lectures or conferences, one three-hour lab or field trip a week.

132. Biology of Flowering Plants. Introduction to plant anatomy, systematics, ecology and field work by study of the most advanced and dominant plants of the earth's vegetation. The evolutionary success of flowering plants is interpreted in terms of the advantages conferred by the vascular system and seed habit, two notable specializations which historically have linked plants to man. Biology 101 prerequisite.

Three lectures or conferences, one three-hour lab or field trip a week.

220. Cytology. Introduction to the study of cells. Topics include: the morphology and chemistry of chromosomes, mitochondria, the Golgi apparatus, centrioles, and the ergastoplasm. Prerequisites: Biology 101, Chemistry 121 and 122. Chemistry 161–162 is recommended.

Three lectures or demonstrations, one three-hour lab a week.

221. Genetics. Genes and cytoplasmic factors as the units of heredity; a general introduction to modern genetics including its molecular basis and its morphogenetic and evolutionary implications. Biology 101 prerequisite.

Three lectures and one lab a week.
Omitted 1966–67

222. Evolution. The evidence for organic evolution and the principles governing the evolution of plants and animals. Biology 101 and 221 prerequisite.

Three lectures a week, no lab.

241. General Embryology. Early stages of development, including maturation and fertilization, cleavage and the formation of the

primary germ layers. Development of tissues, organs and systems in vertebrates. Biology 101 and 125 prerequisite.

Three lectures and two three-hour labs a week.

242. **Experimental Embryology.** A practical and theoretical introduction to the experimental analysis of embryogenesis. Open, on approval of the instructor, to students who have satisfactorily completed Biology 241.

Two lectures or conferences, six hours lab a week.
Omitted 1966–67

260. **Animal Behavior.** Physiological, evolutionary, and developmental mechanisms in behavior. Animal communication; courtship; threat; navigation and migration; behavioral isolating mechanisms. Special attention is devoted to modern neurological approaches to the classical problems of ethology and to the interrelationships between studies under natural conditions and in the laboratory. Prerequisite: Senior status in Biology or Physiological Psychology.

Three lectures a week.

265.* **Cellular Physiology and Metabolism.** Processes common to all cells. Topics include: substances of which cells are composed, the metabolic processes by which the substances are formed, thermodynamic and kinetic characteristics of these processes, processes of diffusion, osmosis, and passive and active transport and origin of bioelectricity. Laboratory work includes quantitative experiments on respiration, mineral nutrition, water relations, permeability, reactions of isolated organelles, and other cellular phenomena. It is strongly recommended that students registering for the course have prior training in quantitative analysis, organic chemistry, general physics, and calculus.

Two lectures, one discussion period, and one four-hour lab a week.

270. **Plant Physiology.** Physiological phenomena peculiar to higher plants. Topics include: water relations, translocation, growth and differentiation, tissue culture, plant hormones, germination, flowering and fruit development. Students are required either to write a term paper on a selected problem or to perform some selected experiments under supervision in laboratory. Biology 265 prerequisite.

Omitted 1966–67

272.* **Comparative Microbiology.** Survey of microorganisms. Physiological patterns of certain algae, bacteria and protozoa, and the evolutionary trends in these patterns. Topics considered: growth curves and their interpretation, adaptation and mutation, the evolution of metabolic pathways, the limitation imposed by size, and the evolution of structure. Prerequisites: Biology 265 and Chemistry 161–162 (which may be taken concurrently).

Three lectures, four hours lab a week.

285–286. **Senior Seminar.** A required course for all senior students concentrating in Biology, in which several questions related to important problems in modern biology are considered. After a series of conferences and seminars with the staff, each senior is expected to write essays which will evaluate the significance of these problems and the methods by which the problems are being or may be explored.

No credit.
One hour per week.

291. **Readings in Biology.** A special program of reading in advanced topics may be arranged according to the needs and interests of individual students. Biology 101 prerequisite. *Registration upon approval of departmental adviser.*

293. **Problems in Biology.** Special problems may be arranged for advanced students wishing individual instruction in the methods of general biological, botanical, or zoölogical investigation. Biology 101 prerequisite. *Registration upon approval of departmental adviser.*

COURSES OFFERED IN THE EVENING SESSION, with approval for college credit in the case of undergraduates *other than* Biology concentrators and pre-medical students.

115. **Genetics and Human Heredity.** Principles of inheritance with emphasis on genetically determined human characteristics. Prerequisite: Biology 101 or the instructor's permission.

Two lectures a week.

COURSES OFFERED IN THE SCHOOL OF MEDICINE, with approval for college credit in the cases of undergraduates *other than* Biology concentrators and pre-medical students.

117. **Microbiology.** A course in which bacteria, fungi, and viruses are studied from the point of view of their biological characteristics and of their importance in public health, industry, and agriculture. Biology 101 and Chemistry 121 and 122 or 123 and 124 prerequisite.

Lectures, two three-hour labs a week.
Medical School.

*Although the lab sections of Biology 265 and Biology 272 are not identical, students taking both courses will take only one semester of lab work, either in spring or in fall.

Center for Brain Research

Leo Abood, PH.D. (Chicago).....Professor in the Center for Brain Research
Robert Doty, PH.D. (Chicago).....Professor in the Center for Brain Research
Karl Lowy, M.D. (Vienna).....Professor in the Center for Brain Research
Ray S. Snider, PH.D. (Washington University).....Professor in the Center for Brain Research and *Director of the Center*

Jerram L. Brown, PH.D. (California).....Associate Professor of Biology and Assistant Professor in the Center for Brain Research

Kengo Kurahasi, M.D. (Okayama).....Research Associate in the Center for Brain Research
Eiji Orikabe, M.D. (Tokyo).....Research Associate in the Center for Brain Research
Manuel Perez del Cerro, M.D. (Buenos Aires).....Research Associate in the Center for Brain Research
Ryo Tanaka, PH.D. (Tokyo).....Research Associate in the Center for Brain Research

John F. Bartlett, PH.D. (McMaster).....Postdoctoral Fellow in the Center for Brain Research
John Fentress, PH.D. (Cambridge).....Postdoctoral Fellow in the Center for Brain Research
Raymond P. Kesner, PH.D. (Cambridge).....Postdoctoral Fellow in the Center for Brain Research
Andrew A. Monjan, PH.D. (Rochester).....Postdoctoral Fellow in the Center for Brain Research

THE CENTER FOR BRAIN RESEARCH, jointly sponsored by the College of Arts and Science, the College of Engineering and Applied Science and the School of Medicine and Dentistry, is concerned with education at the Ph.D. level and with research in problems of the nervous system. Undergraduates with special permission may take special research or reading courses offered by the Center.

Chemistry

Frank Paul Buff, PH.D. (California Institute of Technology).....Professor of Chemistry
Albert Benjamin Ford Duncan, PH.D. (Johns Hopkins).....Professor of Chemistry
Marshall DeMott Gates, Jr., PH.D. (Harvard).....Professor of Chemistry
William Hundley Saunders, Jr., PH.D. (Northwestern).....Professor of Chemistry
Dean Stanley Tarbell, PH.D. (Harvard).....Charles Frederick Houghton Professor of Chemistry and *Chairman of the Department*
Winston Danae Walters, PH.D. (Johns Hopkins).....Professor of Chemistry

Marshall Blann, PH.D. (California).....Associate Professor of Chemistry
Henry M. Sobell, M.D. (Virginia).....Associate Professor of Chemistry
David Wilson, PH.D. (California Institute of Technology).....Associate Professor of Chemistry

Lawrence David Colebrook, PH.D. (Auckland).....Assistant Professor of Chemistry
Jack Kampmeier, PH.D. (Illinois).....Assistant Professor of Chemistry
Robert W. Kreilick, PH.D. (Washington University, St. Louis)..Assistant Professor of Chemistry
George C. Nieman, PH.D. (California Institute of Technology)....Assistant Professor of Chemistry
Francis R. Nordmeyer, M.A. (Wesleyan).....Assistant Professor of Chemistry
Mark M. Rochkind, PH.D. (California).....Assistant Professor of Chemistry
Richard H. Schlessinger, PH.D. (Ohio State).....Assistant Professor of Chemistry

Anthony Cockerill, B.SC. (Liverpool).....Postdoctoral Fellow in Chemistry
Akshayalingam Ekambaram, PH.D. (Annamalai University)....Postdoctoral Fellow in Chemistry

William E. Harvey, PH.D. (Cambridge, England).....Postdoctoral Fellow in Chemistry
Nazir Khawaja, PH.D. (McGill).....Postdoctoral Fellow in Chemistry
Lorraine L. Labana, PH.D. (Cornell).....Postdoctoral Fellow in Chemistry
Victor Powell, M.SC. (Queensland).....Postdoctoral Fellow in Chemistry
Robert A. Slater, PH.D. (Liverpool, England).....Postdoctoral Fellow in Chemistry
Yu-Wen Yu, PH.D. (Illinois Institute of Technology).....Postdoctoral Fellow in Chemistry

Ethel Louetta French, PH.D. (Rochester).....Professor Emeritus of Chemistry
Ralph William Helmkamp, PH.D. (Harvard).....Professor Emeritus of Chemistry
Willard Riggs Line, PH.D. (Columbia).....Professor Emeritus of Chemistry
W. Albert Noyes, Jr., D-ES-SC (D'ETAT), SC.D. (Paris).....Distinguished Senior Professor Emeritus of Chemistry
Edwin Odde Wiig, PH.D. (Wisconsin).....Professor Emeritus of Chemistry

THE DEPARTMENT OF CHEMISTRY offers work leading to a concentration in Chemistry for the A.B. or the B.S. degree and to the M.S. and Ph.D. degrees. Training at the post-doctoral level is also offered.

Two introductory courses are offered. Chemistry 123 and 124 are designed specifically for majors in Chemistry (both A.B. and B.S.), Chemical Engineering, Physics, and Biology. Students planning to take Chemistry 123 and 124 should present secondary school Chemistry for admission. A few other students may be admitted to this course provided their records warrant it. Chemistry 121 and 122, which do not have secondary school Chemistry as a prerequisite, are taken by concentrators and majors other than those mentioned above, either for the purpose of satisfying professional requirements or of meeting the science distribution requirement. Students who wish to major in Chemistry after taking Chemistry 121 and 122 may do so upon obtaining departmental approval.

The undergraduate program in Chemistry allows opportunity for independent study, both for A.B. and B.S. candidates. Both Chemistry 415 and 435 are taught on an individual basis, with the students working on unknowns directly under the instructors in the course. All Chemistry majors take the Senior Seminar, which involves preparation and presentation of a topic from the original literature under the direction of one or more staff members. All of the B.S. candidates, and those A.B. candidates who wish to, take a senior research problem with a member of the staff, in which they carry out original work, with the opportunity of publishing this in a scientific journal if it is successful. In recent years a number of seniors have had publications from their research. Furthermore, some of the undergraduate majors are able to work during the summer on research problems with members of the staff, either as hired research assistants or as participants in the National Science Foundation Undergraduate Research Program.

A.B. Program

The minimum requirements for students concentrating in Chemistry for the A.B. degree are:

A. Chemistry 121 and 122 or 123 and 124

B. Chemistry 141, 143 and 214 or Chemistry 213, 214

C. Chemistry 161–162

D. Chemistry 251 and 252

E. Chemistry 285–286

Chemistry 251 and 252 require as prerequisites one year of Physics, and Mathematics through differential and integral calculus with some differential equations. (This requirement is met by completion of Mathematics 164.) At least one year of Chemistry in addition to the senior seminar must be taken in the senior year. If the student wishes to meet the requirements for membership in the American Chemical Society upon graduation, he should take, in addition to the minimum requirements, an advanced lecture course, an advanced laboratory course, and German.

Additional courses in Physics and Mathematics and courses in other sciences, such as Biology, Geology, etc. may be taken as part of the concentration program. Students are urged to elect German to satisfy the foreign language requirement.

The Senior Seminar, Chemistry 285–286, is the prescribed substitute for the comprehensive examination.

B.S. Program

This program is designed to give the student the minimum training deemed essential to qualify as a professional chemist or to give him a thorough preparation for graduate work in Chemistry; students wishing to do graduate work in Biochemistry may major in Chemistry with electives in Biology. A reading knowledge of technical German is required (German 105 or 103). It is advantageous to present two years of preparatory school German for admission since this allows the student two additional electives. The synopsis of this curriculum follows:

FIRST YEAR

1. Chem. 123 General Inorganic Chem.	1. Chem. 124 General Inorganic Chem. and Qual. Anal.
2. English Requirement	2. Group I
3. Math. 161 Analysis I	3. Math. 162 Analysis II
4. Phys. 115 Physics I	4. Phys. 116 Physics I
or	
Phys. 117 Physics IA	Phys. 118 Physics IA
Physical Education	Physical Education

SECOND YEAR

1. Chem. 163 Organic Chemistry	1. Chem. 164 Organic Chemistry
2. Foreign Language (Group I)*	2. Germ. 105 Special Technical Readings** or Germ. 103 Intermediate German**
3. Math. 163 Analysis III	3. Math. 164 Analysis IV
4. Phys. 125 Physics II	4. Phys. 126 Physics II
or	
Phys. 127 Physics IIA	Phys. 128 Physics IIA
Physical Education	Physical Education

THIRD YEAR

1. Chem. 213 Quantitative Analysis I	1. Chem. 214 Quantitative Analysis II
2. Chem. 251 Physical Chemistry I	2. Chem. 252 Physical Chemistry II
3. Group I	3. Elective
4. Group II	4. Group II

FOURTH YEAR[1]

1. Chem. (431, 451)[2,3]	1. Chem. 295 Thesis Research[2]
2. Chem. 415 or 435	2. Chem. 296 Thesis Research
3. Group II	3. Chem. (412, 452)[2,3]
4. Elective[4]	4. Elective[4]
5. Elective	5. Elective
Chem. 285 Senior Seminar	Chem. 286 Senior Seminar

*Most students can complete their requirement in foreign languages with one term of college work. Those who need more than one term must take the necessary courses as electives.

**Prerequisite: German 101 and 102 or equivalent.

[1]The choice of courses required in the senior year will be determined by the department counsellor. A student who is not taking Chemistry 435 may register for Chemistry 295 during the first semester if approval is obtained from the thesis adviser or department counsellor before the end of the junior year.

[2]Courses in Biology, Mathematics or Physics approved by the Department of Chemistry may be substituted.

[3]Two of these courses must be elected.

[4]Students who intend doing graduate work in Physical Chemistry should make every effort to include additional work in mathematics and physics. For students planning to do graduate work in Organic Chemistry, Biochemistry 401 is recommended.

121. **General Chemistry I.** Fundamental principles of chemical science and the chemistry of several important metals and nonmetals and their compounds. This course, less advanced than Chemistry 123, is primarily intended for premedical students and others who may plan to follow with Chemistry 141, 142 and for mechanical and electrical engineers and others not planning to continue work in Chemistry. Upon recommendation of the department, students may be transferred to Chemistry 123 during or at the end of the first term.

Two lectures, two recitations, one lab a week.

122. **General Chemistry II.** A continuation of the concepts introduced in Chemistry 121 with more emphasis placed on the descriptive chemistry of the various elements of the periodic table. Organic chemistry is discussed briefly. An abbreviated scheme of semi-micro qualitative analysis is carried out in the laboratory. Emphasis is placed on structure of the atom and related topics. Prerequisite: Chemistry 121.

Two lectures, two recitations, one lab a week.

123. **General Inorganic Chemistry.** A more advanced course than Chemistry 121, designed primarily for students majoring in Chemistry, Chemical Engineering and Physics. General principles underlying chemistry and some of the important non-metals and their compounds. Upon recommendation of the department, students may be transferred to Chemistry 121 during the semester. Entrance Chemistry prerequisite.

Two lectures, two recitations and two labs a week.

124. **General Inorganic Chemistry and Qualitative Analysis.** A continuation of Chemistry 123. The chemistry of the metals and their compounds, atomic structure, natural and artificial radioactivity and the principles underlying qualitative analysis. The laboratory work is devoted entirely to semi-micro qualitative analysis. Upon recommendation of the department, students may be transferred to Chemistry 122 during the semester. Chemistry 123 or its equivalent prerequisite.

Two lectures, two recitations and two labs a week.

143. **Elementary Quantitative Analysis.** A course designed for students preparing for medicine and dentistry and for those who may wish to take a one-term elementary course in the subject. Biology, geology, or general science majors may wish to take this course. The principles, stoichiometry and techniques of quantitative analysis are developed and applied. Chemistry 121 and 122 or 123 and 124 prerequisite.

Two hours, two labs a week.

152. **Chemical Principles.** Introduction to thermodynamics, equilibria, elementary chemical kinetics, electrochemistry, colloid and surface chemistry, molecular structure. Prerequisites: one year of calculus and Chemistry 143. May not be taken for credit by Chemistry majors.

Omitted 1966–67

154. **Selected Topics in Physical Chemistry.** Limited to sophomore Mechanical Engineering students. Basic thermodynamics, with application. Kinetic theory of gases. Application to kinetics of homogeneous gas reactions.

Omitted 1966–67

161. **Organic Chemistry I.** A study of the more important classes of carbon compounds and the fundamental theories of organic chemistry. Chemistry 121 and 122 or 123 and 124 prerequisite.

Three hours, two labs a week.

162. **Organic Chemistry IA.** Continuation of Chemistry 161.

163–164. **Organic Chemistry II.** An introduction to the structural theory of organic chemistry and the important types of organic reactions with special emphasis on reaction mechanisms and the dependence of reactivity on structure. Laboratory work will include modern techniques, representative syntheses, and an extended introduction to qualitative organic analysis. Required for the B.S. in chemistry, recommended for the A.B. in chemistry. Prerequisite: Chemistry 121 and 122, or 123 and 124.

Three lectures, two labs a week.

213. **Quantitative Analysis I.** Designed primarily for chemists and chemical engineers. The theories, fundamental principles and stoichiometry of quantitative analysis, and the techniques of quantitative methods are developed and applied. More rigorous and exacting than Chemistry 142. Chemistry 123, 124, and 161–162 prerequisite. May not be taken for graduate credit.

Two lectures and two labs a week.

214. **Quantitative Analysis II.** Continuation of Quantitative Analysis I. A more comprehensive study of the principles of the science. Some of the laboratory work involves the quantitative separation and determination of constituents in materials of industrial importance. Electrochemical, colorimetric, and other photometric methods. May not be taken for graduate credit. Chemistry 213 or consent of instructor prerequisite.

Two lectures and two labs a week.

251. Physical Chemistry I. The first semester's work consists of an introduction to thermodynamics and its interpretation from the molecular standpoint. The ability to apply these concepts is developed both by a large variety of problems, which the student is required to solve, and by laboratory work. Prerequisites: Physics 101–102 or 125–126 or 127–128; Mathematics 163, 164.

Three lectures, one lab a week.

252. Physical Chemistry II. The second course continues the application of thermodynamics to heterogeneous and homogeneous chemical equilibria and concludes with a treatment of chemical kinetics. Prerequisite: Chemistry 251.

Three lectures, one lab a week.

285–286. Senior Seminar. Required of all senior students majoring in chemistry. Papers requiring journal or other library research are prepared under supervision of the staff members and presented orally before the seminar group. Satisfactory participation is the approved substitute for a comprehensive examination in chemistry.

No credit.
One hour a week.

***291–292. Senior Reading Course in Chemistry.** Students majoring in chemistry who are unable to register for other regularly scheduled, advanced courses may, with special permission of the department, register for this course.

Three hours a week.

295. Senior Thesis Research I. Each student selects a thesis topic, the investigation of which will teach him how to attack a problem involving laboratory and library work. This project affords an opportunity for independent reading and research. A written thesis presenting the results and analyzing their significance in a critical manner is required. Chemistry 415 or 435 prerequisite.

296. Senior Thesis Research II. Continuation of 295.

401. General Biochemistry. Will be given at the River Campus by members of the Biochemistry Department of the Medical School provided at least ten students register for credit. Designed primarily for graduate students and senior year undergraduate students in Chemistry who have had Organic Chemistry 161, 162 and Physical Chemistry 251, 252 or their equivalents, but other students may attend by special permission. Topics include: the reaction sequences and cycles involved in the metabolism of carbohydrate, fat, nucleic acids, and amino acids, biosynthetic pathways, enzymatic mechanism, biological oxidation, and energy considerations. Less emphasis is placed on biological and physiological aspects and on areas of the chemistry of natural products offered in other courses.

Credit—two hours.
Two hours a week.

***412. Advanced Inorganic Chemistry.** An advanced course in systematic inorganic chemistry taken up from the standpoint of the periodic law and supplemented by the study of special topics illustrative of recent advances in the subject.

Credit—three hours.
Three hours a week.

***415. Advanced Analytical Laboratory.** Recently developed analytical procedures, colorimetry, spectrophotometry, spectroscopy, electrical methods, and other physico-chemical methods of analysis. The lectures, credit one hour, may be taken by graduate students who are not registered for the laboratory.

Credit—two hours.
Two hours a week.

***431. Advanced Organic Chemistry.** An advanced study of the reactions of carbon compounds and the theories of organic chemistry.

Credit—three hours.
Three hours a week.

***435. Advanced Organic Laboratory.** The identification of organic compounds, organic semi-micro quantitative determinations, and advanced preparations. Open to students who have had or are taking Chemistry 431.

Four hours a week.

***451. Advanced Physical Chemistry I.** Thermodynamics and its application to chemical systems.

Credit—two hours.
Two hours a week.

***452. Advanced Physical Chemistry II.** Emphasis is placed primarily on those parts of Physical Chemistry which usually receive inadequate emphasis in a first course in the subject: (1) introduction to quantum problems, such as the laws of radiation, photoelectric effect, energy levels of atoms and simple molecules, heat capacities, ionization and resonance potentials; (2) nuclear phenomena; (3) reaction kinetics including photochemistry, radiation effects, and heterogeneous reactions.

Credit—two hours.
Two hours a week.

For Industrial Chemistry and other courses in Chemical Engineering see pages 195–198.

*Taken with the consent of the instructor.

East Asian Studies Program

COMMITTEE ON EAST ASIAN STUDIES

Ralph C. Croizier, PH.D. (Berkeley).....Assistant Professor of History

Diran Dohanian, A.M. (Harvard).....Associate Professor of Fine Arts

Robert B. Hall, Jr., PH.D. (Michigan).....Professor of Geography and *Chairman of the Committee*

Harry Harootunian, PH.D. (Michigan).....Associate Professor of History

THE EAST ASIAN STUDIES PROGRAM is offered and administered by an inter-departmental committee and is designed to permit students concentrating in the social sciences and humanities to develop knowledge of East Asian problems and languages as a complement to their disciplinary concentration. A student selecting this program will, in addition to fulfilling the requirements of his department, arrange the following special program which will be drawn from his electives.

1. Basic course in East Asian history and civilization.
2. Two years of either Chinese or Japanese language.
3. Three courses from the offerings listed below.
4. Inter-disciplinary seminar for seniors participating in the program.

Upon graduation the student will receive a certificate in East Asian Studies as well as an A.B. in his department of concentration.

Students planning to take work in the East Asian Studies program should consult with Mr. Harootunian or Mr. Croizier.

101. Great Literature of East Asia. An introduction to the humanistic traditions of East Asia through reading, discussion, and analysis of selections from the great poetry, prose, fiction, and dramatic literatures of China and Japan; the functions of literature within East Asian cultural traditions.

102. Introduction to East Asian Civilizations. An introductory study of East Asian civilizations in terms of the physical and geographical features of the area, the evolution of man and culture, social and political configurations, the impact of the West, and problems of industrialization, urbanization, and rationalization.

Departmental offerings acceptable in the program are: Anthropology 293; Fine Arts 103, 222; Foreign and Comparative Literature–Chinese 251, 284, 285, Japanese 285; Geography 260; History 261, 262, 263; Languages and Linguistics—Chinese 201, 202, 203, 205, Japanese 201, 202, 203. (See departmental headings for course descriptions.)

Economics

William Edward Dunkman, PH.D. (Columbia).....Professor of Economics

Robert R. France, PH.D. (Princeton).....Professor of Economics

Ronald Winthrop Jones, PH.D. (Massachusetts Institute of Technology)...Professor of Economics

Norman Kaplan, M.A. (Chicago).....Xerox Professor of International Economics

Lionel Wilfred McKenzie, PH.D. (Princeton).....John Munro Professor of Economics and *Chairman of the Department*

Hugh Rose, M.A. (Oxford).....Professor of Economics

Sho-Chieh Tsiang, PH.D. (London).....Professor of Economics

W. Allen Wallis, A.B. (Minnesota).....Professor of Economics and Statistics

Emmanuel Drandakas, PH.D. (Rochester).....Associate Professor of Economics

Stanley Engerman, PH.D. (Johns Hopkins).....Associate Professor of Economics
Rudolph Penner, PH.D. (Johns Hopkins).....Associate Professor of Economics
Richard N. Rosett, PH.D. (Yale).....Associate Professor of Economics
Edward Zabel, PH.D. (Princeton).....Associate Professor of Economics

Harry Grubert, B.A. (Manitoba).....Assistant Professor of Economics
Sherwin H. Rosen, PH.D. (Chicago).....Assistant Professor of Economics

Roth Clausing, PH.D. (Columbia).....Professor Emeritus of Economics

THE DEPARTMENT OF ECONOMICS offers a program of study for Bachelor of Arts candidates and, at the graduate level, for the Master of Arts and Doctor of Philosophy degrees.

Economics 101 and Economics 207 are prerequisites for all other courses in economics except with special permission of the Department. Students who plan to concentrate in economics will normally be expected to have completed Economics 101 with a grade of C or better. This will not, however, assure admission to the concentration program unless the Department is confident that the student shows promise of successful academic work in this field of study. Students majoring in economics are required to present two courses of mathematics, Mathematics 110 and either Mathematics 100 or 161; these will normally be taken during the first two years.

Departmental requirements for concentration include Economics 207, 209, 231, and 285. Eight of the ten courses specified by the College of Arts and Science for a concentration program must be courses in economics.

The remaining two courses may be taken in the following related fields: Anthropology, Business Administration, Geography, History, Mathematics, Philosophy, Political Science, Psychology, and Sociology.

Economics majors in the Honors Program are required to take the following regular courses in lieu of one Honors seminar: Economics 207, 209, and 231.

101. Principles of Economics. Survey course of economic principles and problems. Economics 101 is prerequisite for all advanced courses in economics.

207. Intermediate Economic Theory. An analysis of economic equilibrium under conditions of free competition and various degrees of monopoly control. Attention also is given to the theory of distribution of wages, rent, interest, and profits.

209. National Income Analysis. National income accounting concepts are discussed as measures of social welfare, and as quantities whose changes and fluctuations can be explained by theories of income determination and business cycles.

211. Money, Credit, and Banking. Introduction to the study of money and credit. Major emphasis is placed on those institutions in which the money supply is generated and on the influence of monetary and fiscal policy on economic stability and growth. Descriptions, statistics and historical experiences are taken mainly from internal problems of the United States.

213. Monetary and Central Banking Policy. An intensive study of Federal Reserve policies against the background of monetary theory. Inter-relations of fiscal and monetary policies are analyzed theoretically and empirically. International as well as national effects of monetary policy are considered. Major emphasis is placed upon post-World War II problems.

223. Labor Problems. Analysis of wages and other conditions of employment in an industrial society. Emphasis is placed on the impact of unions on workers, management and the public. Consideration is given to economic factors and other issues involved, including labor legislation.

227. Strategic Factors in American Economic Growth. Analysis of the main features of American economic growth since 1800. Recent statistical studies of national product, industrial structure and capital formation are evaluated.

231. Economic Statistics. Regression analysis applied to time series and cross-section data to estimate economic relationships; also elementary exposition of the estimation of simultaneous equations and analysis of variance. Prerequisite: Mathematics 110.

249. Comparative Economic Systems. Primary emphasis on the Soviet economy as a system of economic organization to be compared

with a market economy. Some attention to difference between the Soviet economy and other East European economies. An appraisal of the performance of the Soviet economy in terms of efficiency and growth.

253. **The Canadian Economy.** Development and structure of the expanding Canadian economy in terms of population growth, gross product and other basic characteristics. Critically important economic relations between the United States and Canada receive special attention.

263. **Public Finance and Fiscal Policy.** Economic criteria for judging government policies which alter the allocation of resources and the distribution of income. Government policies to stabilize prices, reduce unemployment, and foster economic growth. Special reference to United States' policies and problems.

269. **International Economics.** Trade patterns according to comparative advantage. The use of commercial policy in altering the gains from trade and distribution of income. Balance of payments, problems of adjustment. The role of the United States in the world-trading community.

Omitted 1966–67

279. **General Equilibrium Analysis.** Exposition of traditional general equilibrium analysis with an introduction to welfare economics, input-output analysis, and activity analysis. Prerequisites: Economics 207, Mathematics 161, 162 (or equivalent mathematics courses as determined by the instructor).

285. **Senior Seminar.** Required of all seniors concentrating in economics, with the exception of Honors majors. Students write short essays on particular problems in economics which serve as a basis for discussion in seminar meetings.

291. **Junior Reading Course.** By arrangement with the department to permit work beyond regular course offerings.

292. **Senior Reading Course.** By arrangement with the department to permit work beyond regular course offerings.

471–472. **Modern Value Theory.** A treatment of leading topics in value theory since 1870 with special attention to the writings of major economists, such as Marshall, Walras, Chamberlin, and Hicks. The approach is analytical, and subjects are developed to their present state in economic theory.

481. **Introduction to Mathematical Economics.** Introduction to the use of modern algebra in economic theory and applied economics. Particular attention is given to linear programming and input-output analysis. Prerequisites: Mathematics 161, 162, Economics 207, 209.

485. **Introduction to Econometrics.** Application of statistics to economics. Design and estimates of economic models. Estimation of simultaneous equation systems. Prerequisites: Mathematics 100, Economics 231, 207, 209.

English

George H. Ford, PH.D. (Yale) ..... Professor of English and *Chairman of the Department*
Joseph Frank, PH.D. (Harvard) ..... Professor of English
William H. Gilman, PH.D. (Yale) ..... Roswell S. Burrows Professor of English
McCrea Hazlett, PH.D. (Chicago) ..... Professor of English and Provost of the University
Robert Benedict Hinman, PH.D. (Johns Hopkins) ..... Professor of English
Cyrus Hoy, PH.D. (Virginia) ..... Professor of English
James William Johnson, PH.D. (Vanderbilt) ..... Professor of English
Ralph James Kaufmann, PH.D. (Princeton) ..... Professor of History and English
Kathrine Koller, PH.D. (Johns Hopkins) ..... Joseph H. Gilmore Professor of English
Bernard Nicholas Schilling, PH.D. (Yale) .. Trevor Professor of English and Comparative Literature

James Broderick, PH.D. (Harvard) ..... Associate Professor of English
Richard M. Gollin, PH.D. (Minnesota) ..... Associate Professor of English
Sherman Hawkins, PH.D. (Princeton) ..... Associate Professor of English
Howard C. Horsford, PH.D. (Princeton) ..... Associate Professor of English
Lawrence W. Kuhl, PH.D. (Western Reserve) ..... Associate Professor of English and Associate Dean of the College of Arts and Science
William Howe Rueckert, PH.D. (Michigan) ..... Associate Professor of English

Kenneth Cameron, M.F.A. (Carnegie Tech) ..... Assistant Professor of English and Adviser for Student Play Productions
Charles Daves, PH.D. (Minnesota) ..... Assistant Professor of English
Harvey D. Goldstein, PH.D. (Northwestern) ..... Assistant Professor of English
Rita K. Gollin, PH.D. (Minnesota) ..... Assistant Professor of English
Husain Haddawy, PH.D. (Cornell) ..... Assistant Professor of English
Bruce Johnson, PH.D. (Northwestern) ..... Assistant Professor of English
Stanley J. Kahrl, PH.D. (Harvard) ..... Assistant Professor of English
Marcia D. Landy, PH.D. (Rochester) ..... Assistant Professor of English
Paul Levine, M.A. (Harvard) ..... Assistant Professor of English
John R. Nabholtz, PH.D. (Chicago) ..... Assistant Professor of English and Assistant Chairman of the Department
Robert Parker, PH.D. (Columbia) ..... Assistant Professor of English
Russell A. Peck, PH.D. (Indiana) ..... Assistant Professor of English
Jarold W. Ramsey, M.A. (Washington) ..... Assistant Professor of English
Lisa Rauschenbusch, A.M. (Cornell) ..... Assistant Professor of English and Adviser for Student Play Productions

Beth A. Casey, M.A. (Columbia) ..... Instructor in English
Robert J. Ziegler, M.A. (Rochester) ..... Instructor in English

George Chester Curtiss, A.M. (Harvard) .. Professor Emeritus of Rhetoric and English Literature
Wilbur Dwight Dunkel, PH.D. (Chicago) ..... Professor Emeritus of English

THE DEPARTMENT OF ENGLISH offers work leading to a concentration for the A.B. degree, for the A.B. degree in the Honors Program, and, at the graduate level, for the A.M. and Ph.D. degrees.

The Colleges of the River Campus require a course in English at the 100 level (excluding courses numbered 120–129); see statement of *Common Requirements* (page 82 in the present Bulletin). Students wishing to take any English course numbered 200 or higher are required to have taken at least one of the following courses in addition to the course required by the College: 102, 103, 111, 130, 131, 132, 133, 141, 144, 195. For concentrators in English the additional requirements are listed below. Courses numbered between 120 and 129 may be taken as electives, but do not ordinarily count towards satisfaction of either general College distribution or departmental concentration requirements.

Courses numbered from 200–249 are customarily open to juniors and seniors and to qualified freshmen and sophomores. Courses numbered from 250–299 are customarily open to seniors and to qualified juniors; approval of the instructor may be required for enrollment.

Students planning to concentrate in English should plan their underclass program to include three* courses at the 100 level, as follows: English 102 (Continental Masterpieces), English 144 (Shakespeare), and at least one of English 130, 131, 132, 133, 141 and 195. The Department strongly recommends that these courses be completed before the end of the sophomore year.

A program of concentration should include at least six courses at the 200 level in English and American literature and the balance (to make a total of ten advanced courses as required by the College**) in acceptable allied fields.

These advanced courses are to include English 206 (Chaucer and Medieval Poetry) or English 213 (Milton and Later Renaissance), and at least two others from the literature of two of the three periods, sixteenth and seventeenth centuries, eighteenth, or nineteenth centuries, among the following courses: English 210, 211; 214, 215, or 216; 217, 218, or 219.

At least two of these specific requirements are to be met by the end of the junior year, including either or both 206 and 213. At least two of these specific requirements are to be met by the end of the junior year.

At least one of the courses required for the major is to be in American literature, taken at either the 100 or 200 level. Ordinarily, students will not take more than one of the group English 221, 223, and 224.

Concentrators working for a secondary school teaching certificate may substitute not more than one of English 115, 123, or 124 for one of the 200 courses in English not listed as a requirement.

On the basis of this historical foundation, the concentrator will wish in the remainder of his choices to pursue particular interests—for example, in the drama or in the novel. The minimum two courses in allied fields should be selected, in consultation with the student's adviser, from among specified courses in History, Philosophy, Fine Arts, Foreign and Comparative Literature, Anthropology, Languages and Linguistics, and certain others. Especially recommended is History 221, 222 (The History of England and Greater Britain) preferably to be completed before the junior year.

Students majoring in the Honors Program are required to fulfill similar requirements, except that they may do so by taking a combination of courses and seminars; see page 84.

Outstanding senior English majors who are not in the Honors Program may be invited to register for a tutorial, English 293, in which they will prepare an essay to be considered, along with other evidence, for the Degree with Distinction. Designed to give such qualified seniors an exceptional opportunity for independent study, English 293 also counts as one of the six 200-level English courses required for the major.

Students transferring into the College from elsewhere and who wish to be admitted for a concentration in English will need to make individual arrangements with the Department regarding the satisfaction of underclass requirements.

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*Two courses if the Shakespeare requirement is met by taking English 212 instead of English 144.

**See p. 82.

102. Continental Masterpieces. A course which aims to develop the understanding and enjoyment of literature through the reading of great works, especially for their expression of enduring problems of mankind. Books are selected from the classics of ancient and medieval periods. Open to all students. Required of English concentrators.

103. English and American Masterpieces. Books are by English and American writers and are selected from the Renaissance and modern periods. Open to all students except juniors and seniors who are concentrating in English.

111. Exposition and the Analysis of Ideas in Literature. An introduction to problems in writing expository and argumentative prose through critical analysis and evaluation of selected literary works. Readings from such authors as Orwell, Baldwin,

Sophocles, Joyce, Shakespeare, Conrad, and Hemingway. Instruction will include close supervision of written assignments through the use of small discussion groups. This course is usually offered in the first semester only.

115. **Advanced Expository Writing.** Principles and practice of expository and narrative writing; frequent papers and exercises, with class discussion of student work. Generally open to sophomores, juniors and seniors with grades of B or better in English. Sophomores by special arrangement with the instructor. For admission to this course, written permission of the instructor is needed.

116. **Creative Writing.** Short story, poetry, and playwriting workshop. A weekly three-hour meeting for criticism and discussion. Frequent conferences. The student is encouraged to improve by constant comparison of his work with the best achievements in fiction or poetry. May be repeated for credit with the consent of the instructor. For admission to this course written permission of the instructor is needed. English 116 ordinarily cannot be substituted for English 115 in order to satisfy requirements for teaching English in secondary schools.

123. **Speech.** A basic course designed to clarify the principles underlying sound and effective speaking of all sorts. Practice and training in group discussion, individual expository, argumentative, and other speeches, and reading aloud. Sections limited to 15 students.

124. **Oral Communication of Literature.** Practice and training in transmitting varied works of various kinds of literature by reading them aloud. By permission of the instructor.

126. **Drama and Theatre.** Designed primarily to enable students to "hear" and "see" plays as they read them. A close study of plays of various kinds, with reading aloud by the students and discussion of the relations of the written drama to its suitable production.

Omitted 1966–67

128. **Acting and Directing.** Training in the methods by which actor and director embody the dramatic text; emphasis on studio practice. The class will present publicly one play from the classic repertoire. Limited to 20 students.

130. **Concepts of Literature.** An introduction to practical critical analysis involving the close study of literature primarily written in English and drawn from prose non-fiction, fiction, drama, and poetry.

131. **The Lyric in English.** An examination of works from selected representative poets of major stature, considered as illustrations of the range of poetic exploration and definition of human experience.

132. **Narrative Literature.** A study of representative ways in literature of dealing with experience, using narrative forms, the reading to be drawn primarily from works in English.

133. **Dramatic Literature.** A study of a broad selection from world drama of many periods, considered as illustrations of the range of representations of experience within the conventions of the theaters which produced the plays.

141. **Classic American Literature.** A study of the most significant achievements by American writers of poetry, fiction and other prose in the nineteenth and twentieth centuries.

144. **Shakespeare.** An introductory study of Shakespeare's major plays. Either 144 or 212 is required of all students concentrating in English.

195. **Preceptorial:** Courses on special topics for selected freshmen.

200. **History of the English Language.** Development of English sounds, inflections, syntax, and vocabulary, with special emphasis on the structure of present-day English as described by modern linguistic analysis. Recommended for those planning to teach English.

201. **Introduction to Old English.** Development of a reading knowledge of Old English poetry and prose, with emphasis on specimens of Old English literature rather than on the structure of the language.

202. **The Old English Epic.** The structure of Old English heroic poetry, with emphasis on *Beowulf*. Prerequisite: English 201.

Omitted 1966–67

206. **Chaucer and Medieval Poetry.** Major medieval writers; Langland, the Pearl poet, and—especially—Chaucer.

210. **The English Renaissance.** A study of such influential continental writers as Petrarch, Boccaccio, Castiglione, Erasmus, and Montaigne, and of the writers of the English Renaissance from More to Spenser.

Omitted 1966–67

211. **English Literature of the Earlier Seventeenth Century.** Leading poets and prose writers from Donne and Bacon to 1660.

212. **Shakespeare and His Contemporaries.** A study of representative comedies, histories, and tragedies of Shakespeare. Read in conjunction with the work of other Elizabethan dramatists.

213. **Milton and the Later Renaissance.** A study of the works of Milton in their historical and intellectual context.

214. **The Restoration (1660–1700).** Poetry, prose and selected drama with special emphasis on John Dryden.

215. **The Augustan Age (1700–1750).** Prose, poetry, criticism and selected drama with emphasis on Swift, Addison and Pope.

216. **The Age of Johnson (1750–1798).** Literature of the later part of the Neo-Classical era, particularly the writings of Dr. Johnson and his circle.

Omitted 1966–67

217. **Romantic Literature.** Major writers, other than novelists, of the early part of the nineteenth century, with particular emphasis on poets from Blake through Keats.

218. **Victorian Issues.** The major intellectual controversies of the Victorian period as framed by the chief prose writings from Carlyle to Pater.

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.

Omitted 1966–67

220. **The Growth of American Literature from the Beginnings to the Civil War.** A study of American poetry and prose as an expression of change and conflict in the American spirit.

221. **The Growth of American Literature, 1865–1940.** A study of the major literary movements, realism, naturalism, and symbolism, especially in relation to American literary traditions.

222. **The Historical Development of American Fiction through Henry James.**

223. **The Historical Development of American Fiction from 1890 to the Present.**

224. **Experiment and Dissent in Later American Literature.** Literature trying to deal with the changes in American life since the Civil War. Emphasis may vary, drawing from writers in the later nineteenth century or the twentieth.

Omitted 1966–67

231. **The English Novel.** The novel from the beginnings to the late nineteenth century, emphasizing such major novelists as Defoe, Fielding, Austen, and Dickens.

232. **The Modern English Novel.** The novel from the late nineteenth century to the present, emphasizing such novelists as Conrad, Joyce, and Lawrence.

233. **Medieval Drama.** English drama from its beginnings until 1580, including material from the mystery cycles, moralities, and early Tudor drama.

Omitted 1966–67

234. **Renaissance and Seventeenth-Century Drama.** A survey of English drama from 1580 to 1700 (exclusive of Shakespeare).

235. **Modern Drama.** Great modern dramas from Ibsen to Eliot as reflectors of the main currents in modern thought and feelings.

237. **Modern British and American Poetry.** An introduction to representative twentieth century poetry.

241. **Comedy and Satire.** The uses of the comic spirit in a range of great literature.

Omitted 1966–67

243. **Style and Linguistics.** The interrelations of English structure, lexicon, and style. Close study of selected literary texts.

Omitted 1966–67

245. **Literary Criticism.** A survey of the major critics from Aristotle to Coleridge.

Courses numbered 250 to 299 are designated studies courses. These are limited enrollment courses. They will usually be devoted to intensive examination of particular writers, forms, or literary problems. The content of these courses is not specified, because it will be determined by 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.

250. **Special Studies in Nineteenth Century Literature.**

251. **Studies in Medieval Literature.**

252. **Studies in American Literature.**

253. **Studies in Fiction.**

254. **Studies in Drama.**

255. **Studies in Poetry and Poetics.**

257. **Studies in Literature and Politics.**

291. **Reading Course in English.**

293. **Tutorial Course.** For selected senior English majors pursuing the Degree with Distinction.

Fine Arts

Carl Kenneth Hersey, PH.D. (Harvard)...Professor of Fine Arts and *Chairman of the Department*
Howard Sutermeister Merritt, PH.D. (Princeton).....Professor of Fine Arts
Harris King Prior, M.A. (Trinity).....Professor of Fine Arts
Elmer G. Suhr, PH.D. (Johns Hopkins).....Professor of Classical Art and Archeology

Diran K. Dohanian, PH.D. (Harvard).....Associate Professor of Fine Arts
Archibald Miller, M.F.A. (Cranbrook).....Associate Professor of Fine Arts

Kurt K. Feuerherm, M.F.A. (Cranbrook).....Assistant Professor of Fine Arts
Robert J. H. Janson-La Palme, M.F.A. (Princeton).....Assistant Professor of Fine Arts

THE DEPARTMENT OF FINE ARTS offers courses in the history and theory of the visual arts and in creative art. Such work may lead to a concentration for the A.B. degree, and, at the graduate level, to the A.M. degree. These programs provide basic training for college teaching, museum work, and other professional applications of the discipline.

Fine Arts 101 and 102 are prerequisite to most Fine Arts courses and to the concentration program. Concentrators are expected to have completed Fine Arts 101 and 102 by the end of the sophomore year.

A concentration program normally consists of eight advanced courses in Fine Arts. Ordinarily at least one course will be taken in each of the main fields: ancient, medieval, renaissance, modern, and oriental. Work in creative art is strongly recommended, but not more than one studio course may be counted toward the concentration program.

The remaining two courses in the concentration, making up the related field, may be selected from one of the following areas: English, Foreign Literatures, History, Philosophy, and Religion.

101. Introduction to Ancient and Medieval Art. This course and its sequel introduce the student to western art through the interpretation of selected works of architecture, sculpture, and painting presented in relation to the historical and cultural forces that influence them. This course is devoted to Egyptian, Greek, Roman, Early Christian and Medieval art.

102. Introduction to Renaissance and Modern Art. General introduction to Renaissance and modern art with special emphasis on the Italian, Flemish, Dutch, and French schools of painting. It is a sequel to Fine Arts 101, but may be taken separately.

103. Introduction to the Art of India and the Far East. A selective survey of the art of India, China, and Japan. Examples of architecture, sculpture, painting, and metal work are discussed in their historic sequence and interpreted with regard to form and content.

111–112. Introduction to Sculpture. A studio course designed to familiarize the student with the nature of sculpture. Problems of three dimensional design and life modelling are assigned. Students are allowed a choice of projects in wood, stone, ceramics, and plaster. Some lectures and papers. No previous experience required. Class limited to fifteen students.

Two supervised periods of three hours and one period of independent work a week.

113–114. Drawing and Painting. Practice of basic principles of drawing and painting in various media. Consists mainly of studio work from life, supplemented by field trips. Emphasis in the first term is on various phases of line drawing; the second term is devoted mainly to water color. Previous experience is not prerequisite. Registration is limited to twenty students. Admission only by consent of the instructor.

Two three-hour studio periods a week.

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

200. Mythology. Outstanding myths of the ancient Greek world, including their origin and their association with early painting, sculpture, and literature. The relation of Greek myths to those of the Orient and the Germanic peoples is stressed. No graduate credit.

Two periods a week.

201. The Art of Early Civilizations. Painting, sculpture, and architecture of the Stone Age,

the Aztec, Mayan and Incan civilizations of our own hemisphere, and of Egyptian, Mesopotamian, Persian and Minoan peoples. The lectures are designed to throw light on the religion, traditions, society, and cultural values of ancient peoples as expressed in their art forms.

Omitted 1966–67

202. Greek and Roman Art. Painting, sculpture, and architecture of ancient Greece and Rome. The lectures are designed to throw light on the religion, traditions, society, and cultural values of the Greeks and Romans as expressed in their art forms.

203. Ancient Painting. A comprehensive review of ancient painting beginning with that of the Egyptians and the Minoans, and emphasizing Greek vases and Roman mural decoration. The course in Classical Mythology is strongly recommended as a precursor.

Two periods a week.
Omitted 1966–67

204. Medieval Art. Origin and development of Romanesque and Gothic art in France, Italy, Spain, Germany, and England, with emphasis on architecture and sculpture.

206. Renaissance Architecture. The theory and problems of Renaissance architectural design and the development of architecture in Europe from the beginning of the Renaissance to the end of the eighteenth century.

Omitted 1966–67

215. Interrelations of Art, Literature, and Philosophy I. The motivating ideals in the viewpoints of the Egyptian, Mesopotamian, Hebrew, Hindu, Chinese, and Greek cultures are sought through an examination of the interplay of the art, literature, and philosophy of these peoples. No graduate credit.

Two periods a week.

216. Interrelations of Art, Literature, and Philosophy II. The motivating ideals in the viewpoints of the Roman, Medieval and Modern cultures are sought through an examination of the interplay of the art, literature, and philosophy of these peoples. No graduate credit.

Two periods a week.

218. Modern Sculpture. An examination of the nature of sculptural expression in Europe and America from Daumier to the present. Attention is given to such movements as cubism and constructivism, to the influence of painting on sculpture, and to certain technical considerations which have led to the development of new forms of sculpture.

Omitted 1966–67

222. The Painting of China and Japan. Masterpieces of Far Eastern painting are studied in their historic contexts and in their relation to each other. Oriental painting techniques as well as individual, period, and national styles are stressed.

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.

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. Factors of art style as well as those of iconographical and iconological character are considered.

Omitted 1966–67

231. Italian Art of the Early Renaissance. A survey of the development of the principal schools of Italian painting and sculpture from the latter half of the 13th century to the middle of the 15th.

232. Italian Art of the 16th and 17th Centuries. Painting and sculpture from the High Renaissance through the evolution of the Baroque style in Italy. Continues Fine Arts 231, but may be taken independently.

233. Venetian Art. The flourishing of the arts, painting, sculpture, and architecture, as they relate to the development of Venetian culture from the fifteenth through the eighteenth centuries.

235. Giotto and his Followers. An analysis of this master's works together with a discussion of painting in Florence during the crucial middle years of the fourteenth century. The study will be integrated with the history of Florentine culture. For upperclassmen and graduate students who have had a course in Italian Renaissance art or history.

Omitted 1966–67

236. Five Italian Masters of the High Renaissance. A careful examination of five great figures—Leonardo da Vinci, Raphael, Michelangelo, Giorgione, and Bramante—and their contributions to the art of 1490–1520. For upperclassmen and graduate students who have had a course in Italian Renaissance art or history.

238. Northern European Painting I. A study of the development of painting in the Netherlands, France, and Germany from about 1400 to 1600. Jan van Eyck, Roger van der Weyden, Bosch, and Bruegel receive special emphasis.

239. Northern European Painting II. Baroque and rococo painting in the North, including Spain, from about 1600 to 1800. El Greco, Velasquez, Rubens, Rembrandt, Poussin, and Watteau are given special consideration.

Omitted 1966-67

240. French Painting from Poussin to David. A study of the French school in relation to the artistic milieux of the period; artistic policy and doctrine, taste, and social developments within the Ancien Régime.

241. Modern European Painting to 1885. Rise of modern painting in Europe, especially France, from the late eighteenth century to about 1885. Neo-Classicism, Romanticism, Realism, and Impressionism are the main movements considered. Fine Arts 102 prerequisite.

242. Modern European Painting Since 1885. After brief consideration of Impressionism, the anti-academic and experimental nature of modern tendencies in art is brought out by examination of the credos and chief exponents of Post-Impressionism, Expressionism, Fauvism, Cubism, Abstractionism, and Surrealism. Fine Arts 102 prerequisite.

245. American Architecture. Colonial, Early Republican, eclectic, and modern styles of American architecture from the seventeenth century to the present. Special attention is given to the English colonial tradition, to the spirit of nationalism underlying the architecture of the Early Republic, and to American contributions to modern architecture. Study is made of structures in Rochester which illustrate phases of American architecture.

Two periods a week.

246. American Painting. A survey of the development of painting in America from the seventeenth century to the twentieth century. Relationships with European art and the problems of amateur and artisan painting are considered.

Two periods a week.

251. Advanced Sculpture Studio I. The figure, life modelling, and composition based on the figure in stone, wood or metal. Some lectures and papers. Fine Arts 111–112 or previous experience prerequisite. No graduate credit.

Two supervised periods of three hours and one period of independent work.

252. Advanced Sculpture Studio II. Problems in composition. Students are encouraged to work toward greater technical competence and more personal expression. Fine Arts 111–112 or previous experience prerequisite. No graduate credit.

Two supervised periods of three hours and one period of independent work.

255–256. Advanced Painting Studio. Continuation of Fine Arts 113–114. Further study of drawing and of the fundamentals of color and composition. Advanced development of painting in the second semester with emphasis on individual expression and independent research.

Two supervised periods of three hours and one period of independent work.

291. Senior Reading Course. Independent study under faculty guidance of a limited field of art history, or investigation of a problem related to an area of knowledge already familiar to the student. Open ordinarily only to senior concentrators in Fine Arts.

Aesthetics and Art Criticism. See Philosophy 241, 244.

Primitive Art. See Anthropology 210.

475–476. Art Museum Theory and Practice. A study of the art museum in society, including its history, philosophy, and current functions. Seminars, assigned readings, reports, research projects, and some actual participation, under staff supervision, in the day-to-day activities of the Memorial Art Gallery. Admission by consent of the instructor.

One three-hour meeting per week, Memorial Art Gallery

Foreign and Comparative Literature

Wilhelm Braun, PH.D. (Toronto) ..... Professor of German Literature
Jules Brody, PH.D. (Columbia) ..... Professor of French Literature and *Chairman of the Department*
Norman O. Brown, PH.D. (Wisconsin) .. Wilson Professor of Classics and Comparative Literature
James Doolittle, PH.D. (Princeton) ..... Professor of French Literature
Peter Dunn, M.A. (London) ..... Visiting Professor of Spanish Literature
Frederick W. Locke, PH.D. (Harvard) ..... Professor of Medieval Literature
Gerhard Loose, PH.D. (Leipzig) ..... Professor of German Literature
Sidney Monas, PH.D. (Harvard) ..... Professor of Russian History and Foreign and Comparative Literature
Rémy G. Saisselin, PH.D. (Wisconsin) ..... Professor of French Literature
Bernard N. Schilling, PH.D. (Yale) .... Trevor Professor of English and Comparative Literature
Kurt Weinberg, PH.D. (Yale) ..... Professor of French and Comparative Literature

Nathan Rosen, PH.D. (Columbia) ..... Associate Professor of Russian Literature
Eléonore Zimmermann, PH.D. (Yale) .. Associate Professor of French and Comparative Literature

Annie-Claude Dobbs, M.A. (Bryn Mawr) ..... Assistant Professor of French Literature
Alfred Geier, PH.D. (Johns Hopkins) ..... Assistant Professor of Classics
Eva Kagen-Kans, M.A. (California) ..... Assistant Professor of Russian Literature
Neil M. Larkin, PH.D. (Johns Hopkins) ..... Assistant Professor of French Literature
Robert ter Horst, PH.D. (Johns Hopkins) ..... Assistant Professor of Spanish Literature

Philip R. Berk, B.A. (Harvard) ..... Instructor in French Literature

Howard Graham Harvey, PH.D. (Harvard) ..... Professor Emeritus of French
L. Alfreda Hill, PH.D. (Johns Hopkins) ..... Professor Emeritus of French
Virginia Moscrip, PH.D. (Chicago) ..... Professor Emeritus of Classics

THE DEPARTMENT OF FOREIGN AND COMPARATIVE LITERATURE offers work in Chinese, Classics, French, German, Russian, and Spanish literature leading to the A.B. degree. The Department also offers the A.M. and Ph.D. degrees in French Literature.

REQUIREMENTS AND RECOMMENDATIONS FOR CONCENTRATIONS

Chinese: Mr. Brody, adviser

1. A minimum of six literature courses numbered 203 and above.
2. At least four courses in related fields to be chosen from among the following: Fine Arts 222, 224, 226; Geography 260; History 261, 262, 263; Japanese 201, 202, 203, 285, 286.
3. Concentrators intending to go on to graduate study are strongly urged to do formal work in the Japanese language, and to develop a sound reading knowledge of French and German.

Comparative Literature (Honors): See p. 90.

Classics: Mr. Geier, adviser

A student must concentrate in either Greek or Latin literature. This concentration will consist of:

1. At least eight courses numbered 103 and above.
2. A minimum of two courses in related fields (e.g., other ancient languages, ancient history, art, archeology, or philosophy, linguistics, literature).
3. Concentrators intending to go on to graduate study are strongly urged to pursue formal work *both* in Latin *and* Greek literature, and to develop a sound reading knowledge of *at least* one of the following modern languages: French, German, or Italian.

French, German, and Spanish

French advisers: Mrs. Dobbs
Mr. Saisselin
German adviser: Mr. Loose
Spanish adviser: Mr. ter Horst

1. At least six literature courses numbered 131 and above.

2. Two advanced composition courses: French, German or Spanish 200 *and* 220, or equivalent work done during an approved Junior Year Abroad program.

3. A minimum of two courses in related fields (e.g., history, linguistics, literature, philosophy).

4. Concentrators intending to go on to graduate study in French or Spanish are strongly urged to develop a sound reading knowledge of German *and* Latin; in preparation for graduate work in German, French *and* Latin are recommended as secondary languages.

Russian: Mr. Rosen, adviser

1. At least six literature courses numbered 131 and above; these must include 141, 142, and one course on a major Russian writer.

2. A minimum of four courses in related fields (e.g., advanced Russian language, history, literature).

3. Concentrators intending to go on to graduate study are strongly urged to include in their related work as many as possible of the following: English 231; French 131, 132, 221; German 131, 132; History 265, 266.

THE SENIOR ESSAY

All concentrators in foreign literatures are required to write a Senior Essay during their last year of study. In the Fall of the senior year students must register for the 295 course in the field of concentration. The subject of the Essay will be chosen in consultation with the professor in charge of that course and, at his recommendation, with appropriate members of the Department. The major part of the research for the Essay will be done during the Fall term; the completed Essay is to be submitted in mid-April. Precise indications as to the scope of the Essay, research, bibliographical and stylistic procedures, will be made known at the first meeting of the 295 course.

STUDENT TEACHING

Concentrators interested in student teaching experience for the purpose of New York State certification should be in touch with Mr. W. H. Clark (327 Hopeman) as well as their adviser.

CHINESE

251. Introduction to Classical Chinese. Reading and analysis of Confucian and Taoist texts. Prerequisite: Chinese 203.

261. Essays of the T'ang and Sung. Selected essays in the *ku wen* style by such writers as Han Yu, Liu Tsungtuan, and Ouyang Hsiu. Prerequisite: Chinese 251.

262. Poetry of the T'ang and Sung. Selected *shih* style poems from the works of such poets as Wang Wei, Li Po, Tu Fu, Wang An-shih, and Su Shih. Prerequisite: Chinese 251.

Omitted 1966-67

271. Chinese Ideological Texts I. Texts of the Chou-Han, Confucian, Taoist, and Legalist schools. Readings in English; concentrators will be required to read selected portions in the original.

Omitted 1966-67

272. Chinese Ideological Texts II. "Neo-Confucian" texts of the Sung, Ming, and Ch'ing periods. Readings in English; concentrators will be required to read selected portions in the original.

Omitted 1966-67

273. Chinese Historical Texts. The Standard Histories *(cheng shih)* and other pre-modern historical materials. Readings in English;

concentrators will be required to read selected portions in the original.

Omitted 1966–67

284. Chinese Literature in Translation. Selected poetry, short stories, essays, and novels, from the classical period to the present.

285. The Growth of Chinese Thought. The rise and development of Confucianism, Taoism, the *Yin-yang* school, Mohism, Legalism, and the School of Names; Buddhism; "Neo-confucianism" in its various forms. Persisting conceptual elements in the Chinese world view. Readings in English.

286. The Confucian Tradition. Chinese traditional thought from Confucius, Mencius, and Hsun Tzu, through Tung Chung-shu and the "Neo-Confucians" of Sung and Ming, to the re-evaluation of Ch'ing and modern times. Readings in English.

Omitted 1966–67

291. Reading Course. Study of special literary problems under the direction of a member of the staff.

295. Senior Thesis. A paper based upon independent study; required of concentrators as part of the Senior Comprehensive Examinations. Students should normally register for this course in the fall term of their senior year.

CLASSICS

GREEK

200. Introduction to Greek Literature I. Selections from Herodotus, Thucydides, Plato, Aesop and Xenophon.

201. Introduction to Greek Literature II. Selected dialogues of Plato.

202. Homer and Greek Tragedy. Selections from the Iliad and Odyssey, Sophocles, and Euripides.

Omitted 1966–67

203. Greek Comedy. Selections from Aristophanes.

Omitted 1966–67

291. Reading Course. Study of special literary problems under the direction of a member of the staff.

295. Senior Thesis. A paper based upon independent study; required of concentrators as part of the Senior Comprehensive Examinations. Students should normally register for this course in the fall term of their senior year.

LATIN

103. Introduction to Latin Literature. Representative samples of Roman poetry and prose.

NOTE: In the fall term only, section 1 of this course will be offered as a Preceptorial with enrollment limited to 15 freshmen.

200. Roman Philosophy. Cicero, Lucretius, Seneca; their debt to Greek philosophy and influence on Christian thought.

201. Horace. *Odes, Epodes, Satires,* and *Epistles* (including the Art of Poetry).

Omitted 1966–67

202. Roman Historians. Livy, Tacitus, Suetonius, Augustine; influence of the Greek historiographical traditions.

203. Roman Comedy. Plautus and Terence: their relation to Greek New Comedy and influence on later comedy.

Omitted 1966–67

204. Ovid: Metamorphoses. Elementary knowledge of Latin required. The *Metamorphoses* will be read in Latin, with the aid of an English translation, and studied as poetry and as mythology; its position in European literature as a whole will be examined.

Omitted 1966–67

205. Roman Lyric and Elegiac Poetry. Catullus, Tibullus, Propertius, Ovid.

Omitted 1966–67

206. Virgil. Selections from the *Aeneid, Bucolics,* and *Georgics.*

Omitted 1966–67

207. Roman Satire. Horace, Petronius, Juvenal, with selections from other authors.

Omitted 1966–67

220. Medieval Latin. Literary Latin from the 6th to the 13th century; the distinction between Vulgar and Medieval Latin; rapid reading of texts from Harrington's anthology; close reading of a couple of select complete texts; the influence of Medieval Latin writing on the vernacular literatures.

250. Prose Composition. Practice in writing Latin prose in the various styles.

291. Reading Course. Study of special literary problems under the direction of a member of the staff.

295. Senior Thesis. A paper based upon independent study; required of concentrators as part of the Senior Comprehensive Examinations. Students should normally register for this course in the fall term of their senior year.

CLASSICS IN TRANSLATION

151. **Preceptorial: Classics of the Graeco-Roman Tradition: Philosophy and History.** The Ancients' views on the nature of the soul, the divine, the world, the state, human excellence, human history, and the irrational; discussion of the Presocratics, the orphic tradition and the mysteries, Plato, Aristotle, Lucretius, Seneca, Augustine; Herodotus, Thucydides, Livy, Tacitus, and Suetonius.

152. **Classics of the Graeco-Roman Tradition: Poetry and Drama.** The form and content of Greek and Roman tragedy, comedy, epic and lyric poetry; Homer, Virgil, Hesiod, Pindar, Aeschylus, Sophocles, Euripides, Aristophanes, Horace, Catullus, and Ovid.

COMPARATIVE LITERATURE

108. **Masterpieces of European Literature.** From Rabelais and Machiavelli to Dostoevsky and Kafka. Readings in English.

131. **The Concept of the Tragic Spirit.** Concepts of the tragic spirit in great literature from the classics to the present.

Omitted 1966-67

190. **Preceptorial: The Mystical Tradition in Literature.** Readings in the mystical tradition: from modern poetry back through Blake to the ancient mystery religions and mystical philosophers.

Omitted 1966-67

205. **Archetypes.** Lectures on the psychoanalytical interpretation of recurrent patterns of symbolism in human thought and affairs. Introductory readings in the psychoanalytical, cultural, and literary theory of archetypes; also ancient religious texts.

291. **Reading Course.** Intended primarily for advanced students wanting to study specific literary problems across national boundaries. Prerequisites to be set by the instructor.

FRENCH

NOTE: French 131 and 132 are prerequisite for all 200-level courses in French literature.

131. **Introduction to Modern French Literature.** Critical reading of representative 19th- and 20th-century poetry and fiction; practice in the *explication de texte* method. Prerequisite: satisfactory performance on Placement Examination or in French 103, or permission of the instructor.

NOTE: In the fall term only, section 1 of this course will be offered as a Preceptorial with enrollment limited to 15 freshmen.

132. **Masterpieces of French Literature to 1800.** Survey of chief literary movements and forms from the late Middle Ages through the Enlightenment. Prerequisite: French 131 or consent of the instructor.

200. **French Prose Style.** Inquiry into the artistic and expressive resources of the French literary idiom through *explication de texte*, composition, and translation into French of a wide variety of samples of English prose. Not for graduate credit.

221. **The French Novel to 1850.** Development of the genre from the classical period to its triumph in the first half of the 19th century.

222. **The French Novel Since 1850.** Evolution of the genre from Realism to the *nouveau roman*.

223. **French Lyric Poetry to 1800.** An introduction to the French lyric tradition from the Middle Ages to André Chénier, with emphasis on renaissance poetry.

Omitted 1966-67

224. **French Lyric Poetry Since 1800.** *Explication de texte* of the lyric and the short epic: Lamartine, Hugo, Vigny, Nerval, Baudelaire, Rimbaud, Mallarmé.

225. **The French Drama to 1800.** Survey of the genre from the Renaissance to Beaumarchais; emphasis on Corneille, Racine and Molière.

226. **The French Drama Since 1800.** Representative plays from romantic melodrama to the "theater of the absurd"; some attention will be paid to the relevant theoretical statements.

239. **Rabelais and Montaigne.** Intensive study of Rabelais' *Gargantua and Pantagruel* and of Montaigne's *Essais;* introduction to the main intellectual and esthetic currents of the French Renaissance.

Omitted 1966-67

240. **Descartes and Pascal.** An introduction to the major works of Descartes and Pascal; study of their thought, milieu, and influence on French classicism.

Omitted 1966-67

250. **French Classical Tragedy.** Detailed analysis of the chief plays of Corneille and Racine; frequent reference to Greek theory and practice.

Omitted 1966-67

265. **18th-Century French Literature.** Montesquieu, Voltaire, Diderot, Rousseau, Beaumarchais; also other playwrights and *philosophes*.

Omitted 1966-67

267. **Baudelaire.** Close reading of *Fleurs du Mal;* selections from prose poems.
Omitted 1966–67

272. **Proust.** Analysis of *A la recherche du temps perdu* from points of view of language, esthetics, psychology and society.
Omitted 1966–67

281. **Giraudoux and Sartre.** Close study of two representatives of the theater of ideas.
Omitted 1966–67

286. **20th-Century French Poetry.** A study of avant-garde movements (Futurism, Dada, L'Esprit nouveau, Surrealism, etc.) and the renewal of lyricism from Jacob, Apollinaire, and Cocteau to the present.
Omitted 1966–67

289. **The Sociology of French Literature.** The social and historical background of French literature: the Middle Ages, the Ancien Régime, and modern France; emphasis on the relation of literary genres to social class and profession; the changing functions and attitudes of writers toward their society.
Omitted 1966–67

291. **French Reading Course.** Study of special literary problems under the direction of a member of the staff.

295. **Senior Thesis.** A paper based upon independent study; required of concentrators as part of the Senior Comprehensive Examinations. Students should normally register for this course in the fall term of their senior year.

GERMAN

NOTE: German 131 and 132 are prerequisite for all 200-level courses in German literature.

131. **Introduction to Modern German Literature.** Close reading and analysis of representative works of poetry and fiction of the 19th and 20th centuries. Prerequisite: satisfactory performance on Placement Examination or in German 103, or permission of the instructor.

NOTE: In the fall term only, section 1 of this course will be offered as a Preceptorial with enrollment limited to 15 freshmen.

132. **Masterpieces of German Literature to 1832.** An introduction to selected works of German literature as seen in their historical and stylistic context. Prerequisite: German 131 or consent of the instructor.

200. **German Prose Style.** Inquiry into the artistic and expressive resources of the German literary idiom through *explication de texte,* composition, and translation into German of a wide variety of samples of English prose. Not for graduate credit.

210. **German Lyric Poetry.** Intensive textual analysis of selected poets from the Baroque to the present. Principally: Opitz, Logau, Goethe, Schiller, Hölderlin, Novalis, Heine, Rilke, George, Brecht.

212. **Textual Analysis.** Close reading of selected authors from the 17th century to the present. Emphasis on imagery, rhetorical devices, evolution of the various styles.
Omitted 1966–67

265. **Eighteenth-Century Literature I.** Development of German literature from 1720 to 1785, with emphasis on Lessing and the young Goethe.
Omitted 1966–67

266. **Eighteenth-Century Literature II.** Works of Goethe and Schiller from 1785 to 1805, in the "Classical" period of German literature.
Omitted 1966–67

269. **Goethe.** Intensive study of *Faust* with emphasis on Part 2.
Omitted 1966–67

275. **Nineteenth-Century Drama and Poetry.** Major dramatists of the period: Kleist, Grillparzer, Hebbel. Introduction to representative poets.
Omitted 1966–67

276. **Nineteenth-Century Prose.** Selected works by Keller, Stifter, Raabe, and Fontane.

277. **Nietzsche.** Ontology, rhetoric, philosophy of language, the theory of tragedy; the Apollonian-Dionysian antinomy in Nietzsche's aesthetics.
Omitted 1966–67

285. **Modern German Drama and Poetry.** Readings in Hauptmann, Hofmannsthal, Brecht, and Rilke.
Omitted 1966–67

286. **Modern German Prose.** The major prose writers since 1880: Mann, Kafka, Hesse.

291. **Reading Course.** Study of special literary problems under the direction of a member of the staff.

295. **Senior Thesis.** A paper based upon independent study; required of concentrators as part of the Senior Comprehensive Examinations. Students should normally register for this course in the fall term of their senior year.

INDIAN

201. An Introduction to the Indian Civilization I. The culture of ancient and medieval India from the prehistoric "Harrapa Culture" to the threshold of the Indo-Turkish period. Examination of the essential background for an understanding of Hinduism.

202. An Introduction to the Indian Civilization II. The impact of Islamic and western European culture on Indian intellectual traditions with emphasis on those elements of the traditional culture employed by 20th Century Indians to symbolize an Indian identity.

ITALIAN

225. Dante. Introduction to *La Divina Commedia;* close reading for structural analysis and lectures on medieval background.

Omitted 1966–67

JAPANESE

285. Classical Japanese Literature. The Imperial Anthologies; Heian Prose; The War Tales; the fugitive essay; the No Drama. Readings in English.

286. Modern Japanese Literature. The evolution of *haiku, joruri, kabuki;* tokugawa fiction; the new literature of Meiji; the modern novel. Readings in English.

LITERATURE IN TRANSLATION

See: Chinese Literature 271, 272, 273, 284, 285, 286
Classics in Translation 151, 152
Comparative Literature 108, 131, 190, 205
Indian 201, 202
Japanese 285, 286
Russian 141, 142, 143, 232, 233

RUSSIAN

131. Introduction to Modern Russian Literature I. Readings in 19th-century fiction. Prerequisite: Russian 103.

132. Introduction to Modern Russian Literature II. Analysis of the language and style of the major Russian writers. Prerequisite: Russian 103.

141. Survey of Russian Literature I. From the beginnings in folklore to Pushkin and Gogol; literary and historical inquiry into the origins of the "Russian soul." Readings in English.

142. Survey of Russian Literature II. Includes Turgenev, Dostoevsky, Tolstoy, and Chekhov. Readings in English.

143. Modern Russian Literature. The Symbolist movement; writers from Gorky to Pasternak; attention to the "thaw" period. Readings in English.

Omitted 1966–67

190. Preceptorial: Three Major Russian Novelists. Gogol, Dostoevsky, and Tolstoy.

Omitted 1966–67

201. Pushkin. His life and times; intensive study of *Eugene Onegin* and other poems. Prerequisite: Russian 121 or 131. Not for graduate credit.

Omitted 1966–67

232. Tolstoy. Major novels, stories, and plays. Readings in English; Russian concentrators will be assigned selected portions in the original language.

Omitted 1966–67

233. Dostoevsky. Representative early works and all the major novels. Readings in English; Russian concentrators will be assigned selected portions in the original language.

Omitted 1966–67

291. Reading Course. Study of special literary problems under the direction of a member of the staff.

295. Senior Thesis. A paper based upon independent study; required of concentrators as part of the Senior Comprehensive Examinations. Students should normally register for this course in the fall term of their senior year.

SPANISH

NOTE: Spanish 131 and 132 are prerequisite for all 200-level courses in Spanish literature.

131. Introduction to Modern Spanish Literature. Close reading and analysis of representative works of poetry, drama, and fiction of the 19th and 20th centuries. Prerequisite: satisfactory performance on Placement Examination or in Spanish 103, or permission of the instructor.

NOTE: In the fall term only, section 1 of this course will be offered as a Preceptorial with enrollment limited to 15 freshmen.

132. Masterpieces of Spanish Literature to 1800. Survey from the late Middle Ages to the beginning of Romanticism; emphasis on the *siglo de oro.* Prerequisite: Spanish 131 or consent of the instructor.

200. Spanish Prose Style. Inquiry into the artistic and expressive resources of the Spanish literary idiom through *explication de texte,* composition and translation into Spanish of a wide variety of samples of English prose. Not for graduate credit.

255. Spanish Golden Age Prose. A critical study of the picaresque novel, the *Quijote* and other works of Cervantes, Quevedo, etc.
Omitted 1966–67

256. Spanish Golden Age Drama and Poetry. A critical study of the theater of the Spanish Golden Age, from Lope de Vega to Calderón, and the poetry of the same period.

258. Don Quixote. The thought and style of Cervantes' novel; its themes and manner of expression in the intellectual and esthetic context of the late 16th century.

275. Nineteenth-Century Prose. Romanticism, Realism, and Naturalism in Spain, with special reference to the *costumbrismo* movement.
Omitted 1966–67

276. Nineteenth-Century Spanish Drama and Poetry. A critical study of the Spanish theater and poetry of the 19th century, from Moratín to Benavente.
Omitted 1966–67

281. Spanish-American Literature. A critical study of the literary developments among the independent nations of Hispanic America; the political essay, the Modernist Movement in poetry, and the novel of social protest.
Omitted 1966–67

285. Twentieth-Century Spanish Novel and Essay. The Generation of '98, the introspective essay, and the Spanish 20th-century novel to the present.
Omitted 1966–67

286. Twentieth-Century Spanish Drama and Poetry. A critical study of Spanish drama and poetry, from Benavente to the present.
Omitted 1966–67

291. Reading Course. Study of special literary problems under the direction of a member of the staff.

295. Senior Thesis. A paper based upon independent study; required of concentrators as part of the Senior Comprehensive Examinations. Students should normally register for this course in the fall term of their senior year.

General Science

COMMITTEE ON GENERAL SCIENCE

Norman G. Gunderson, PH.D. (Cornell) .....Associate Professor of Mathematics and Education
H. Lawrence Helfer, PH.D. (Chicago).....Associate Professor of Astronomy
Lawrence W. Lundgren, Jr., PH.D. (Yale).....Associate Professor of Geology
William B. Muchmore, PH.D. (Washington).....Associate Professor of Biology and *Chairman of the Committee*
Russel F. Green, PH.D. (Southern California).....Associate Professor of Psychology
David J. Wilson, PH.D. (California Institute of Technology)....Associate Professor of Chemistry

THE COMMITTEE ON GENERAL SCIENCE supervises a program leading to the A.B. degree which gives the student an opportunity to acquire a broad education in the sciences and at the same time to devote approximately half of his time to the study of the humanities and social sciences. The program is especially well suited for the student who wishes to prepare to teach science at the secondary school level. It is also attractive to the premedical student who wishes a broad, general preprofessional education. Students who are planning to enter medical school after only three years of undergraduate work should consider this program.

The program of concentration includes, during the entire four years, sixteen courses chosen from among the offerings in biology, chemistry, geology, mathematics, physics and astronomy, and the work in psychology which is oriented toward the natural sciences (odd-numbered courses). The concentrator in general science must take introductory courses in four or five departments. Four or more courses beyond the introductory level must be taken in one department, and two or more courses beyond the introductory level must be taken in two other departments. At least two courses must be taken in a department in order to count toward the concentration.

Because of the broad, general nature of the general science program, the requirement of the related field is met by the completion of the program described above.

Relevant sections of the Graduate Record Examination are administered as a substitute for the comprehensive examination.

Geology and Geography

William H. Diment, PH.D. (Harvard) ..... Professor of Geology
Robert Burnett Hall, Jr., PH.D. (Michigan) ..... Professor of Geography
David M. Raup, PH.D. (Harvard) ..... Professor of Geology
Robert George Sutton, PH.D. (Johns Hopkins) ..... Professor of Geology and *Chairman of the Department*

William Akers Bassett, PH.D. (Columbia) ..... Associate Professor of Geology
Zeddie Paul Bowen, PH.D. (Harvard) ..... Associate Professor of Geology
Lawrence William Lundgren, Jr., PH.D. (Yale) ..... Associate Professor of Geology
Taro Takahashi, PH.D. (Columbia) ..... Associate Professor of Geology

****David H. Krinsley,*** PH.D. (Chicago) ..... Research Associate in Geology
****A. Lee McAlester,*** PH.D. (Yale) ..... Research Associate in Geology
Norman R. Rukavina, PH.D. (Rochester) ..... Research Associate in Geology
****Roger D. Walker,*** PH.D. (Oxford) ..... Research Associate in Geology

John Edward Hoffmeister, PH.D. (Johns Hopkins) ..... Professor Emeritus of Geology

*Part-time.

THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY offers programs in Geology leading to the A.B. and B.S. degrees, and, at the graduate level, to the M.S. and Ph.D. degrees. In Geography, work is available for a concentration for the A.B. degree.

GEOLOGY

Degree Programs. Three degree programs are offered in geology: B.S., A.B., and B.S. in Biology-Geology. The B.S. program is a rigorous one designed to give students the best preparation for graduate studies and a professional career. The A.B. program is more flexible and offers students the greatest freedom in selecting courses, especially in the social sciences and humanities, while providing them with at least the minimum background for graduate studies. The B.S. in Biology-Geology is for students planning graduate studies in either Biology or Geology and emphasizes the common ground between the two.

A.B. Program in Geology

A concentration should consist of at least six and not more than eight courses in the Department beyond Geology 101. No specific courses are required except for the prerequisites in course descriptions. Students planning a concentration should obtain an adequate background in related sciences, including at least two courses beyond the introductory level. They should consult with the departmental adviser as early as possible.

The courses in geology and related sciences are arranged in such a manner as to carry the student from the introductory levels to the more advanced and highly specialized subjects in the senior year. The senior-year electives are provided to allow the student a choice of courses that can best serve his interests and special needs in graduate school. A summer course in field geology, equivalent to 6–8 credit hours, is required during the summer following the junior year.

B.S. Program

A synopsis of the courses required in the B.S. program, term by term, follows:

FIRST YEAR

1. Geol. 101 Geologic Processes*	1. Geol. 224 Introductory Mineralogy
2. Math. 161 Analysis I	2. Math. 162 Analysis II
3. English Requirement	3. Foreign Language**
4. Chem. 121 General Chemistry	4. Chem. 122 General Chemistry
or	
Chem. 123 Inorganic Chemistry	Chem. 124 Inorganic Chemistry
Physical Education	Physical Education

SECOND YEAR

1. Geol. 201 Evolution of the Earth	1. Geol. 221 Principles of Paleontology
2. Math. 163 Analysis III	2. Math. 164 Analysis IV
3. Phys. 115 Physics I	3. Phys. 116 Physics I
or	
Phys. 117 Physics IA	Phys. 118 Physics IA
4. Elective	4. Elective
Physical Education	Physical Education

THIRD YEAR

1. Geol. 227 Optical Mineralogy & Petrology	1. Geol. 235 Stratigraphy
2. Biol. 101 General Biology I	2. Biol. elective
3. Phys. 125 Physics II	3. Phys. 126 Physics II
4. Math. 110 Elementary Statistics	4. Elective

[1]Field Camp

FOURTH YEAR

1. Geol. 277 Paleoecology	1. Geol. 248 Geochemistry
2. Geol. 281 Introduction to Geophysics I	2. Elective
3. Chem. 251 Physical Chemistry I	3. Elective
4. Elective	4. Elective

B.S. Program in Biology-Geology

The program is appropriate for those who are inclined toward either Geology or Biology, but who wish a broader training in the natural sciences than is offered by the programs in either department. Students completing this program may enter graduate school in either biology or geology or do graduate work in such hybrid fields as oceanography, limnology, marine geology, and marine biology.

The suggested sequence of courses for the Biology-Geology program is given below. The actual order of courses may be altered where prerequisites do not interfere. Also, some course substitutions can be made where appropriate and upon approval by the two departments.

FIRST YEAR

1. Geol. 101 Geologic Processes*	1. Geol. 224 Intro. Mineralogy
2. Biol. 101 General Biology I	2. Biol. 125 Comp. Chordate Anatomy
3. English Requirement	3. Foreign Language 103 or 105
4. Math. 161 Analysis I	4. Math. 162 Analysis II
Physical Education	Physical Education

*201 may be elected if the student has taken at least one course in secondary school earth science, with permission of the instructor.

**Most students can complete the foreign language requirement with one term of college work. Those who need more than one term must take the necessary courses as electives.

[1]A summer course in field geology, equivalent to 6–8 credit hours, is required during the summer following the junior year.

SECOND YEAR

1. Geol. 201 Evolution of the Earth
2. Biol. 122 Invertebrate Zoölogy
3. Chem. 121 or 123 Inorganic Chem.
4. Group I or II
   Physical Education

1. Geol. 221 Principles of Paleontology
2. Biol. 221 Genetics
3. Chem. 122 or 124 Inorganic Chem.
4. Group I or II
   Physical Education

THIRD YEAR

1. Biol. 151 Plant Kingdom
2. Biol. 222 Evolution
3. Physics 101 General Physics
4. Chemistry 161 Organic Chemistry

1. Geol. 235 Stratigraphy
2. Math. 110 Elementary Statistics
3. Phys. 102 General Physics
4. Chemistry 162 Organic Chemistry

FOURTH YEAR

1. Geol. 277 Paleoecology
2. Group I or II
3. Group I or II
4. Elective
   Senior Seminar

1. Biol. Elective
2. Group I or II
3. Group I or II
4. Elective
   Senior Seminar

101. Geologic Processes. The role of field observation, laboratory analysis and experimentation in the description and analysis of some important geologic processes; economic and ecologic implications of those processes. Lectures designed for students having little or no scientific background.
Two lectures, one discussion period, one three-hour laboratory a week. Laboratory optional.

201. Evolution of the Earth. The composition, origin and age of the earth, the dynamic history of the earth's crust, including mountain building and continental drift, and the origins and evolution of life as revealed in the fossil record. The course is open to students with at least one course in secondary school earth science or with permission of the instructor.
Two lectures, one discussion meeting, and one laboratory a week. Field trips.

221. Principles of Paleontology. Introduction to the subject by an examination of the principles of Paleontology and by a review of the invertebrate faunas of the past. Field trips. Prerequisite: Geology 101 or 201.
Two lectures, one lab a week.

224. Introductory Mineralogy. Basic principles involved in the description, classification, and genetic interpretation of minerals. Laboratory work is divided between a study of elementary crystallography and an examination of common minerals and rocks. Prerequisite: Chemistry 121 or 123.
Two lectures, one recitation, 1 lab a week.

227. Optical Mineralogy and Petrology. The first half of the course is concerned with polarizing microscopy and the relationships between the structure and composition of minerals and their optical properties. The second half is concerned with the study of igneous and metamorphic rocks. Prerequisites: Geology 101 or 201 and Chemistry 121 or 123.

235. Stratigraphy. Principles of stratigraphy, including the application of fundamental principles of physical geology and paleontology to problems of stratigraphy and paleography.
Three lectures and one lab a week.

248. Geochemistry. Discussion will center on the elements and their isotopes, their role in the evolution of the earth, and their use as tools in geological investigations. Prerequisites: Chemistry 121 and 122 or 123 and 124 and Physics or permission of the instructor.

277. Paleoecology. Environmental reconstruction based on evidence from fossils and their relations with the enclosing sediment. Emphasis on paleoecological applications of faunal distributions, adaptive morphology, and biogenic sedimentary structures. Field trips. Prerequisites: Geology 221 and Biology 101.

281. Introduction to Geophysics I. The gravity and magnetic fields of the earth. Survey of observational and theoretical seismology. Introduction to the thermal regime of the earth. Exploration geophysics and the physical properties of rocks. Prerequisites: Math. 162 or equivalent and Physics 101–102 or its equivalent.

282. Introduction to Geophysics II. Continuation of Geology 281.

291. Senior Reading Course in Geology.
Credit to be arranged.

GEOGRAPHY

A program of concentration in geography consists of six to eight courses beyond Geography 103 and 104. Included in this number is a required senior reading course.

The remaining courses required to make up ten for a concentration are to be drawn from advanced course offerings in the following related fields: Anthropology, Economics, Geology, History, and Political Science.

Students planning to concentrate in geology should consult the departmental adviser concerning the selection of courses.

103. Fundamentals of Physical Geography. A systematic study of the elements of the natural environment: climates, soils, associations of natural vegetation and wildlife, landforms, and the water bodies of the world; and their global and regional relationships. Laboratories will include the elements of map interpretation and detailed, large-scale, map studies of selected parts of the world.

104. Principles of Cultural Geography. An introduction to the basic concepts of social, economic, and political geography, and their application to the study of regions. Laboratory work will involve the map-study of selected regions in various parts of the world. Prerequisite: Geography 102 or 103.

207. Economic Geography I. A presentation of the world's most important agricultural resources and the environmental factors that control their production. Discussions on domestic animals, forests, and the major agricultural patterns as they occur in different parts of the world.

208. Economic Geography II. A study of the world's important mineral resources dealing principally with factors controlling regional distribution, production, conservation, transportation, and consumption. The bearing of these factors on economic and political problems and on future regional changes is considered.

215. Historical Geography. A critical review of objectives and methods in historical geography. Discussion centers on the role of environment in history, the evolution of man-made landscapes, and the problems of reconstructing the human geography of particular historical periods. Detailed regional studies will apply principally to the North American continent.

260. Geography of Asia. A geographical study of the continent of Asia, including China, Japan, southeast Asia, India, and the Soviet Far East. Stresses the influence of the physical environment on the cultural and economic development of the various regions.

264. Geography of Canada. A geographical study of Canada, stressing the influence of the physical environment on the economic and cultural development of the various parts of the country. Special emphasis is placed on the problems of resource development, transportation, and industrialization.

291. Senior Reading Course in Geography. *Credit to be arranged.*

History

Loren Baritz, PH.D. (Wisconsin).....Professor of History
Marvin B. Becker, PH.D. (Pennsylvania).....Professor of History
Michael Cherniavsky, PH.D. (Berkeley).....Professor of History
John Barrett Christopher, PH.D. (Harvard).....Professor of History
Herbert G. Gutman, PH.D. (Wisconsin).....Professor of History
Ralph James Kaufmann, PH.D. (Princeton).....Professor of History and English and *Chairman of the Department*
Sidney Monas, PH.D. (Harvard).....Professor of History
A. William Salomone, PH.D. (Pennsylvania).....Wilson Professor of History
Bernard A. Weisberger, PH.D. (Chicago).....Professor of History
Hayden V. White, PH.D. (Michigan).....Professor of History
Perez Zagorin, PH.D. (Harvard).....Professor of History

Milton Berman, PH.D. (Harvard).....Associate Professor of History and Associate Chairman of the Department

Harry Haroutunian, PH.D. (Michigan).....Associate Professor of History

Ralph C. Croizier, PH.D. (Berkeley).....Assistant Professor of History
Paul Forman, PH.D. (Berkeley).....Assistant Professor of History
James Friguglietti, PH.D. (Harvard).....Assistant Professor of History
Christopher Lindley, PH.D. (Cornell).....Assistant Professor of History
Dean A. Miller, PH.D. (Rutgers).....Assistant Professor of History
Arthur Mitzman, PH.D. (Brandeis).....Assistant Professor of History
John J. Waters, Jr., PH.D. (Columbia).....Assistant Professor of History

Willson Havelock Coates, PH.D. (Cornell).....Professor Emeritus of History
Arthur James May, PH.D. (Pennsylvania).....Professor Emeritus of History
Dexter Perkins, PH.D. (Harvard).....Professor Emeritus of History
Glyndon Garlock VanDeusen, PH.D. (Columbia).....Professor Emeritus of History

THE DEPARTMENT OF HISTORY offers work leading to a concentration for the A.B. degree, to the A.B. degree in the Honors Program, and to the A.M. and Ph.D. degrees.

A program of concentration for the A.B. degree will normally consist of six to eight courses in History. However, if a student elects to take more than two of the sophomore-level survey courses (History 221, 222; 223, 224; 231, 232), he will be required to complete a minimum of seven courses in History for the concentration.

A student will be expected to add to his advanced work in History enough additional courses to bring the total in his concentration to ten. The related field may be chosen from among the following: Anthropology, Economics, English, Fine Arts, Foreign Languages, Geography, Philosophy, Political Science. A student interested in a related field not listed above should consult the departmental counselor. All courses in the related field should lie beyond the introductory level, except that a student who elects to study a second foreign language will be permitted to include the first year course in that language.

Qualified History concentrators will be approved by the department for the junior year abroad.

No courses at the 200 level carry credit for graduate students in History.

For Honors seminars in History see page 93.

101–102. Introduction to Western Civilization. A broad survey of the European background of western civilization from ancient times to the present. Intellectual, religious, social, economic, and scientific developments. Political evolution and international affairs.
Omitted 1966-67

193. Preceptorial: History and Social Illusion. Close study of the interplay of art and social attitudes at moments of historical crisis in the 19th and 20th centuries.
Omitted 1966-67

194. Preceptorial: Problems in Historical Analysis. An introduction to selected analytical theories.
Omitted 1966-67

195. Preceptorial: Tradition and East Asia. The role of tradition, historical consciousness, and modernity in the transformation of Chinese and Japanese societies.

196. Preceptorial: Classical Civilization. An analysis of social, political and intellectual modes in classical Greece and Rome.
Omitted 1966-67

208. Myth and History: Early Rome. The Roman Republic; origins and structure, legend and history. Suggested correlative course: Latin 202.

209. Greek Intellectual History. An exploration of the origin, rationale, course of development, and interrelationship of the fundamental ideas of Greek thought from Homer to Aristotle.

210. The Byzantine Imperial City. Constantinople as a social, economic, administrative phenomenon; the "imperial" city as a type, and its effect on history.
Omitted 1966-67

211. Hellenic Civilization. A study of the main lines of Greek development from Minoan times to the end of the Peloponnesian Wars.
Omitted 1966-67

212. **Hellenistic Civilization.** A study of the ancient world from the early fourth to the first century B.C.

Omitted 1966–67

213. **Roman Civilization.** A study of Roman culture and society from the foundation of the city of Rome to the foundation of Constantinople.

Omitted 1966–67

214. **Byzantine Empire.** History of Byzantium from 330 to 1453, including a consideration of the Islamic world and the early medieval Slavonic states.

Omitted 1966–67

215. **Byzantine Culture and Civilization.** A study of the cultural foundations of Byzantium, its accomplishments in thought, art, and literature.

216. **Emergence of Western European Civilization.** A study of the fusion of Graeco-Roman, Christian and Germanic traditions, and an analysis of the main institutions, artistic trends, and intellectual components of the nascent European culture, from ca. 300 to ca. 1200 A.D.

Omitted 1966–67

217. **The Medieval Synthesis.** A study of Western European civilization from ca. 1200 to ca. 1350.

218. **The Italian Renaissance.** A study of Italian cultural life from ca. 1300 to ca. 1550.

Omitted 1966–67

219. **The Northern Renaissance and the Reformation.** A study of the cultural history of Northern Europe from the fourteenth to the late sixteenth century.

Omitted 1966–67

220. **Italy in the Late Middle Ages.** This course will involve a study of Italian culture and institutions from the coronation of Charlemagne to the age of Dante.

Omitted 1966–67

221. **The History of England and Greater Britain I.** A historical survey of the development of British civilization from its beginnings to 1685 with the emphasis on England.

Omitted 1966–67

222. **The History of England and Greater Britain II.** An historical survey of the development of British civilization since 1685, including the development of the Empire and Commonwealth, with the emphasis on England.

Omitted 1966–67

227. **Seventeenth Century England.** A study of all aspects of English history during a most critical and decisive phase, and in the context of the expanding Western European civilization. History 221 or 219 prerequisite or by permission of the instructor.

Omitted 1966–67

230. **Colonial Latin American History.** A study emphasizing the high cultures of Peru and Mexico in the native and viceregal eras.

Omitted 1966–67

231. **The History of the United States I.** A general history of the United States from colonial times to the Civil War.

Omitted 1966–67

232. **The History of the United States II.** A general history of the United States from the Civil War to the present.

Omitted 1966–67

233. **American Colonial History.** A study of the English discovery, settlement, and development of America, 1580–1763.

Omitted 1966–67

234. **The Colonial Mind.** An analysis of the dominant patterns of thought in colonial America, with emphasis on theology, philosophy, and social theory.

Omitted 1966–67

235. **The American Revolution.** A study of the causes and consequences of the American Revolution.

236. **The Jacksonian Era, 1824–1850.** Political and social developments underlying and accompanying westward expansion, sectional conflict, and growing economic sophistication.

237. **Civil War and Reconstruction, 1850–1877.** The coming of the war, its political and social effects, and the short-run and long-term results of the postwar reshaping of the nation.

238. **Recent History of the United States, 1890–1929.** A survey of domestic and diplomatic developments in the United States from the emergence of the Populist movement to the eve of the Great Depression.

Omitted 1966–67

239. **Recent History of the United States, 1929–1945.** A survey of domestic and diplomatic developments in the United States from the beginning of the Great Depression to the end of World War II.

Omitted 1966–67

240. The History of the American West. A survey of the expansion of the American West from the Revolution to the early 20th Century.

Omitted 1966–67

243. American Social History I. The development of American society and culture from the seventeenth century to the Civil War.

244. American Social History II. The development of American society and culture from the Civil War to the present.

245. American Intellectual History I. The American mind from colonial times to the end of the Civil War.

Omitted 1966–67

246. American Intellectual History II. The American mind from Civil War to the present.

Omitted 1966–67

247. Religion in American Society. The impact of religion on life in America, and the adaptation of religion to a changing American society, from the Puritans to the present. The course will deal with religion primarily as a social phenomenon.

Omitted 1966–67

248. The American Historiographical Tradition. A study of the development of American historiography from the early 19th Century to the present.

Omitted 1966–67

249. Nineteenth Century American Diplomatic History. A survey of the foreign policy of the United States to 1890.

Omitted 1966–67

251. The Age of Absolutism. A study of European thought and institutions, 1556–1789. Special attention is given to the Age of Louis XIV and the Enlightenment.

Omitted 1966–67

252. The Age of Revolution, 1789–1870. Special attention is given to the era of the French Revolution and Napoleon and to the industrial, political and intellectual revolutions of the mid-nineteenth century.

253. France Since 1870. Economic, political, diplomatic, imperial, and cultural developments, concluding with an estimate of the changes resulting from World War II.

Omitted 1966–67

255. Europe in the Liberal Era. Analytical studies of European history from the close of the epoch of traditional statemaking to the opening of the age of world wars and revolutions. Emphasis will be placed on the inter-European character of the larger political, diplomatic, social, economic, and cultural problems of the period.

Omitted 1966–67

256. Europe in the Twentieth Century. An historical analysis of Europe's era of crises, world wars, and revolutions. Emphasis will be placed upon the origins and impact of the two great European wars of the twentieth century with a view to elucidating the dual transformation of Europe from hegemony to potential "third force" and from nationalism through totalitarianism to an emergent European Community.

257. The History of Italy from the Renaissance to the Risorgimento. A study of the origins, character, and significance of modern Italian civilization conducted through historical analysis of major expressions during the eras of the Renaissance, the Baroque, and the Enlightenment.

Omitted 1966–67

258. The History of Italy from the Risorgimento to the Present. A study of Italian history during the nineteenth and twentieth centuries which emphasizes the rise, rule, and decline of the Liberal State.

Omitted 1966–67

259. Russian Intellectual History. A consideration of the main themes of Russian intellectual history in the 19th and 20th centuries.

Omitted 1966–67

260. Japanese History to 1800. A survey of Japanese institutions and culture before modernization.

262. Japan Since 1800. An historical analysis of the economic, political, social, and cultural forces which contributed to Japan's emergence as a modern state.

Omitted 1966–67

263. Intellectual History of Modern East Asia. The development of Chinese and Japanese thought from the 18th century to the present. This course is conducted as a discussion group.

Omitted 1966–67

265. A History of Russia I. History of Russia from the earliest times to Peter I. Stress placed on the origins and development of characteristic Russian political, social and economic institutions.

266. A History of Russia II. This course covers the history of Russia from Peter I to the present.

267. The Middle East in Modern Times. Rapid survey of the background before 1800; emphasis on the growth of Turkish and Arab nationalism, the strategic importance of the Middle East, and the record of attempts to modernize and "Westernize" the Middle Eastern states.

Omitted 1966–67

268. History of China to 1600. The formation of a distinctively Chinese culture area and its political unification. Disintegration and reunification of the centralized Empire, with the evolution of the political, social, and cultural forms which characterized early modern China.

269. History of China Since 1600. The mature Imperial system in its social and cultural setting. Collapse of the traditional order under the impact of the industrialized West, and the process of China's modern revolution.

271. Intellectual History of Modern Europe. A reading course in the history of western thought from ca. 1300 to 1750.

272. Intellectual History of the West. A continuation of History 271, dealing with the period from ca. 1750 to the present. History 271 is *not* prerequisite for this course.

274. History of Germany from the Reformation to Bismarck. An analysis of social, political and intellectual currents in Germany.

275. German History from 1890 to 1945. An examination of the social, political and intellectual trends in Germany from 1890–1945.

281. Totalitarianism. The background and development of totalitarian movements in the twentieth century, with special emphasis on Soviet Russia and Nazi Germany.

Omitted 1966–67

283. Problems in Cultural History I. A wide-range investigation of four major periods of cultural vitality, Periclean Athens, Augustan Rome, the Carolingean Renaissance and Florence under the Medici. Open to seniors.

Omitted 1966–67

284. Problems in Cultural History II. History 283 not prerequisite. The period covered will be from the French to the Russian Revolutions. Open to seniors.

291. Reading Course in History. For students whose interests cannot be satisfied by the normal range of course offerings. Permission of the Chairman of the Department required.

Languages and Linguistics

D. Lincoln Canfield, PH.D. (Columbia) ..... Professor of Spanish and *Chairman of the Department*
Arthur Monroe Hanhardt, PH.D. (Cornell) ..... Professor of German
Stanley M. Sapon, PH.D. (Columbia) ..... Professor of Psycholinguistics

William H. Clark, Jr., PH.D. (Columbia) ..... Associate Professor of German and Education
Antanas Klimas, PH.D. (Pennsylvania) ..... Associate Professor of German
Dean H. Obrecht, PH.D. (Pennsylvania) ..... Associate Professor of Linguistics

Frank R. P. Akehurst, M.A. (Brasenose College, Oxford) ..... Assistant Professor of French
Vladimir Butkoff, M.A. (Syracuse) ..... Assistant Professor of Russian
Charles Carlton, PH.D. (Michigan) ..... Assistant Professor of French
William A. Coates, PH.D. (Harvard) ..... Assistant Professor of Linguistics
Ronald V. Harrington, PH.D. (Harvard) ..... Assistant Professor of Russian
Richard M. Harris, PH.D. (Cornell) ..... Assistant Professor of Linguistics
Demetrius Moutsos, PH.D. (Chicago) ..... Assistant Professor of Linguistics
Donald G. Reiff, PH.D. (Michigan) ..... Assistant Professor of Linguistics
Guy R. Welbon, PH.D. (Chicago) ..... Assistant Professor of Sanskrit

Piero Braggiotti, A.M. (Rochester) ..... Instructor in Italian
Anne Marie Méar, DIPLOME (Rennes) ..... Instructor in French
Alex Wieber ..... Instructor in German and Russian
Caroline Wood, B.A. (Tsing Hua) ..... Instructor in Chinese

*Part-time.

THE DEPARTMENT OF LANGUAGES AND LINGUISTICS offers courses in Chinese, French, German, Greek, Hindi, Italian, Japanese, Latin, Russian, Sanskrit, and Spanish as well as in Linguistics. It offers concentration toward the A.B. degree in Linguistics, French, German, Russian, and Spanish; toward the M.A. degree in Linguistics, French, German, and Spanish; and toward the Ph.D. degree in General Linguistics.

For the A.B. degree in French, German, Russian or Spanish, a student's program of concentration will consist of six to eight courses beyond Conversation and Composition 121. In consultation with the departmental adviser for the language in question, the student will plan a program with emphasis on *language* but including at least the Survey of Literature courses (131 and 132) given by the Department of Foreign and Comparative Literature and at least the Introductory course in Linguistics 201. Allied courses bring the total to ten.

For the A.B. degree in Linguistics, a student's program of concentration will consist of six to eight courses in Linguistics, including 201 (the prerequisite for all other courses in Linguistics), and 202, 203, 204. Courses in Foreign Languages, Literature, Anthropology, Mathematics, Philosophy or Psychology are accepted as allied material to complete the ten-course concentration.

The facilities of four established laboratories are used in the training of students: the Laboratory of Verbal Behavior, the Phonetics Laboratory, the Programmed Learning Studio and the Language Service Center.

The Department encourages the Junior Year Abroad for qualified students of French, German and Spanish, and has regular exchange agreements with institutions in France, Germany and Colombia.

CHINESE

201. Elementary Chinese I. Introductory training in the structure of modern Chinese and its basic vocabulary. Practice in speaking; reading of selected graded texts. No graduate credit.

Three class hours and two laboratories a week.

202. Elementary Chinese II. A continuation of Chinese 201. No graduate credit.

203. Intermediate Chinese. Continuing study of modern Chinese in its spoken and written forms. Reading of graded texts in the Chinese script. Prerequisite: Chinese 202 or equivalent. No graduate credit.

205. Readings in Modern Chinese Prose. Practice in reading selected short prose works as preparation for the use of Chinese as a research tool in the humanities and social sciences. Prerequisite: Chinese 203 or equivalent. No graduate credit.

221. Chinese Conversation. Practice in understanding and speaking modern mandarin Chinese; attention to Chinese grammar. Prerequisite: Chinese 202 or equivalent. No graduate credit.

FRENCH

101. Elementary French I. Introductory training in the structure of modern French and its basic vocabulary. Practice in speaking; reading of selected graded texts.

Three class hours and two laboratories a week.

102. Elementary French II. A continuation of French 101.

103. Intermediate French. Continuing study of modern French in its spoken and written forms. Prerequisite: French 101 and 102 or equivalent.

Three class hours and one laboratory a week.

121. French Conversation and Composition. Study of current French structure, usage, and vocabulary. Practice in expository writing and in speaking, to increase fluent active command of the language; problems of translation. Required of French majors. Prerequisite: French 103 or equivalent.

Three class hours and two laboratories a week.

211. The Linguistic Structure of French. Synchronic analysis of the phonemic, mor-

phological, syntactic, and semantic systems of present-day French; dialectal variations. Prerequisites: French 121 or equivalent and Linguistics 201, or permission of instructor.

212. **French Dialectology.** Study of the dialectal variations of the French language both in their geographical and social dimensions. Prerequisites: French 211 or permission of instructor.

Omitted 1966-67

220. **Advanced French Conversation and Composition.** Advanced study of structure and usage; examination of problems of translation; expository writing; prepared and extemporaneous speaking. French 121 or equivalent and French 131 and 132. Permission of instructor required. No graduate credit.

221. **French Orthoëpy and Advanced Conversation.** Study of French pronunciation in all its aspects; emphasis on diction, effectiveness, levels of speech and style. Prepared and extemporaneous speaking. Prerequisite: permission of instructor. No graduate credit.

235. **History of the French Language.** Diachronic analysis of French as one of the Romance languages; its formation, development, and present state with emphasis on phonology and morphology. Examination of selected texts from the earliest period to modern times illustrating the development of French. Prerequisites: French 121 or equivalent and Linguistics 201, or permission of instructor.

236. **Historical Development of Literary French.** Continuation of preceding course (FR 235), but with emphasis on reading .nd examination of selected texts from the earliest period to modern times to illustrate the syntactical, lexical, and semantic development of French. Prerequisite: French 235, or permission of instructor.

241. **Practicum in French.** Investigation of special problems in French.

Omitted 1966-67

291. **Reading Course in French Language.**

GERMAN

101. **Elementary German I.** Introductory training in the structure of modern German and its basic vocabulary. Practice in speaking; reading of selected graded texts.

Three class hours and two laboratories a week.

102. **Elementary German II.** Continuation of German 101.

103. **Intermediate German.** Continuing study of modern German in its spoken and written forms. Prerequisite: German 102 or equivalent.

Three class hours, one laboratory a week.

105. **German Specialized and Technical Reading.** Controlled readings in specialized and technical prose as a preparation for use of the language in fields of the student's interest. Prerequisite: German 102 or equivalent.

121. **German Conversation and Composition.** Study of current German structure, usage, and vocabulary. Practice in expository writing and in speaking, to increase fluent active command of the language; problems of translation. Required of German majors. Prerequisite: German 103 or equivalent.

Three class hours and two laboratories a week.

211. **The Linguistic Structure of German.** Synchronic analysis of the phonemic, morphological, syntactic, and semantic systems of present-day German; dialectal variations. Prerequisites: German 121 or equivalent and Linguistics 201, or permission of instructor.

Omitted 1966-67

212. **German Dialects.** An examination of the growth and development of the German language area of Central Europe: Germany, Austria, Switzerland and the bordering regions in which dialect forms of German are spoken. Prerequisite: German 211 or permission of the instructor.

Omitted 1966-67

220. **Advanced German Conversation and Composition.** Advanced study of structure and usage; examination of problems of translation. Expository writing; prepared and extemporaneous speaking. Prerequisites: German 121 or equivalent and German 131 and 132. Permission of instructor required. No graduate credit.

235. **History of the German Language to 1500.** Diachronic analysis of German as one of the Germanic languages; its formation and development to 1500. Examination of selected texts from the earliest period to 1500 illustrating the development of German. Prerequisites: German 121 or equivalent and Linguistics 201, or permission of instructor.

236. **History of the German Language from 1500.** A continuation of German 235, covering the period from 1500 to the present.

241. **Practicum in German.** Investigation of special problems in German.

Omitted 1966-67

291. **Reading Course in German Language.**

GREEK

101. Elementary Greek I. Introductory training in the structure of Greek and its basic vocabulary. Reading of selected graded texts.

102. Elementary Greek II. Continuation of Greek 101.

HINDI

201. Hindi I. Intensive study of basic vocabulary and structure of modern Hindi for rapid development of speaking, listening and reading skills. Prerequisite: fulfillment of foreign language requirement.

202. Hindi II. A continuation of Hindi 201.

203. Hindi Composition and Conversation I. Continuing study of current Hindi structure, usage, and vocabulary. Practice in expository writing and in speaking, to increase fluent active command of the language; problems of translation. Prerequisite: Hindi 202 or permission of instructor.
Three class hours and one laboratory a week.
Omitted 1966–67

204. Hindi Composition and Conversation II. A continuation of Hindi 203. Prerequisite: Hindi 203, or permission of instructor.
Omitted 1966–67

205. Hindi Reading I. Controlled readings in general prose as a preparation for further work with the written language. Prerequisite: Hindi 202, or permission of instructor.

206. Hindi Reading II. A continuation of Hindi 205. Prerequisite: Hindi 205, or permission of instructor.

ITALIAN

101. Elementary Italian I. Introductory training in the structure of modern Italian and its basic vocabulary. Practice in speaking; reading of selected graded texts.
Three class hours and two laboratories a week.

102. Elementary Italian II. Continuation of Italian 101.

103. Intermediate Italian. Continuing study of modern Italian in its spoken and written forms. Prerequisite: Italian 101 and 102 or equivalent.
Three class hours and one laboratory a week.

121. Italian Conversation and Composition. Study of the structure, usage, and vocabulary of modern Italian. Practice in expository writing and in speaking, to increase fluent active command of the language; problems of translation. Prerequisite: Italian 103 or equivalent.
Three class hours and one laboratory a week.

JAPANESE

201. Elementary Japanese I. Introductory training in the grammar of modern Japanese with reading of simple texts and practice with tapes. No graduate credit.

202. Elementary Japanese II. Continuation of Japanese 201. No graduate credit.

203. Intermediate Japanese. Reading of a variety of texts with emphasis on comprehension. No graduate credit.

LATIN

101. Elementary Latin I. Introductory training in the structure of Latin and its basic vocabulary. Practice in speaking; reading of selected texts.
Three class hours and two laboratories a week.

102. Elementary Latin II. Continuation of Latin 101.

RUSSIAN

101. Elementary Russian I. Introductory training in the structure of modern Russian and its basic vocabulary. Practice in speaking; reading of selected graded texts.
Three class hours and two laboratories a week.

102. Elementary Russian II. Continuation of Russian 101.

103. Intermediate Russian. Continuing study of modern Russian in its spoken and written forms. Prerequisite: Russian 102 or equivalent.

105. Russian Specialized and Technical Reading. Controlled readings in specialized and technical prose as a preparation for use of the language in fields of the student's interest. Prerequisite: Russian 102 or equivalent.

121. Russian Conversation and Composition. Study of current Russian structure, usage, and vocabulary. Practice in expository writing and in speaking, to increase fluent active command of the language; problems of translation. Required of Russian majors. Prerequisite: Russian 103 or equivalent.
Three class hours and two laboratories a week.

211. The Linguistic Structure of Russian. Synchronic analysis of the phonemic, morphological, syntactic, and semantic systems

of present-day Russian; dialectal variations. Prerequisites: Russian 121 or equivalent and Linguistics 201 or permission of instructor.

Omitted 1966–67

220. Advanced Russian Conversation and Composition. Advanced study of structure and usage; examination of problems of translation. Expository writing; prepared and extemporaneous speaking. Emphasis on diction, effectiveness, levels of speech, and style. Prerequisites: Russian 121 or equivalent and Russian 131 and 132. Permission of instructor required. No graduate credit.

233. Old Church Slavic. A descriptive study of the structure of Old Church Slavic. Analysis of texts. Prerequisite: proficiency in one Slavic language, or permission of the instructor.

234. Old Russian. A descriptive and comparative study of the Russian language of the X–XIII centuries. Analysis of texts. Prerequisite: Old Church Slavic, or permission of the instructor.

235. History of the Russian Language. Diachronic analysis of Russian as one of the Slavic languages; its formation, development, and present state. Examination of selected texts from the earliest period to modern times illustrating the development of Russian. Prerequisites: Russian 121 or equivalent and Linguistics 201, or permission of instructor.

Omitted 1966–67

241. Practicum in Russian. Investigation of special problems in Russian.

SANSKRIT

231. Sanskrit I. Textual analysis of synchronic and diachronic elements of the classical language stressing acquisition of vocabulary and the significance of Sanskrit in the Indian civilization.

232. Sanskrit II. Continuation of 231 with additional attention devoted to the basic terminology and certain methodological contributions of the Sanskrit grammarians. Prerequisite: consent of instructor.

SPANISH

101. Elementary Spanish (Programmed) I. Intensive training in speaking, comprehension, reading, and writing through the use of programmed learning materials, presented on tape and in workbooks. Students work independently under supervision and also participate in periodic meetings with the instructional staff.

102. Elementary Spanish (Programmed) II. Skills acquired in Spanish 101 are maintained in audio-lingual classroom instruction. Reading and writing are emphasized.

103. Intermediate Spanish. Continuing study of modern Spanish in its spoken and written forms. Prerequisite: Spanish 102 or equivalent.

121. Spanish Conversation and Composition. Study of current Spanish structure, usage, and vocabulary. Practice in expository writing and in speaking, to increase fluent active command of the language; problems of translation. Required of Spanish majors. Prerequisite: Spanish 103 or equivalent.

Three class hours and two laboratories a week.

211. The Linguistic Structure of Spanish. Synchronic analysis of the phonemic, morphological, syntactic, and semantic systems of present-day Spanish; dialectal variations. Prerequisites: Spanish 121 or equivalent and Linguistics 201, or permission of instructor.

212. American Spanish. A study of the dialectal variations of Latin American Spanish: phonology, syntax, semantics. Prerequisites: Spanish 121 and Linguistics 201, or permission of instructor.

Omitted 1966–67

220. Advanced Conversation and Composition. Advanced study of structure and usage; examination of problems of translation. Expository writing; prepared and extemporaneous speaking. Emphasis on diction, effectiveness, levels of speech, and style. Prerequisites: Spanish 121 or equivalent and Spanish 131 and 132. Permission of instructor required. No graduate credit.

235. 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 illustrating the development of Spanish. Prerequisites: Spanish 121 or equivalent and Linguistics 201, or permission of instructor.

Omitted 1966–67

241. Practicum in Spanish. Investigation of special problems in Spanish.

291. Reading Course in Spanish Language.

LINGUISTICS

201. Introduction to Linguistics. Principles of structural analysis of speech phenomena. Examination of material from a wide variety of languages. Prerequisite: fulfillment of the foreign language requirement.

202. **Introduction to Historical Linguistics.** A diachronic study of the phases and processes of linguistic change: phonological, grammatical and semantic. Prerequisite: Linguistics 201 or permission of instructor.

203. **Articulatory Phonetics.** An introduction to the science of phonetics. Physiological bases of speech production and perception. Analysis and classification of speech sounds in isolation and in context. Discrimination, production and transcription skills are acquired.

204. **Acoustic Phonetics.** Introduction to the structure of the speech wave, problems of acoustical and linguistic speech segmentation, and perceptual relationship between acoustic features and linguistic units. Practical experience in laboratory phonetics. Prerequisite: Linguistics 201 and permission of instructor.

205. **Applied Linguistics for Language Teachers.** Introduction to principles of linguistic analysis and their effective application in second-language teaching. Prerequisite: fulfillment of the foreign language requirement.
Omitted 1966–67

213. **Languages in the World I.** A survey of the living Indo-European languages of the world, by language families and in terms of their functions in modern society and of their structure; writing systems. Prerequisite: Linguistics 201 or permission of the instructor.

214. **Languages in the World II.** Survey of the living non-Indo-European languages of the world, by language families and in terms of their functions in modern society; types of linguistic structure; writing systems. Prerequisite: Linguistics 213 or permission of the instructor.

215. **Descriptive Analysis I: Phonology.** Consideration of the phonemic principle and development of skills in the description of the sound systems of language. Prerequisites: Linguistics 201 and Linguistics 203, or permission of instructor.

216. **Descriptive Analysis II: Morphology and Syntax.** Procedures of morphemic analysis and syntactic description and development of skills in the description of grammatical systems. Prerequisite: Linguistics 201 or permission of instructor.

217. **Informant Work.** Intensive practice in the transcription and analysis of an unknown language from speech. Elements of phonological, morphological and syntactical analysis and presentation. Prerequisite: Linguistics 201 and 203 and permission of instructor.

237. **Introduction to Romance Linguistics.** Comparative study of the development of the principal Romance Languages from their Latin origins. Prerequisite: Concentration in one of the Romance languages or equivalent.

281. **Practicum in Linguistics.** Investigation of special problems in linguistics.

Mathematics

William Frederick Eberlein, PH.D. (Harvard) ..... Professor of Mathematics
Leonard Gillman, PH.D. (Columbia) ..... Professor of Mathematics and *Chairman of the Department*
Norman Gustav Gunderson, PH.D. (Cornell) ..... Professor of Mathematics and Associate Professor of Education
Johannes Henricus Bernardus Kemperman, PH.D. (Amsterdam) ..... Professor of Mathematics
Leopoldo Nachbin, PH.D. (Brazil) ..... Professor of Mathematics
John Adam Fitz Randolph, PH.D. (Cornell) ..... Fayerweather Professor of Mathematics
Arthur Harold Stone, PH.D. (Princeton) ..... Professor of Mathematics
Dorothy Maharam Stone, PH.D. (Bryn Mawr) ..... Professor of Mathematics
W. Allen Wallis, A.B. (Minnesota) ..... Professor of Economics and Statistics

Norman Larrabee Alling, PH.D. (Columbia) ..... Associate Professor of Mathematics
Ralph Alexis Raimi, PH.D. (Michigan) ..... Associate Professor of Mathematics and *Associate Chairman of the Department*
Norman Stein, PH.D. (Cornell) ..... Associate Professor of Mathematics
Stanley Tennenbaum, PH.D. (Chicago) ..... Associate Professor of Mathematics
Charles Edward Watts, PH.D. (California) ..... Associate Professor of Mathematics

John Day Dollard, PH.D. (Princeton) ..... Assistant Professor of Mathematics
John Arthur Ernest, PH.D. (Illinois) ..... Assistant Professor of Mathematics
Newcomb Greenleaf, PH.D. (Princeton) ..... Assistant Professor of Mathematics
Warren May, PH.D. (Columbia) ..... Assistant Professor of Mathematics
Govind Shrikrishna Mudholkar, PH.D. (North Carolina) ..... Assistant Professor of Statistics
Arlan Bruce Ramsay, PH.D. (Harvard) ..... Assistant Professor of Mathematics
Sanford Leonard Segal, PH.D. (Colorado) ..... Assistant Professor of Mathematics

Anthony Wood Hager, PH.D. (Pennsylvania State) ..... Instructor in Mathematics
Samuel Merrill III, PH.D. (Yale) ..... Instructor in Mathematics

Charles William Watkeys, A.M. (Harvard) ..... Professor Emeritus of Mathematics

THE DEPARTMENT OF MATHEMATICS offers the A.B., A.M., and Ph.D.

Undergraduate majors are limited to students who do well in Mathematics 161–164 or 171–174. The first of these is the standard sequence in analysis; it may be entered with advanced standing. The second is an accelerated sequence covering the standard material more deeply and with additional theoretical work.

A concentration consists of ten courses; six to eight are mathematics courses numbered 200 or higher; the rest are nonintroductory electives in biology, chemistry, economics, philosophy, physics, or psychology.

The A.B. requires Mathematics 237, 265 and 266. To earn Distinction, the student must present additional advanced work of high quality.

There is considerable flexibility in mathematics electives. All students planning graduate work in mathematics are urged to take at least two courses from among Mathematics 266, 267, 268, and 275; they should also study two of the languages: French, German, Russian. Mathematics majors planning a career in industry are advised to take Mathematics 200, 207, 267, 268, and 280; those planning to teach in the secondary schools should consider Mathematics 200, 230, and 250.

Mathematics 267 and 268 are recommended for majors in the natural sciences and engineering. Mathematics 100 is appropriate for majors in management and social sciences. Mathematics 140 is intended primarily for students planning to teach in the elementary school or in a non-science area at the secondary school level. Mathematics 100, 130, and 150 are recommended electives for students in the liberal arts.

100. Finite Mathematics. Logic and the algebra of sets; partitions; combinatorial probability; vectors and matrices; linear programming and the theory of games.

130. Mathematical Snapshots. Prime numbers, rationals, complex numbers; traveling salesman problems; memory wheels; algebraic systems; Latin squares; map coloring problems; infinite sets.

140. Topics in Elementary Mathematics. The real number system and its subsystems. Sets and relations. Topics in geometry. Intended primarily for the student planning to teach in the elementary school or in a non-science area at the secondary school level.

150. Analytic Geometry and Calculus. Differential calculus and its application to the geometric properties of elementary curves.

161. Analysis I. Equations of the line; sets, functions; limits; derivatives; conic sections; the definite integral.

162. Analysis II. Integration; solid analytic geometry; series; vector analysis. Prerequisite: Math. 161.

163. Analysis III. Multiple integrals; partial derivatives; differential equations. Prerequisite: Math. 162.

164. Analysis IV. Further topics in differential equations; linear algebra. Prerequisite: Math. 163.

171. Analysis Ia. Math. 161 at a deeper theoretical level. Consent of the department required.

172. Analysis IIa. Math. 162 at a deeper theoretical level. Prerequisite: Math. 171.

173. Analysis IIIa. Math. 163 at a deeper theoretical level. Prerequisite: Math. 172.

174. Analysis IVa. Math. 164 at a deeper theoretical level. Prerequisite: Math. 173.

200. Probability. Random variables; binomial, Poisson, and normal distributions; mathematical expectation, law of large num-

bers; central limit theorem; Markov chains. Prerequisite: Math. 163.

207. Linear Programming and the Theory of Games. The basic properties of convex sets. The linear programming problem and its dual. Principal theorems; applications, in particular to finite games. Some infinite games. Prerequisite: Math. 162.

Omitted 1966–67

220. Mathematical Logic. Propositional calculus, functional calculus of first and higher order, the decision problem, consistency, completeness.

Omitted 1966–67

230. Theory of Numbers. Divisibility, primes; congruences; Euler's ø-function; quadratic residues and quadratic reciprocity; algebraic integers.

235. Finite Dimensional Vector Spaces. Bases, dimension, linear transformations, rank and nullity, eigenvalues, inner products, orthogonality.

Omitted 1966–67

237. Introduction to Abstract Algebra. Fundamental algebraic structures: rings, fields, polynomial domains, groups, vector spaces, modules.

Omitted 1966–67

247. Theory of Sets. Sets, relations, mappings; equivalence, order; cardinals, ordinals, transfinite arithmetic; axiom of choice and equivalents.

Omitted 1966–67

250. Higher Geometry. Foundations of geometry; isometry, similarity, inversions; introduction to affine, projective, and various non-Euclidean geometrics.

Omitted 1966–67

265. Functions of a Real Variable I. Real number system; uniform continuity; mean value theorems; bounded variation; Riemann-Stieltjes integral; sequences of functions. Prerequisite: Math. 163.

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: Math. 265.

267. Functions of a Complex Variable. Complex numbers, analytic functions, elementary functions, line integrals, Cauchy theorems, Laurent series, residues, applications. Prerequisite: Math. 164.

268. Orthogonal Functions and Fourier Series. Orthogonal functions. Sturm-Liouville equations; integral operators, Dirichlet kernel, Fourier series, Gibbs phenomenon; generalized functions; Legendre polynomials, Bessel functions; heat and temperature, harmonic functions, waves and vibrations; Fourier integral. Prerequisite: Math. 265 or 267.

275. Topological Methods in Analysis. Metric spaces, compactness, contracting mapping theorem and applications to differential equations, implicit function theorem, fundamental theorem of algebra, Weierstrass approximation theorem. Prerequisite: Math. 265.

280. Numerical Methods. Numerical approximations to solutions of linear, transcendental, differential, and partial differential equations. Some time may be spent at the Computing Center. Prerequisite: Math. 164.

Omitted 1966–67

291. Reading Course in Mathematics. Special work, arranged individually. Consent of the department required.

295. Senior Thesis. A paper based upon independent study.

436. Abstract Algebra I. Basic algebraic structures, including semi-groups, groups, rings, fields, vector spaces, modules, linear algebras, lattices.

437. Abstract Algebra II. Rings of endomorphisms of abelian groups, multilinear algebras, exterior algebras, Galois theory. Prerequisite: Math. 436.

440. General Topology. Continuity. Compactness, connectedness, metrizability. Product spaces. Prerequisite: Math. 265.

443. Algebraic Topology I. The combinatorial structure of complexes and the homology of polyhedra. Application of algebraic techniques in topology to classification of surfaces, fixed point theory, and analysis. Prerequisite: Math. 436 and 440.

467. Theory of Analytic Functions. Cauchy theorems, Taylor and Laurent series, residues, conformal mapping, analytic continuation, product theorems. Prerequisite: Math. 265 or 267.

471. Measure and Integration I. Lebesgue measure on the line. Measure spaces. Integration. Convergence theorems. The Radon-Nikodym theorem. Differentiation. Prerequisite: Math. 265.

472. Measure and Integration II. Fubini's theorem. Convergence in measure, in mean. Hölder and Minkowski inequalities. The function spaces L_p and C. The Riesz representation theorem. Hilbert space, Fourier series. Prerequisite: Math. 471.

Music

COLLEGE OF ARTS AND SCIENCE

***Paul R. Allen,** M.A. (Columbia).....Teaching Assistant in Music

EASTMAN SCHOOL OF MUSIC FACULTY

(see current "Official Bulletin")

*Part-time.

AN A.B. PROGRAM with a concentration in music is offered by the College of Arts and Science in cooperation with the Eastman School of Music. Students planning to pursue this curriculum must be auditioned and accepted by the Eastman School of Music as well as the College of Arts and Science.

Since such concentrators have such a high level of sophistication in music, the courses in Music 101, 103, and 104 offered in the College of Arts and Science are not open to them.

Students concentrating in music are required to meet the general requirements of the College of Arts and Science in English, foreign language, distribution, and physical education. In addition they are required to take sixteen courses in music at the rate of two in each of the eight terms, as indicated in the following sample program:

FIRST YEAR

1. Applied Music	1. Applied Music
2. 101 Theory	2. 102 Theory
3. English Requirement	3. Group I (Foreign Language)
4. Group III (Lab)	4. Group III (Lab)
Physical Education	Physical Education

SECOND YEAR

1. Applied Music	1. Applied Music
2. 111 Theory	2. 112 Theory
3. Group II	3. Group II
4. Group III	4. Group III
Physical Education	Physical Education

THIRD YEAR

1. Applied Music	1. Applied Music
2. Music Elective	2. Music Elective
3. Group II	3. Group II
4. Elective (CAS)	4. Elective (CAS)

FOURTH YEAR

1. Applied Music	1. Applied Music
2. Theory Elective	2. Theory Elective
3. Elective (CAS)	3. Elective (CAS)
4. Elective (CAS)	4. Elective (CAS)

Non-music majors may take electives in music at the Eastman School of Music with the permission of the Registrar. One year of work in a single field of applied music is defined as a *course* and non-music majors will be permitted to submit for degree credit no more than two such courses. Students electing such courses should confer with their faculty advisers concerning the courses for which they are eligible. Practice facilities are available on the River Campus to all students who are enrolled in courses in applied music. Practice rooms supplied with pianos are located in the Women's Gymnasium and the Men's Dining Center.

OFFERED BY THE COLLEGE OF ARTS AND SCIENCE

Music 101. Fundamentals of Music. Introduction of basic aspects of the theory of music to students not concentrating in music. Elementary ear-training. Practice in writing simple exercises in harmony. Study of rhythm, melody, musical form and the characteristics of orchestral instruments.

Music 103. Introduction to the Literature of Music I. This course and its sequel, Music 104, aim to introduce the student to the subject of Western music through analysis of selected masterpieces of that art. It is devoted to the development of music from early Christian times until 1830 with special attention being given to the Renaissance, Baroque and Classical periods in their relationship to the cultural and social forces of the times. A knowledge of the fundamentals of music is prerequisite.

Music 104. Introduction to the Literature of Music II. Development of music during the Romantic and Modern periods. Correlation between music and the other arts is given special consideration. A knowledge of the fundamentals of music is prerequisite.

OFFERED BY THE EASTMAN SCHOOL OF MUSIC

Theory 101. First-Year Theory I.[1] The melodic, harmonic and rhythmic elements of music. The four types of triads; intervals, keys, scales, cadences, notation, rhythmic reading, sight-singing; keyboard harmony, melodic and harmonic dictation.

Five hours a week.

Theory 102. First-Year Theory II.[1] Continuation. Dominant seventh chord, modal scales, key relationship, modulations, transposition, four-part writing, and two-part counterpoint. Rhythmic reading, sight-singing, keyboard harmony, melodic and harmonic dictation continuing. Prerequisite: Theory 101.

Five hours a week.

Theory 111. Second-Year Theory I.[1] Two-, three-, and four-part music of J. S. Bach and his contemporaries. Analysis, part-writing, practical application at the piano, and dictation. Harmonic and formal analysis of music by K. P. E. Bach, Haydn, Mozart, and Beethoven. Writing includes chorale harmonization, chorale-preludes, a two-part invention, recitatives, piano accompaniments for folk songs, and three- and four-part vocal arrangements. Prerequisite: Theory 101, 102.

Five hours a week.

Theory 112. Second-Year Theory II.[1] A continuation of Theory 111. Prerequisite: Theory 111.

Five hours a week.

***Theory 131. Styles I.** Technical analysis of works of the late eighteenth- and nineteenth-century composers with written assignments in the styles under consideration. Prerequisite: Theory 112.

***Theory 132. Styles II.** Continuation of Theory 131. Styles of twentieth-century American and European composers. Prerequisite: Theory 131.

***Counterpoint 101. Modal Counterpoint I.** Modal counterpoint of the sixteenth century; the motet and the Mass. Writing in up to three voices. Prerequisite: Theory 112. To receive credit, Counterpoint 102 must be completed.

***Counterpoint 102. Modal Counterpoint II.** Continuation of Counterpoint 101. Writing in four and five voices. Prerequisite: Counterpoint 101.

***Orchestration 201. Fundamentals of Orchestration I.** Instruments of the orchestra; practical scoring for individual choirs.

Two hours a week.

***Orchestration 202. Fundamentals of Orchestration II.** Continuation of 201. Scoring for chamber and full orchestra. Prerequisite: Orchestration 201.

Two hours a week.

***History 101. Historical Survey I.** A general consideration of Western civilization from antiquity to the present with special emphasis upon the development of Western musical forms and styles.

***History 102. Historical Survey II.** Continuation of 101.

***Music Literature 211. Piano Literature I.** Analysis and performance of keyboard music from the pre-piano period to Beethoven; special attention to the piano sonata and other characteristic forms. Primarily for majors in piano, composition, or history of music.

Two hours a week.

***Music Literature 212. Piano Literature II.** Continuation of 211. From the Romantic Period to the present.

Two hours a week.

***Ensemble 111. Eastman School Chorus.** *A cappella* literature and larger works for chorus and orchestra. Required of voice majors and recommended if voice is studied as an elective.

No credit.
Two hours a week.

***Ensemble 112. Eastman School Chorus.** A continuation of Ensemble 111.

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[1]These courses are required of music majors. Others may enroll only with permission of the Instructor.

*Offered at Eastman School only.

Naval Science

F. J. Ruder, CAPT. (USN), MSBA (George Washington).....Professor of Naval Science and *Chairman of the Department*

R. J. Hoffman, CDR (USN), B.A. (Maryland).....Associate Professor of Naval Science

W. C. Stratmann, LCDR (USN), B.S. (U.S. Naval Postgraduate School).....Assistant Professor of Naval Science

James L. Bayne, LT. (USN), B.S. (Naval Academy).....Assistant Professor of Naval Science

R. R. Mason, LT. (USN), B.A. (Miami).....Assistant Professor of Naval Science

James L. Sparks, LT. (USNR), B.S. (Itowson State Teachers).....Assistant Professor of Naval Science

Charles B. Webster, MAJ. (USMC), B.S. (Ohio State).....Assistant Professor of Naval Science

John P. Barton, SKC (USN).....Instructor in Naval Science

Wilford E. Dowell, YNC (SS), (USN).....Instructor in Naval Science

Mark E. Maul, GMGC (A) (USN).....Instructor in Naval Science

Howard E. McConnell, RDC (USN).....Instructor in Naval Science

Philip L. Stinson, GYSGT (USMC).....Instructor in Naval Science

John E. Sullivan, QMC (USN).....Instructor in Naval Science

THE NAVAL SCIENCE SEQUENCE consists of work in each of the eight undergraduate terms. The College of Arts and Science grants three courses of credit for work in Naval Science toward the A.B. and the B.S.

In addition to the requirements for enrollment in the NROTC program and the requirements for commission discussed in the Officer Candidate Programs section of the catalogue, the following specific requirements must be met:

1) By the end of the sophomore year, every regular NROTC student must have satisfactorily completed one year of college physics and one year of college mathematics. Contract students are encouraged but not required to take physics.

2) All Contract students must have completed mathematics through trigonometry by the end of the sophomore year. Contract students who have completed the mathematics requirements in secondary school need not take more mathematics unless it is required by the courses they are pursuing in the University.

3) Every student must achieve proficiency in written and oral expression represented by successful completion of the English requirement (see p. 83).

4) Physical training will be taken by every student.

5) Each student shall take instruction in swimming, and qualify as a First Class Swimmer.

101. Naval Orientation. A study of the basic customs and traditions of the Navy and of functions of the Naval Establishment and its components in the defense of the nation; the duties and responsibilities of a line officer in the Naval Service.

Three lecture-recitations.
One two-hour practical instruction period a week.

102. Evolution of Sea Power. Influence of sea power upon global history in general, and upon the world balance of power in particular, with especial reference to the role of sea power in maintaining the peace.

Three lecture-recitations.
One two-hour practical instruction period a week.

151. Naval Weapons. Fundamentals of naval weapons and weapons systems, stressing basic principles, and their application to control of the seas.

Three lecture-recitations.
One two-hour practical instruction period a week.

221. Navigation. Theory and techniques of the art of navigation, including dead reckoning, piloting, electronic and celestial navigation.

Three lecture-recitations.
One two-hour practical instruction period a week.

222. Naval Operations. Naval operations in general at the junior watch officer level, including rules of the nautical road, OOD and CIC operational duties, and maneuvering board. Capabilities, restrictions, and security of naval communications. Radar

navigation, polar operations and operational meteorology.

Three lecture-recitations.
One two-hour practical instruction period a week.

232. **Principles and Problems of Naval Leadership.** Principles and problems of human relations, the principles of management, and the responsibilities of the junior officer in his role as a Division Officer. Topics include: concepts of leadership; principles of interviewing; the functions of management; recent developments in management; concept of command; the Uniform Code of Military Justice; and other similar topics.

Three lecture-recitations.
One two-hour practical instruction period a week.

233. **Naval Machinery Nuclear Power and Ship Stability.** Basic principles relating to the transformation of energy from fuel, including nuclear fuel, to heat to power. Application of steam, internal combustion and other prime movers to propulsion and auxiliary uses in naval vessels and aircraft. Principles of ship stability and buoyancy and their application to the problems of damage control.

Three lecture-recitations.
One two-hour practical instruction period a week.

261. **Evolution of the Art of War.** Classic principles, tactics, and techniques of land warfare and their development.

Three lecture-recitations.
One two-hour practical instruction period a week.

262. **Modern Basic Strategy and Tactics.** Modern military tactical principles and techniques, especially on the small unit level, and development of a general understanding of strategy.

Three lecture-recitations.
One two-hour practical instruction period a week.

271. **Amphibious Warfare.** Concept, history, development and techniques of amphibious warfare; critical analysis of selected amphibious operations.

Three lecture-recitations.
One two-hour practical instruction period a week.

272. **Amphibious Planning, Naval Justice and Leadership.** Planning in the amphibious operation, the administration of naval justice, and principles and techniques of leadership.

Three lecture-recitations.
One two-hour practical instruction period a week.

Philosophy

Lewis White Beck, PH.D. (Duke) ..... Burbank Professor of Moral and Intellectual Philosophy and *Chairman of the Department*
Henry E. Kyburg, Jr., PH.D. (Columbia) ..... Professor of Philosophy
Murray Jerome Stolnitz, PH.D. (Harvard) ..... Professor of Philosophy
Richard Taylor, PH.D. (Brown) ..... Professor of Philosophy
Colin Murray Turbayne, PH.D. (Pennsylvania) ..... Professor of Philosophy

James Welton Cornman, PH.D. (Brown) ..... Associate Professor of Philosophy
Robert Lawrence Holmes, PH.D. (Michigan) ..... Associate Professor of Philosophy
Keith Lehrer, PH.D. (Brown) ..... Associate Professor of Philosophy

E. Newton Garver, PH.D. (Cornell) ..... Visiting Lecturer in Philosophy[1]

Alfred Harrison Jones, PH.D. (Cornell) ..... Professor Emeritus of Philosophy

[1]Term II.

THE DEPARTMENT OF PHILOSOPHY offers a program leading to the A.B. degree and, at the graduate level, to the A.M. and Ph.D. degrees.

A program of concentration for the A.B. degree will normally consist of seven courses beyond Philosophy 101. Included in these will be Philosophy 102, 103, 104, and either 107 or 216.

The remaining courses to make up the number of ten for the concentration may be drawn from advanced courses in any other field of the humanities and social sciences and most fields of the natural sciences. (English, Foreign and Comparative Literature, History, Languages and Linguistics, Political Science, Anthropology, Economics, Biology, Physics, Psychology, and Mathematics are the related fields most often chosen.)

Colloquia for all seniors concentrating in Philosophy are held throughout the academic year. They are planned to help students integrate their work in courses and to prepare them for the comprehensive examinations.

The following courses in Philosophy may be taken to meet some of the distribution requirements in the Humanities: 103, 104, and 211. Others may be taken to fulfill the distribution requirements in the Social Sciences.

Students who wish to do advanced work in Philosophy are strongly urged to enter the Honors Program in Philosophy. In their programs, Philosophy 303 may be substituted for Philosophy 103, but they must take Philosophy 104 and Philosophy 107 or Philosophy 216 in addition to four Honors seminars in Philosophy.

Qualified concentrators in Philosophy may be approved by the Department for the junior year abroad.

101. Introduction to Philosophy. Critical examination of some of the central beliefs and methods of thinking in common sense, science, and religion. Topics include: the existence and nature of God; why is knowledge gained by the scientific methods reliable? Can science decide questions of value? Classroom discussion and conference sections.

102. Ethics. Examination of the principles of duty and right conduct which are applied in making moral choices, and of the leading conceptions of the good life in ethical philosophy. The religious, psychological, sociological, and philosophical approaches to morality contrasted. Moral conflict in literature, the drama, and everyday life. Classroom discussion and conference sections.

103. History of Ancient Philosophy. An introduction to ancient philosophy through a study of important philosophers from the sixth century B.C. to the third century B.C., and of their significance for the problems of today. Readings in the Pre-Socratics, Plato, Aristotle, Epicureans and Stoics.

104. History of Modern Philosophy. An introduction to modern philosophy through a study of important philosophers from the seventeenth to the end of the eighteenth century, and of their position in the cultural history of the West.

107. Logic I. An introduction to symbolic logic. Definition of some semantical notions (truth, consequence, etc.) as well as of some syntactical notions (provability, derivability, etc.). Formalization of arguments. Theorems of first-order logic with and without identity.

108. Philosophy of Mind. An historical and philosophical study of some problems in the philosophy of mind, including such topics as: the nature of mental phenomena, the relation between body and mind, our knowledge of other minds, the concept of a person, and the privacy of mental states. Prerequisite: Philosophy 101 or permission of the instructor.

190. Preceptorial: Logical Positivism. A study of A. J. Ayer's *Language, Truth and Logic* and its significance in present-day thought.

191. Preceptorial: Self-Knowledge. A study of some problems in the philosophy of mind, including our knowledge of the self and of other selves, and the privacy of mental states. Readings from three of the most important recent works in philosophical psychology, viz. Strawson's *Individuals*, Hampshire's *Thought and Action*, and Ayer's *The Concept of a Person*.

205. Recent and Contemporary Philosophy. A study of several of the most influential philosophers of the nineteenth and twentieth centuries: an introduction to contemporary views in philosophy. Prerequisite: Philosophy 104 or permission of the instructor.

Interrelations of Art, Literature and Philosophy. (See Fine Arts 215, 216)

211. Philosophy of Religion. A critical and systematic study of the main problems of religious thought today, such as the existence of God, religious knowledge, and the relation of religion and culture.

Omitted 1966–67

216. **Logic II.** Metatheory of first-order logic (Gödel's completeness theorem, Lowenheim-Skolem theorem, etc.). Further topics to be selected by the instructor. Prerequisite: Philosophy 107 or permission of instructor.

221. **Ethics and Society.** The application of ethical theory to concrete problems of moral choice in society. The relation between morality and the law, the theory of punishment, the nature of human rights. Moral analysis of specific decisions in government and the law which have been of historic importance. Prerequisite: Philosophy 102.

Omitted 1966–67

237. **Social and Political Philosophy.** A philosophical and historical inquiry into various attempts that have been made to expound and justify the leading social and political theories. The works of philosophers such as Plato, Aristotle, Hobbes, Locke, Hume, and Marx will be examined and critically evaluated.

Omitted 1966-67

241. **Aesthetics.** Examination of the experience of appreciating beauty, both in nature and art; critical analysis of leading theories of the creation of art and the structure and value of works of art, e.g., formalism, expressionism, religious and moral influence; the semantic problem of the "meaning" of art, particularly the difference between scientific and poetic uses of language. Concrete reference to specific works of art in the various media—painting, music, poetry, drama, etc.

252. **Philosophy of Science.** An examination of the general characteristics of scientific formal systems, beginning with the pervasive formal systems of logic and mathematics, and including parts of specialized systems representing geometry, physics, biology, psychology, and the social sciences. Special emphasis will be placed on the role played by theoretical terms in these systems, and on the relation between more abstract and more concrete terms. Prerequisite: Philosophy 107 or permission of instructor.

Mathematical Logic. (See Mathematics 220)

281. **The Theory of Knowledge.** A study of the character of human knowledge. Main emphasis will be placed on problems such as: sense perception, truth, belief, and necessary knowledge.

Omitted 1966-67

Chinese Philosophy. (See Chinese 285. The Growth of Chinese Thought)

291. **Reading Course.** The reading of philosophical literature under guidance. Planned primarily in the interest of seniors majoring in philosophy. Other students may register only with the consent of the chairman of the Department of Philosophy.

Physical Education for Men

Paul E. Bitgood, M.ED. (Springfield) ..... Professor of Physical Education

Clarence I. Aikey, M.S. (Ithaca) ..... Associate Professor of Physical Education
Lyle D. Brown, M.S. (Ithaca) ..... Associate Professor of Physical Education
Donald C. Smith, M.ED. (Springfield) ..... Associate Professor of Physical Education

David R. Ocorr, M.A. (Columbia) ..... Assistant Professor of Physical Education
Everett J. Phillips, M.S. (Springfield) ..... Assistant Professor of Physical Education

William L. Boomer, M.ED. (Rochester) ..... Instructor in Physical Education
John B. Robertson, B.S. (Springfield) ..... Instructor in Physical Education

Louis A. Alexander, A.M. (Columbia) ..... Professor Emeritus of Physical Education
Elmer H. Burnham, B.S.P.E. (Notre Dame) ..... Professor Emeritus of Physical Education
Roman L. Speegle, M.A. (Columbia) ..... Professor Emeritus of Physical Education

THE AIM OF THE DEPARTMENT is to provide physical activity and recreation for the students, to stimulate interest in their general well-being, develop skills in a wide variety of individual and team games, encourage participation in intramural and intercollegiate athletics, and stress in the required program the games and sports that have a high carry-over value for after class hours as well as after college years. Each instructor takes an individual interest in counseling students.

11. **Physical Education I.** Required of all freshmen. Instruction is provided in swimming, tennis, handball, basketball, softball, track, volleyball, soccer, squash, golf, wrestling, and weight training.

No credit.

13. **Physical Education II.** A continuation of Physical Education 11.

No credit.

21. **Physical Education I.** Required of all sophomores. Each student must demonstrate satisfactory ability in handball, tennis, squash racquets, and swimming. More advanced instruction is provided in the above activities as well as the following: basketball, softball, track, volleyball, soccer, golf, wrestling, and badminton.

No credit.

23. **Physical Education II.** A continuation of Physical Education 21.

No credit.

Physical Education for Women

Sylvia Fabricant, M.S. (Wellesley).....Associate Professor of Physical Education and *Chairman of the Department*

Berthaida Fairbanks, M.S. (Colorado).....Associate Professor of Physical Education

Jessie Disston Mason, (Bouve Boston School).....Assistant Professor of Physical Education

Joanne May Baker, B.S. (Illinois State).....Instructor in Physical Education

Marjorie Jane Medd, B.S. (Tufts).....Instructor in Physical Education

Merle Spurrier, B.A. (Ohio Wesleyan).....Professor Emeritus of Physical Education

THE AIM OF THE DEPARTMENT is to present a program that will develop an appreciation of the value of intelligent participation in motor activity; to teach skills and encourage interest in these activities; to direct an intramural program, which includes a wide variety of interests; to promote the maintenance of good health habits.

Three hours a week are required during the freshman and sophomore years. The activities are taught for a period of eight weeks during four seasons: Fall, Winter I, Winter II, and Spring. Activities are offered from the following: American Red Cross Life Saving, archery, badminton, basketball, body conditioning, diving, fencing, field hockey, folk dance, golf, lacrosse, modern dance, skiing, soccer, softball, swimming, tennis, trampoline, volleyball, water safety instructor's training.

12. **Physical Education I.** Each girl is required to take a season of fundamentals of movement or fundamentals of dance. A safety proficiency swimming test is given prior to the start of the fall season. Those who do not qualify are expected to enroll for one season of swimming. Activities for all other students are on an elective basis.

No credit.

14. **Physical Education II.** A continuation of 12.

No credit.

22. **Physical Education I.** Election from above list of activities.

No credit.

24. **Physical Education II.** A continuation of 22.

No credit.

Physics and Astronomy

W. Parker Alford, PH.D. (Princeton)..... Professor of Physics
Sidney W. Barnes, PH.D. (Cornell)..... Professor of Physics
David L. Dexter, PH.D. (Wisconsin)..... Professor of Physics
J. Bruce French, PH.D. (Massachusetts Institute of Technology)..... Andrew Carnegie Professor of Physics
Harry W. Fulbright, PH.D. (Washington)..... Professor of Physics
Harry E. Gove, PH.D. (Massachusetts Institute of Technology)..... Professor of Physics and *Director, Nuclear Structure Research Laboratory*
Everett M. Hafner, PH.D. (Rochester)..... Professor of Physics
Edward H. Jacobsen, PH.D. (Massachusetts Institute of Technology)..... Professor of Physics
Morton F. Kaplon, PH.D. (Rochester).... Professor of Physics and *Chairman of the Department*
Leonard Mandel, PH.D. (London)..... Professor of Physics
Robert E. Marshak, PH.D. (Cornell)..... Distinguished University Professor of Physics
Elliott W. Montroll, PH.D. (Pittsburgh)..... Albert Einstein Professor of Physics
Herch M. Nussenzveig, PH.D. (São Paulo)..... Visiting Professor of Physics
Susumu Okubo, PH.D. (Rochester)..... Professor of Physics
Malcolm P. Savedoff, PH.D. (Princeton)..... Professor of Astronomy
Stewart Sharpless, PH.D. (Chicago)..... Professor of Astronomy and *Director, C. E. Kenneth Mees Observatory*
Emil Wolf, PH.D. (Bristol) D.S. (Edinburgh)..... Professor of Physics

Theodore G. Castner, PH.D. (Illinois)..... Associate Professor of Physics
H. Lawrence Helfer, PH.D. (Chicago)..... Associate Professor of Astronomy
Robert S. Knox, PH.D. (Rochester)..... Associate Professor of Physics
Adrian C. Melissinos, PH.D. (Massachusetts Institute of Technology).... .... Associate Professor of Physics
Ronald D. Parks, PH.D. (Stanford)..... Associate Professor of Physics
Jerome L. Rosen, PH.D. (Columbia)..... Associate Professor of Physics
Edward H. Thorndike, PH.D. (Harvard)..... Associate Professor of Physics

Ezio Ferrari, PH.D. (Rome)..... Visiting Senior Research Associate in Physics
Vishnu Sahai Mathur, PH.D. (Delhi)..... Visiting Senior Research Associate in Physics
K. H. Purser, PH.D. (Canberra)..... Senior Research Associate in Physics
Taiji Yamanouchi, PH.D. (Rochester)..... Senior Research Associate in Physics

Robert L. Burman, PH.D. (Illinois)..... Assistant Professor of Physics
Douglas Cline, PH.D. (Manchester)..... Assistant Professor of Physics
J.G.M. Duthie, PH.D. (Bristol)..... Assistant Professor of Physics
Gerard G. Emch, PH.D. (Geneva)..... Assistant Professor of Physics
Thomas Ferbel, PH.D. (Yale)..... Assistant Professor of Physics
Carl Richard Hagen, PH.D. (Massachusetts Institute of Technology).... .... Assistant Professor of Physics
Daniel S. Koltun, PH.D. (Princeton)..... Assistant Professor of Physics
Frederick Lobkowicz, PH.D. (Edg. Tech. Hochschule Zurich)..... Assistant Professor of Physics
M. Emery Nordberg, PH.D. (California Institute of Technology).... Assistant Professor of Physics
Donald C. Schmalberger, PH.D. (Indiana)..... Assistant Professor of Astronomy

Conrad R. Sturch, PH.D. (California)..... Instructor in Astronomy

Tapaskumar Das, PH.D. (Pennsylvania)..... Research Associate in Physics
Clifford L. Deney, PH.D. (Louisiana State)..... Research Associate in Physics
Brian R. Dennis, PH.D. (Leeds)..... Research Associate in Physics
Joseph H. Eberly, PH.D. (Stanford)..... Research Associate in Physics

George D. Gaspari, PH.D. (California-Riverside).....Research Associate and *Assistant Professor of Physics
Bruno Gobbi, PH.D. (Swiss Federal Institute of Technology).....Research Associate in Physics
Marek Grynberg, PH.D. (Institute for Nuclear Research, Warsaw)..Research Associate in Physics
G. S. Guralnik, PH.D. (Harvard).....Research Associate in Physics
Loke Soo Hsu, PH.D. (Rochester).....Research Associate in Physics
Keiji Kikkawa, PH.D. (Tokyo).....Research Associate in Physics
M. Jean Marc Lévy-Leblond.....Research Associate in Physics
Chandra Lal Mehta, PH.D. (Rochester)..Research Associate and *Assistant Professor of Physics
Yorikiyo Nagashima, PH.D. (Tokyo).....Research Associate in Physics
Keith F. Ratcliff, PH.D. (Pittsburgh).....Research Associate in Physics
John J. Schwartz, PH.D. (Rochester).....Research Associate in Physics
Alan Strelzoff, PH.D. (Pennsylvania).....Research Associate and *Assistant Professor of Physics
Hugh Van Horn, PH.D. (Cornell).....Research Associate in Astronomy
Samuel S. M. Wong, PH.D. (Rochester).....Research Associate in Physics
Haruo Yuta, PH.D. (Pennsylvania).....Research Associate in Physics

Alfred L. Green, BBA (Niagara).....Assistant to the Chairman

Howard L. Foote, A.B. (Cornell).....Senior Administrator

Herbert R. Childs, A.B. (Rochester).....Associate Professor Emeritus of Physics

*Part-time.

THE DEPARTMENT OF PHYSICS AND ASTRONOMY offers programs leading to the A.B., B.S., M.S. (Plan A or Plan B) and Ph.D. degrees in the fields of physics and astronomy. The following description of requirements refers particularly to the A.B. and B.S. programs in physics; the corresponding astronomy programs are described on page 152. The A.B. and B.S. degrees provide adequate preparation for most graduate schools; the B.S. program, however, provides a more intensive study of physics, while the A.B. program should be elected only by students desiring a broader academic experience.

Students are not formally accepted as physics (or astronomy) majors until their junior year. Freshman and sophomore students wishing eventually to major in physics (or astronomy) are urged to express their intent to the Department so as to be assigned a departmental counselor. Through his contact with the departmental counselor the student will be advised as to specific deficiencies he should make up, or to concentrate on some topic well suited to his aptitudes; specifically, if the prospects of his acceptance as a physics major in his junior year are weak, he will be informed in due time to seek some other major field. Clearly, however, the choice of majoring in physics (or astronomy) is the student's own responsibility contingent upon departmental approval.

The requirements for the B.S. and A.B. degree are the ones set forth by the College of Arts and Science (see page 82) in addition to specific departmental requirements. A synopsis of the two programs indicating how the general as well as departmental requirements may be met is given below. It will be noticed that the first two years of both programs are identical.

The introductory sequence of physics courses consists of four terms of physics, Physics 115, 116, 125 and 126, or Physics 117, 118, 127 and 128. The last four courses cover the same material as the first four, but at a deeper physical and mathematical level; students can be admitted to these courses at any term, but participation in these courses is *only* by departmental and instructor's approval. Similarly four terms of mathematics are required in the freshman and sophomore year and they consist of Mathematics 161, 162, 163 and 164 or Mathematics 171, 172, 173 and 174. Two additional introductory courses in the natural sciences (Group III) are required during either the freshman or sophomore year.

B.S. Program

In addition to the general and first two year requirements, the following departmental requirements must be fulfilled. In the junior year, four terms of physics must be taken, Physics 235, 236, 237 and 238, as well as two terms of advanced mathematics. Mathematics 267 and 268 are strongly recommended, but ME 201 and 202 may be substituted, or any mathematics course at the 200 level or higher. A laboratory course in electronics (EE 221) or physical chemistry, (Chem. 251) is also required. In the senior year an additional six terms of physics must be taken, including two terms of laboratory work. Physics 243, 244, 245, 246 and 247, 248 are recommended.

The program of study should be planned by the student in consultation with the departmental advisor at the end of his sophomore year and is subject to departmental approval. A synopsis of a typical B.S. program is given below.

FIRST YEAR

1. Physics 115 or 117 Physics I or IA	1. Physics 116 or 118 Physics I or IA
2. Math. 161 Analysis I	2. Math. 162 Analysis II
3. English Requirement	3. Group I
4. Group III	4. Group III
Physical Education	Physical Education

SECOND YEAR

1. Physics 125 or 127 Physics II or IIA	1. Physics 126 or 128 Physics II or IIA
2. Math. 163 Analysis II	2. Math. 164 Analysis IV
3. Foreign Language (Group I)*	3. Group I
4. Group II	4. Group II
Physical Education	Physical Education

THIRD YEAR

1. Physics 235 Theor. Phys. IA	1. Physics 236 Theor. Physics IB
2. Physics 237 Mod. Phys. IA	2. Physics 238 Mod. Physics IB
3. Math. 267**	3. Math. 268**
4. EE 221 or Chem. 251	4. Group II
5. Elective	5. Elective

FOURTH YEAR

1. Physics 245 Theor. Phys. IIA	1. Physics 246 Theor. Phys. IIB
2. Physics 247 Mod. Phys. IIA	2. Physics 248 Mod. Phys. IIB
3. Physics 243 Senior Lab. I	3. Physics 244 Senior Lab. II
4. Elective	4. Elective
5. Elective	5. Elective

*Most students can complete their requirements in foreign languages with one term of college work. Students who need more than one term must take the necessary courses in place of electives.

**ME 201-202 may be substituted.

A.B. Program

Aside from an introductory sequence at least six advanced courses in physics are required for an A.B. concentration. The Department recommends Physics 235, 236, 237, 238 and either Physics 245 and 246 or Physics 247 and 248 as the minimum program. Substitutions can be made with the approval of the departmental counsellor.

An A.B. concentration program must include at least four courses beyond the introductory level in fields related to physics. The Department recommends that two of these courses be mathematics.

All candidates for the A.B. in physics must take a comprehensive examination in the senior year. A synopsis of a typical A.B. program is given below:

FIRST YEAR

Same as B.S. Program

SECOND YEAR

Same as B.S. Program

THIRD YEAR

1. Physics 235 Theor. Phys. IA[1]	1. Physics 236 Theor. Phys. IB[1]
2. Physics 237 Mod. Phys. IA[1]	2. Physics 238 Mod. Phys. IB[1]
3. Math. 267 Complex Var.[2]	3. Math. 268 Part. Diff. Eq.[2]
4. Group I	4. Group II
5. Elective	5. Elective

FOURTH YEAR

1. Physics 245 Theor. Phys. IIA[1]	1. Physics 246 Theor. Phys. IIB[1]
2. Group III (Advanced)[1]	2. Group III (Advanced)[1]
3. Group II	3. Elective
4. Elective	4. Elective
5. Elective	5. Elective

[1]Substitutions may be made subject to departmental approval.
[2]ME201 and ME202 may be substituted or any other advanced course in Group III.

ASTROPHYSICS

The description of programs in physics on page 150 generally applies as well to the program in astrophysics. Astronomy 111–112 is recommended for those students without an extensive prior knowledge of elementary astronomy. Aside from the introductory four-course sequences in physics and mathematics, the A.B. program must contain at least six courses from Group III related to astrophysics and must include Astronomy 231 and 232. In both the A.B. and B.S. programs, the chosen program of Group III (science) electives must be approved by the Department Chairman or his representative as constituting a coherent degree program. Ordinarily four physics courses above the 200 level are recommended in the A.B. program and three in the B.S. program for these electives.

A synopsis of a typical program leading to the B.S. degree is given below. Students planning to pursue graduate study in astronomy should elect the B.S. program; they are encouraged to take advantage of opportunities for reading or research by taking Astronomy 293 in their senior year. In planning their programs, students should remember that proficiency in French, German, or Russian is usually required by graduate schools.

FIRST YEAR

1. Physics 115 or 117 Physics I or IA	1. Physics 116 or 118 Physics I or IA
2. Math. 161 Analysis I	2. Math. 162 Analysis II
3. Astronomy 111†	3. Astronomy 112†
4. English Requirement	4. Group I
Physical Education	Physical Education

SECOND YEAR

1. Physics 125 or 127 Physics II or IIA	1. Physics 126 or 128 Physics II or IIA
2. Math. 163 Analysis III	2. Math. 164 Analysis IV
3. Foreign Language (Group I)*	3. Group I
4. Group II	4. Group II
Physical Education	Physical Education

THIRD YEAR

1. Physics 235 Theor. Phys. IA	1. Physics 236 Theor. Phys. IB
2. Physics 237 Mod. Phys. IA	2. Physics 238 Mod. Phys. IB
3. Math. 267	3. Math. 268
4. Astronomy 231	4. Astronomy 232
5. Elective	5. Elective

FOURTH YEAR

1. Physics 247 Mod. Phys. IIA	1. Group III
2. Group III*	2. Group II
3. Group III**	3. Group III**
4. Elective	4. Elective
5. Elective	5. Elective

†Astronomy 111, 112 is recommended for those students without an extensive prior knowledge of astronomy. Students with a prior knowledge may substitute a Group III elective.

*Most students can complete their requirements in foreign languages with one term of college work. Students who need more than one term must take the necessary courses in place of electives.

**The chosen Group III (science) electives must be approved by the Department Chairman or his representative as constituting a coherent degree program. Ordinarily three physics courses above the 200 level are recommended.

Even though it is possible for a student to obtain advanced standing, it has been found by previous experience that all entering students should follow the introductory physics sequence beginning with Physics 115 or Physics 117 depending on his preparation and aptitude.

The Department is currently offering part-time research assistantships to a limited number of qualified undergraduates during the academic year. Full-time summer assistantships are occasionally available.

The Department also offers the two following courses intended for students not concentrating in physics:

Physics 101–102

Physics 203.

These courses cannot be counted towards physics or astronomy concentration.

PHYSICS

101–102. Survey Course in General Physics. An introduction to the primary phenomena and fundamental concepts of physics, including demonstrations. The subjects covered in the lectures are mechanics, heat, sound, electricity and magnetism, light, and atomic and nuclear physics. Calculus is not required.
Two lectures, one recitation.
One lab a week.

115–116. Physics I. The first year of a two year sequence. An introductory course covering topics in mechanics, wave motion, kinetic theory, and thermodynamics. Mathematics 161, 162 to be taken concurrently.
Two lectures, two recitations a week.
Laboratory in alternate weeks.

117–118. Physics IA. Covers the content of Physics 115–116 at a more intensive mathematical and physical level. Consent of the Department required.
Three meetings a week.
Laboratory in alternate weeks.

125–126. Physics II. A continuation of Physics 115–116 covering topics in electromagnetism, electronics and circuit theory, geometrical and wave optics. Mathematics 163, 164 to be taken concurrently. Satisfactory performance in Physics 115–116 or 117–118 prerequisite.
Two lectures, two recitations a week.
Laboratory in alternate weeks.

127–128. Physics IIA. Continuation of Physics 117–118.

203. Introduction to Modern Physics. A survey course for non-specialists, covering selected topics in modern physics.
Omitted 1966–67

221. Introduction to Quantum Mechanics and Atomic Structure. Includes the special theory of relativity, an introduction to quantum theory and solutions to the Schroedinger equation for simple atomic systems, quantum statistics and atomic spectroscopy. Prerequisites: Math. 164 and Physics 126. Taught by the Institute of Optics.
Three lectures and one lab a week.

222. Introduction to the Theory of the Solid State. Includes a study of the energy band theory of solids, conduction in solids, thermionic and photoelectric emission, semiconductors, dielectrics, crystalline imperfections, mechanical properties of solids, luminescence, and photoconductivity. Prerequisite: Optics 221. Taught by the Institute of Optics.
Three lectures and one three hour lab a week.

235. Theoretical Physics IA. Advanced Mechanics. Covers kinematics, dynamics of systems of particles, coordinate transformations, rigid body motion, LaGrange's and Hamilton's Equations. Satisfactory performance in Physics 125–126 or Physics 127–128 and Mathematics 163–164 prerequisite. Advanced Calculus to be taken concurrently.

236. **Theoretical Physics IB. Advanced Mechanics.** A continuation of Physics 235. Covers theory of small oscillations, the special theory of relativity, mechanics of continuous media, including elasticity and wave motion in solids and fluids. Physics 235 prerequisite. Advanced Calculus to be taken concurrently.

237. **Modern Physics IA.** Thermodynamics and introduction to statistical mechanics. A survey of thermodynamics, both from the classical and the statistical point of view. Covers the three laws of thermodynamics and some of their consequences, and introduces statistical mechanics. Satisfactory performance in Physics 125–126 or Physics 127–128 and Mathematics 163–164 prerequisite. Advanced Calculus to be taken concurrently.

238. **Modern Physics IB.** Introduction to wave mechanics. Covers the breakdown of classical theory, the quantum hypothesis of Planck and the Bohr theory of atomic phenomena. The DeBroglie hypothesis and Schroedinger's wave equation are developed and applied to atomic systems. Introductory laboratory in modern experimental methods accompanies the course. Physics 237 prerequisite. Advanced Calculus to be taken concurrently.

243. **Senior Laboratory I.** An advanced course in experimental physics, using techniques and principles of modern research. Introduces design and interpretation of measurements rather than construction of equipment. Experiments in atomic physics, nuclear physics and the solid state physics, including X-ray diffraction, Compton scattering, nuclear resonance, mass spectrometry, γ-γ angular correlation, μ-meson lifetime, Zeeman effect, Hall effect in semiconductors. Lectures cover topics on statistics, detector theory, electronic functional assemblies, scattering theory. Prerequisites: Physics 237–238. Two lectures and two laboratories each week.

244. **Senior Laboratory II.** A continuation of Physics 243.
Two lectures and two laboratories each week.

245. **Theoretical Physics IIA. Electromagnetic Theory.** An advanced course emphasizing the field point of view. Electrostatic phenomena including the concepts of microscopic and macroscopic fields, solution of electrostatic boundary value problems, Maxwell's equations and solutions to the wave equation. Discussion of electromagnetic fields and optical phenomena. Physics 235, 236, Advanced Calculus prerequisite.

246. **Theoretical Physics IIB. Electromagnetic Fields and Waves.** A continuation of Physics 245. Covariant formulation of electrodynamics and its consequences. Radiation by moving charges. Multipole fields; radiation damping. Physics 245 prerequisite.

247. **Modern Physics IIA. Quantum Mechanics and the Structure of Matter.** A rigorous development of quantum mechanics with application to atomic physics. Physics 235, 236, 237, 238 and Advanced Calculus prerequisites.

248. **Modern Physics IIB. Quantum Mechanics and the Structure of Matter.** A continuation of Physics 247. A discussion of quantum statistics and the development of the basic concepts of solid state and nuclear physics. Physics 247 prerequisite.

261. **Physical Optics I.** (See Optics 261)

291. **Reading or Research in Physics.** Normally open to seniors majoring in Physics.

293. **Special Topics in Physics.** Selected topics offered when justified by sufficient interest.

ASTRONOMY

111. **Elementary Astronomy I.** Primarily a course designed to provide a general knowledge of the universe as well as some understanding of the techniques and logical methods by which such knowledge is obtained. Three lectures, one laboratory each week.

112. **Elementary Astronomy II.** Continuation of 111.

231. **Intermediate Astronomy.** Instruments and techniques in classical and modern astronomical research; introduction to celestial mechanics including figures of celestial bodies, orbit determination, the three and n-body problems and problems of stellar systems. Prerequisites: Physics 125–126 or 127–128; Math 163, 164. Astronomy 111, 112 recommended but not required.

232. **Introductory Astrophysics.** Basic physical aspects of typically astronomical phenomena: stellar interiors, stellar atmospheres, interstellar medium and galactic structure, the solar system and vignettes of cosmological problems. Prerequisite: Astronomy 231 or consent of instructor.

291. Reading or Research in Astronomy. Normally open to seniors majoring in physics or astronomy.

293. Special Topics in Astronomy. Selected topics offered when justified by sufficient interest.

Political Science

William Edwin Diez, PH.D. (Chicago) ..... Professor of Political Science
Richard Francis Fenno, Jr., PH.D. (Harvard) ..... Professor of Political Science
William H. Riker, PH.D. (Harvard) ..... Professor of Political Science and *Chairman of the Department*
Glenn Gordon Wiltsey, PH.D. (Chicago) ..... Professor of Political Science

William Theodore Bluhm, PH.D. (Chicago) ..... Associate Professor of Political Science
S. Peter Regenstreif, PH.D. (Cornell) ..... Associate Professor of Political Science and Assistant Professor of Canadian Studies

Arthur Goldberg, PH.D. (Yale) ..... Assistant Professor of Political Science
Gerald H. Kramer, PH.D. (Massachusetts Institute of Technology) ..... Assistant Professor of Political Science
John E. Mueller, PH.D. (California) ..... Assistant Professor of Political Science
Dale Allen Neuman, PH.D. (Northwestern) ..... Assistant Professor of Political Science

THE DEPARTMENT OF POLITICAL SCIENCE offers programs leading to the A.B. degree, the A.B. degree with honors and, at the graduate level, the A.M. and Ph.D. degrees.

Political Science 101 and 102 are normally prerequisites to all other courses in Political Science; however, exceptions to this rule may be made by the instructor of each course.

A program of concentration for the A.B. degree consists of seven courses in Political Science beyond 102. Of the seven, at least one must be chosen from each of groups A, B, and C. All students (including Honors) concentrating in Political Science are required to enroll in course 210.

The remaining three courses to make up ten in the concentration may be chosen from among advanced course offerings in one of the following related fields: Anthropology, Economics, Geography, History, Philosophy, and Psychology. A student interested in a related field not here listed should consult the department counsellor.

Political Science 101 and 102 are required of all students enrolling in Political Science seminars in the Honors Program unless excused by the department counsellor.

101. European Political Systems. A comparative study of the background, political processes, institutions, and ideologies of selected European states including Great Britain, France, and the Soviet Union.

102. The American Political System. An examination of the background, political processes, institutions, and ideologies of the United States with comparative illustrations drawn from the governmental systems studied in Political Science 101. Political Science 101 is a prerequisite.

191. Preceptorial: Experiments with Freedom. A consideration of the public and private problems and choices before leaders and peoples in developing societies in creating new political systems and cultures.

210. Scope and Methodology of Political Science. An examination of political science as a field of study. Emphasis will be placed upon scope, method, bibliography, and the relation of Political Science to allied disciplines. Required of all Political Science concentrators. It is desirable that concentrators take this course in the junior year.

Group A. International Relations and Foreign Political Systems

251. International Politics I. An examination of the nature, environment and objectives of nation-states and other significant groups.

252. International Politics II. An examination of processes, techniques, and patterns of behavior characteristic of international poli-

tics. Prerequisite: Political Science 251 or consent of instructor.

253. **National Security Policy.** An examination of the problems of war and peace in the nuclear era. Included are considerations of strategic planning, prediction, deterrence, arms control, limited war, military economics and sociology, civil defense, and the dispersion of nuclear weapons.

256. **Problems in Comparative Politics.** An examination of topics in comparative political analysis. Major emphasis will be on aspects of political affiliation, organization and participation in the major developed areas of the world.

257. **Comparative Political Life.** A study of the way in which indigenous values, beliefs and attitudes affect political behavior. Material will be drawn from a variety of systems and cultures, with emphasis on the Western. Prerequisite: Consent of the instructor.

Omitted 1966-67

258. **Federalism.** A comparative study of the constitutional form and administrative devices of the main examples of federal government.

Omitted 1966-67

259. **Government and Politics in Continental Africa.** An examination and analysis of selected political, economic, and social problems in Africa south of the Sahara.

260. **Africa in International Politics.** An analysis of the patterns of action and interaction among African states in the environment of continental and extracontinental politics.

Group B. American Politics and Institutions

261. **Party and Pressure Politics in the United States.** An analysis of the activity of political parties and pressure groups in the American system of government. Attention will be given to the nature of the two-party system, national, state and local; the social bases of partisanship; electoral behavior; party organization, leadership, and strategy. Parties and pressure groups will be studied as participants in the making of public policy decisions.

262. **The Legislative Process.** An analysis of decision-making in legislative bodies. Major emphasis on the American Congress, with comparative materials from state legislatures and non-American political systems.

264. **Urban Government and Politics.** An examination of the evolution of city politics in relation to social and economic change and in terms of issues of planning, urban renewal, racial conflict and transportation problems.

266. **Public Opinion and Electoral Behavior.** The role of public opinion and electoral behavior in political systems, particularly in American politics.

281. **The Constitutional Power Structure.** A study of the constitutional pattern of power distribution between agencies of government and within the federal system as determined by the American judiciary.

282. **Civil Rights.** An examination of the permissible limits of governmental restraints on private rights and liberties as determined by the American judiciary. Prerequisite: Political Science 281.

Group C. Political Theory

285. **Classics of Political Thought.** Systematic political theories from Plato to Lasswell. An assessment of the universality of the great political theories and their relevance to the understanding of contemporary political systems.

286. **Modern Political Ideologies.** A comparative study of important ideological currents in the age of the nation-state, and their relationship to political events; liberalism, conservatism, socialism, communism, nationalism.

289. **Strategy in Politics.** An examination of recent descriptive theories of political behavior (including theories derived from the theory of games and economic models) in order to arrive at a general theory of political strategy.

Omitted 1966-67

Group D. Methodology

291. **Senior Reading Course in Political Science.** By arrangement with the department to permit work beyond regular course offerings.

412. **Theories of Decision-Making.** Consideration of various qualitative and quantitative theories of decision-making and of their uses in analyzing political behavior. Open to undergraduates with consent of instructor.

Omitted 1966-67

413. **Theories of Organization.** A consideration of theories of systems, roles, and organizations.

Psychology

Robert Merrill Boynton, PH.D. (Brown) ..... Professor of Psychology and Director of the Center for Visual Science

Kenneth Edwin Clark, PH.D. (Ohio State) ..... Professor of Psychology and Dean of the College of Arts and Science

Emory Leland Cowen, PH.D. (Syracuse) ..... Professor of Psychology and Associate Chairman of the Department

Vincent Nowlis, PH.D. (Yale) ..... Professor of Psychology

Sidney Durward Shirley Spragg, PH.D. (Yale) ..... Professor of Psychology and *Chairman of the Department*

G. Richard Wendt, PH.D. (Columbia) ..... Professor of Psychology

****Helen H. Nowlis,*** PH.D. (Yale) ..... Professor of Psychology and Dean of Students

Burton G. Andreas, PH.D. (Iowa) ..... Associate Professor of Psychology

David Elkind, PH.D. (Los Angeles) ..... Associate Professor of Psychology

Russel Frank Green, PH.D. (Southern California) ..... Associate Professor of Psychology

Ralph Norman Haber, PH.D. (Stanford) ..... Associate Professor of Psychology

James Ison, PH.D. (Michigan) ..... Associate Professor of Psychology

Forrest L. Vance, PH.D. (Minnesota) ..... Associate Professor of Psychology and Associate Dean of Students

*Part-time.

Melvin Zax, PH.D. (Tennessee) ..... Associate Professor of Psychology

Ralph Barocas, PH.D. (Pennsylvania State) ..... Assistant Professor of Psychology
Michael L. Davidson, PH.D. (Berkeley) ..... Assistant Professor of Psychology
Jay Steven Efran, PH.D. (Ohio State) ..... Assistant Professor of Psychology
Joel F. Lubar, PH.D. (Chicago) ..... Assistant Professor of Psychology
Edward E. Ware, PH.D. (Illinois) ..... Assistant Professor of Psychology
Ronald E. Jackson, ED.D. (Columbia) ..... *Assistant Professor of Psychology and Assistant Dean of Students

**Francis H. Parsons*, PH.D. (Pennsylvania) ..... Senior Clinical Associate in Psychology

**Alex Braiman*, M.D. (New York State) ..... Clinical Associate in Psychology
**Daniel Cecil Broida*, PH.D. (Syracuse) ..... Clinical Associate in Psychology
**Ilona M. Engel*, PH.D. (Michigan) ..... Clinical Associate in Psychology
**Howard Friedman*, PH.D. (Clark) ..... Clinical Associate in Psychology
**Robert H. Goldstein*, PH.D. (Michigan) ..... Clinical Associate in Psychology
**Norman Harway*, PH.D. (Rochester) ..... Clinical Associate in Psychology
**Armin Klein*, PH.D. (Teachers College, Columbia) ..... Clinical Associate in Psychology
**Sydney Koret*, PH.D. (Boston) ..... Clinical Associate in Psychology
**Benjamin F. McNeal*, PH.D. (Pennsylvania) ..... Clinical Associate in Psychology
**Robert A. Pierce*, PH.D. (Rochester) ..... Clinical Associate in Psychology
**John Mark Reisman*, PH.D. (Michigan State) ..... Clinical Associate in Psychology
**Leonard Franklin Salzman*, PH.D. (Rochester) ..... Clinical Associate in Psychology
**A. Donald Smith*, PH.D. (Rochester) ..... Clinical Associate in Psychology
**Martin Gene Staiman*, PH.D. (New York) ..... Clinical Associate in Psychology
**Earl Franklin Telschow*, ED.D. (Columbia) ..... Clinical Associate in Psychology
**Irving Weiner*, PH.D. (Michigan) ..... Clinical Associate in Psychology
**Floyd M. Wylie*, PH.D. (Wayne State) ..... Clinical Associate in Psychology

Donald W. DeMott, PH.D. (Rochester) ..... Senior Research Associate and *Assistant Professor of Psychology
Karl Lowy, M.D. (Vienna) ..... *Senior Research Associate in Psychology and Professor in the Center for Brain Research

**Robert Ader*, PH.D. (Cornell) ..... Research Associate in Psychology
Jean Schaefer Cameron, A.B. (Rochester) ..... Research Associate in Psychology
**Ruth Haber*, PH.D. (Radcliffe) ..... Research Associate in Psychology
**Howard P. Iker*, PH.D. (Rochester) ..... Research Associate in Psychology
**Judith Onley*, PH.D. (Rochester) ..... Research Associate and Assistant Professor of Psychology

Priscilla Specht, A.B. (Cornell) ..... Technical Associate in Psychology

*Part-time.

THE DEPARTMENT OF PSYCHOLOGY offers programs of study leading to the A.B. degree and, in graduate studies, to the Ph.D. degree.

Psychology 101 is prerequisite to all other courses in Psychology. All students concentrating in Psychology are required to take Psychology 201 (with its prerequisite Mathematics 110), and five to seven further semester courses in Psychology, at least two of which are laboratory courses in Psychology. When possible, concentrators should plan to complete Psychology 101, Mathematics 110 and Psychology 201 by the end of their sophomore year. These five to seven courses are to include at least two courses from Group II and at least two courses from Group III, beyond Psychology 101.[1] To complete the total concentration requirement of ten courses, from two to four courses in an allied field or fields should be carefully selected. An allied field to Psychology

[1]Psychology courses meeting Group II distribution requirements for the College (see p. 83) are even-numbered, those satisfying Group III are odd-numbered.

should be chosen to permit the student to apply his knowledge gained in the study of behavior to another discipline concerned with similar problems, or where knowledge of that other discipline will be of some direct benefit to his study of Psychology. Depending on the student's interests, certain courses in Anthropology, Biology, Business Administration, Chemistry, Economics, Engineering, Linguistics, Mathematics, Optics, Philosophy, Political Science, or Sociology may be approved. They should, in general, be advanced courses and selected so as to best maximize the objectives of an allied field as defined above. Students planning to pursue graduate studies in Psychology should seek a broad foundation in such closely related disciplines as Biology, Chemistry, Mathematics, or Philosophy.

Concentrators in Psychology may *not* use any laboratory course in Psychology to satisfy the Group III laboratory science requirement of the College. Typically the department advises concentrators to take the laboratory courses in Biology although others are in principle acceptable.

Whereas the lecture courses (Group A, 203–229) are designed for both psychology concentrators and those concentrating in other departments, the laboratory courses (Group B, 233–259) are designed primarily, but not exclusively, for the concentrator in psychology and other behavioral sciences. When the same area is covered both as a lecture course and a laboratory course, a student cannot receive credit for both courses. This rule presently applies to the following: Learning 203 and 233; Physiological Psychology 205 and 235; Social Psychology 220 and 250; and Personality 222 and 252. No such rule is applied to the seminar courses (Group C, 260–289).

101. Introduction to Psychology. A survey of the principles of human behavior and experience. Lectures and class discussions supplemented by demonstrations and participation in psychological research. Prerequisite to all courses in psychology.

201. Statistics in Psychology. Statistical analysis and experimental design for psychologists: parametric tests, correlation and regression, and analysis of variance. Mathematics 110 and Psychology 101 prerequisites. Required of all psychology concentrators.

Group A. Lecture Courses

203. Psychology of Learning. Inquiry into empirical findings and theoretical viewpoints on conditioning and learning, exemplified by research on both animal and human subjects. Related topics such as retention and transfer of training are also covered. This cannot be taken for credit if Psychology 233 is taken for credit.

205. Physiological Psychology. A basic survey course covering the major areas of physiological psychology. Prerequisite: Biology 101 or concurrent registration. This cannot be taken for credit if Psychology 235 is taken for credit.

213. Psychology of Motivation. A consideration of the variables of human and animal behavior that are motivational in character. Attention will be given to empirical studies and to the theoretical models used to explain motivational principles. This cannot be taken for credit if Psychology 235 is taken for credit.

Omitted 1966–67

219. Psychology of Human Differences. An objective, and, where possible, quantitative investigation of the nature, extent, organization and causes of individual and group differences.

220. Social Psychology. Individual behavior in relation to a variety of social environments; emphasis on such concepts as social interaction, influence, and control and on such topics as socialization of behavior systems, group processes, leadership, mass media, prejudice, and behavior in various institutional settings. This cannot be taken for credit if Psychology 250 is taken for credit.

222. Psychology of Personality. A survey of the field of personality, emphasizing modern theoretical approaches, basic methods of investigation, and current research findings. This cannot be taken for credit if Psychology 252 is taken for credit.

224. Child Psychology. Development of the child in the periods before and immediately after birth, during infancy, and adolescence. Special attention is given to the development of socialization, personality, emotion, language.

226. Psychology in Business and Industry. Applications of psychological findings and methods to problems encountered in business, industry and the professions. Topics include: Personnel selection, training and evaluation; motivation and morale; problems of supervision and management; factors in efficient performance; human engineering, problems of safety (industrial and trans-

portation accidents); market, product, advertising and selling research; a brief consideration of applications of psychology to the professions. Cannot be taken for credit if BSI205 is taken for credit.

228. **Abnormal Psychology.** Etiological factors, clinical description, and treatment of personality aberrations emphasizing the more serious forms of mental disorder. Class lectures are supplemented by demonstrations. Psychology 222 prerequisite.

Group B. Laboratory Courses

All laboratory courses require prior completion of Mathematics 110 and either completion of or concurrent registration in Psychology 201, as specified.

233. **Learning with Laboratory.** Topics in learning and conditioning: practice, reinforcement parameters, secondary reinforcement, discrimination learning and generalization, and the role of motivation. Laboratory work includes demonstration and analysis of basic phenomena using techniques and design principles of modern research. This cannot be taken for credit if Psychology 203 is taken for credit.

235. **Physiological Psychology with Laboratory.** The basic areas of physiological psychology and the basic laboratory and behavioral techniques employed in physiological research. This cannot be taken for credit if Psychology 205 is taken for credit. Prerequisite: Biology 101.

237. **Psychological Measurements with Laboratory.** A comprehensive treatment of the problems, statistical techniques, and theoretical concepts basic to psychological measurement. Laboratory work is concerned with test construction, scaling, item analysis, and determination of reliability and validity. Does not meet the laboratory distribution requirements.

239. **Sensory Processes with Laboratory.** Present concepts of how human sensory systems process the energy contained in visual, auditory, and other stimuli will be considered and studied experimentally. Prerequisite: Mathematics 110.

241. **Perception with Laboratory.** Basic perceptual processes, including the psychophysics of sensitivity and detection, color, movement, form, shape, and depth perception, the development of perceptual abilities, and the effects of learning, motivation and set on perceptual processes. Laboratory demonstrations and experiments.

243. **Motivation with Laboratory.** Material on conflict, anxiety and guilt, fantasy behavior, and unconscious processes, drawn from research using primarily humans, but also biological studies of primary and secondary drives, punishment and frustration, arousal, exploration, and stress. Laboratory experiments with both animal and human subjects. This cannot be taken for credit if Psychology 213 is taken for credit.

245. **Cognition with Laboratory.** A survey of theory and research concerning human intellectual functioning, including problem-solving, concept formation, word association, and creativity. Standard laboratory demonstrations and original experimentation.

247. **Comparative Psychology with Laboratory.** The classification of behavioral processes; the relationships between behaviors, between and within species; the identification of the origins and development of behavior; and the development of theories of behavior.

250. **Social Psychology with Laboratory.** The study of individual behavior in social contexts, with selected experiments to be conducted which illustrate research methods and techniques of social psychology in a variety of social-psychological problem areas. Cannot be taken for credit if Psychology 220 is taken for credit.

252. **Personality with Laboratory.** Emphasis on modern theoretical approaches, basic methods of investigation and current research findings with associated laboratory work and demonstrations. Cannot be taken for credit if Psychology 222 is taken for credit.

Group C. Seminar Courses

260. **Seminar in Special Topics.** Consideration of recent experimental and theoretical contributions in several selected areas of psychology. Students will prepare written reports for presentation and intensive discussion. Open to junior and senior psychology concentrators by permission of the instructor.

Omitted 1966–67

265. **Seminar in Physiological Psychology.** Physiological basis of coordination, learning, perception, thought, emotion, and motivation of behavior. Some material on sensory processes. Biology 101 prerequisite.

273. **Seminar in the Psychology of Motivation.** Theories of motivation, motivational antecedents, and the consequences of such antecedents on instrumental behavior, learning and perception. Open to advanced undergraduates and to graduate students by permission of instructor.

277. Seminar in Comparative Psychology. The concepts of the science of behavior and the application of scientific method of the study of animal conduct. Evolution of behavior and intelligence, the receptor control of activity, periodicity in behavior and higher mental processes in animals. Prerequisite: Biology 101.

280. Seminar in Social Psychology. Selected areas of current research in social psychology, including attitude change models and experimentation, dissonance theory, small group processes, motivational determinants of social behavior, and simulation models of group processes. Prerequisite: A previous course in Social Psychology and approval of instructor.

284. Seminar in the Psychology of Language. Theory and research in the psychological aspects of language behavior.

Omitted 1966-67

286. Seminar in Developmental Psychology. Selected areas of current research and theory in developmental and child psychology. Special attention will be given to the work of Piaget, the recent research on cognitive processes displayed by newborn humans, and the importance of environmental variation in early life. Prerequisite: A previous course in Child or Developmental Psychology and approval of instructor.

288. Seminar in Abnormal Psychology. Advanced study of the clinical descriptions and treatment of personality aberrations with special emphasis on the etiology of the more serious forms of mental disorder. Seminar discussions supplemented by student reports and by demonstrations.

Group D. Special Courses

Each of the following courses may be offered as a Group II or Group III course with the approval of the instructor.

289. Seminar in Current Psychological Research. A discussion of current research undertaken by members of the seminar. Frequent oral reports of their research, with opportunity for mutual criticism and suggestions. Required of all seniors working on a research project to be submitted for Distinction in Psychology, and others by permission of the Department of Psychology.

291. Reading Course in Psychology. Supervised reading on topics not covered by existing courses or on specialized topics. Permission of the instructor required.

293. Special Problems Course in Psychology. The investigation under guidance of a special problem in experimental psychology and the presentation of the result of the research in a paper. Permission of the instructor required.

295. Senior Thesis in Psychology. A paper based upon independent study and research, primarily for a degree with distinction. Permission of the department and instructor required.

Sociology

Hanan C. Selvin, PH.D. (Columbia) ..... Professor of Sociology and *Chairman of the Department*

Dean Harper, PH.D. (Columbia) ..... Associate Professor of Sociology

Stephen Berger, M.A. (Harvard) ..... Assistant Professor of Sociology
Walter Charles Kaufman, PH.D. (Northwestern) .. Assistant Professor of Psychiatry and Sociology
Dorothy Anderson Mariner, M.A. (Berkeley) ..... Assistant Professor of Sociology
Klaus Roghmann, DR.RER.POL. (Cologne) ..... Assistant Professor of Sociology

THE DEPARTMENT OF SOCIOLOGY offers work leading to a concentration for the A.B. degree. A program of concentration will ordinarily consist of six to eight courses in the department beyond Sociology 101, which will not carry credit toward the concentration and which is not a prerequisite for any other course. The following courses are required:

203 The Social Organization of Industrial Society
204 Major Social Theorists
221 Methods of Empirical Research
241 Complex Organizations
270 Principles of Sociology

Concentrators should take Sociology 203 as soon as possible in their programs. Additional courses for the required total of ten courses may be taken in any of the other social sciences with the approval of the departmental counselor. All concentrators must have taken one course in statistics, such as Mathematics 110, or equivalent, no later than the first semester of their senior year.

101. Introduction to Sociology. Elements of social organizations; the nature of society; study of the social group and bureaucracy. Not required for other courses.

203. Social Organization of Industrial Society. Social class and social stratification; differential class behavior; subgroup organization of modern society; institutional patterns of behavior and the effect of the class structure on these institutional patterns. *Intended primarily for concentrators; others admitted with consent of instructor.*

204. Major Social Theorists. A comparative study of selected works of Marx, Weber, Durkheim and classic and contemporary theorists. *Intended primarily for concentrators; others admitted with consent of the instructors.*

206. Deviant Behavior. Formal and informal social control; the development of individual and collective forms of norm violation; theories of criminality.

Omitted 1966–67

208. The Sociology of Culture. The social contexts of folk, mass, and high cultures examined through a study of the social organization of the arts and crafts, the artists' roles, the audience, and typical art forms.

Omitted 1966–67

211. Contemporary Sociological Theories. A rigorous examination of some contemporary theories in the sociological literature. Social interaction, small group behavior, mass phenomena, and crime and delinquency will be among the topics considered.

Omitted 1966–67

212. Mathematical Models in Anthropology and Sociology. The application of mathematics to the study of social organization and social processes, such as the diffusion of innovations, interaction, and kinship systems. Prerequisite: an elementary knowledge of the calculus (a knowledge of matrix algebra is desirable but not essential).

Omitted 1966–67

213. Sociology of Conflict. An examination of theories of conflict and of the empirical literature on conflict within and between groups; sources and consequences of social conflict.

Omitted 1966–67

215. Mass Society and Mass Culture. Social processes and cultural symbols under the impact of industrialization and mass communication; social sources of alienation; the role of the intellectual.

Omitted 1966–67

217. Stratification. Major theorists and empirical studies of stratification in historical and

contemporary settings; correlates of class structure; sources and consequences of social mobility.

218. **Social Change.** The nature, sources, and consequences of changes in social institutions, both planned and unplanned; special attention will be given to industrialization.

Omitted 1966–67

221. **Methods of Empirical Research.** A critical examination of several major empirical studies, emphasizing such problems as validity, causal inference, the control of error, and generalization. Prerequisites: a course in statistics, such as Mathematics 110 or its equivalent. *Intended primarily for concentrators; others admitted with consent of the instructor.*

224. **Advanced Statistical Methods in Social Research.** A critical appraisal of statistical techniques in theoretically oriented research, stressing the assumptions of different techniques and the interpretation of their results. Multiple cross-classification; multivariate statistical analysis. Prerequisite: Sociology 221 and Math. 110 or its equivalent.

227. **Problems of Social Inquiry.** Current issues in methodology selected from: causal inference, concepts and indicators, aggregation, theory building. Prerequisite: Sociology 221.

Omitted 1966–67

231. **Society and the Individual.** Social influences on the development of the individual; interaction and communication in small groups; attitude formation; role analysis.

Omitted 1966–67

234. **The Family and Social Structure.** A rigorous examination of the modern family, from demographic, comparative, and structural perspectives. Prerequisite: Sociology 231 or consent of the instructor.

Omitted 1966–67

241. **Complex Organizations.** Analysis of groups with bureaucratic structures, such as schools, hospitals, factories, and offices; the impact of the organization on the individual; functions of informal groups in organizations.

244. **Political Sociology.** The relation of social structure to political organization and participation, with special attention to the implications of empirical research on power, voting, and alienation.

Omitted 1966–67

245. **Comparative Social Structure.** An examination of selected topics relating to the macrosocial structure of different types of societies, Western and non-Western, industrialized, and pre-industrial.

246. **Community and Polity.** The distribution of power, influence, and authority in urban communities; problems of conceptualization and measurement; the sources and consequences of power in a comparative perspective.

247. **Race and Ethnic Minorities.** Intergroup relations in industrial society with special attention to Negro-white relations in America.

Omitted 1966–67

251. **Population.** Relations between demographic phenomena (birth, death and mobility) and social structure; the nature of the "population explosion" and its consequences in societies at different stages of development.

Omitted 1966–67

254. **Urbanization.** Patterns of urban and suburban growth; the spatial distribution of buildings and people; urban culture and urban blight.

266. **Medical Sociology.** Social organization of the hospital; social and cultural factors in illness; recruitment and socialization of medical personnel.

Omitted 1966–67

270. **Principles of Sociology.** A critique of current concepts and hypotheses stressing the interplay between social theory and empirical research. *Required of senior concentrators, first-year graduate students; open to others only with permission of the instructor.*

291. **Reading Course in Sociology.** Special work, individually arranged, with the consent of the department.

293. **Senior Problems Course in Sociology.** Supervised research and discussion on special topics, primarily for concentrators.

Omitted 1966–67

Statistics

In 1965–66 the faculty of the College of Arts and Science voted to establish statistics as a separate department. In 1966–67 the department will offer a limited number of courses. It plans to offer in the following year degree programs at the undergraduate and graduate levels. Students interested in pursuing work with a concentration in statistics should consult a faculty member in the department. The following faculty members of the College will participate in teaching courses in the department next year.

Johannes Henricus Bernardus Kemperman, PH.D. (Amsterdam).....Professor of Mathematics
Julian Keilson, PH.D. (Harvard).....Professor of Business Administration and Statistics
W. Allen Wallis, A.B. (Minnesota).....Professor of Economics and Statistics
Govind Shrikrishna Mudholkar, PH.D. (North Carolina).....Assistant Professor of Statistics

The following courses are offered by the department. Related courses in probability and linear programming are offered in the Department of Mathematics. Courses in applied statistics may be found in the offerings of the relevant departments.

110. Elementary Statistics. Relative frequencies; probability models; sampling from a finite population. Random variables, probability distributions, expectations and variances. Bionomial, Poisson, and normal distributions. Introduction to statistical inference. Theory of estimation; confidence intervals; choice of estimator. Testing of hypotheses; significance level and power. Some non-parametric tests.

200. Theory of Probability and Applications (See Mathematics 200)

207. Linear Programming and the Theory of Games (See Mathematics 207)

210. Introduction to Statistical Inference. Introduction to probability theory, fixed sample and sequential solutions to the problems of estimation and testing of hypotheses in parametric and nonparametric setups. Prerequisite: Mathematics 163 and Statistics 200.

291. Reading Course in Statistics. Special work, arranged individually. Consent of the department required.

South Asia Language and Area Center

McCrea Hazlett, PH.D. (Chicago) ..... *Director of the Center* and Provost of the University

Guy R. Welbon, PH.D. (Chicago) ..... Assistant Director of the Center and Assistant Professor of Sanskrit

William A. Coates, PH.D. (Harvard) ..... Assistant Professor of Linguistics

****V. E. Devadutt,*** TH.D. (Toronto) ..... Professor of Religion

Diran K. Dohanian, PH.D. (Harvard) ..... Associate Professor of Fine Arts

Arnold L. Green, A.B. (Antioch) ..... Assistant Professor of Anthropology

Richard M. Harris, PH.D. (Cornell) ..... Assistant Professor of Linguistics

Charles Morrison, PH.D. (Chicago) ..... Assistant Professor of Anthropology

Rama Nath Sharma, M.A. (Agra) ..... Teaching Assistant in Hindi

*Part-time.

THE SOUTH ASIA LANGUAGE AND AREA CENTER, one of twelve in the United States which are endorsed and supported by the Department of Health, Education and Welfare of the United States Government, has as its purpose the development of opportunities for studying the languages and culture of India, Pakistan and Ceylon. The Center supports faculty, courses, and a variety of extra-classroom activities, such as films and lectures. Courses, however, are all approved by and located in one of the established departments.

Instruction is available either for undergraduate or graduate credit in the following languages offered under the auspices of the Languages and Linguistics Department:

HINDI: A north Indian language spoken by approximately 130 million people, and designated as the official language of India.

201. **Hindi I.** Intensive study of basic vocabulary and structure of modern Hindi for rapid development of speaking, listening and reading skills. Prerequisite: fulfillment of foreign language requirement.

202. **Hindi II.** A continuation of Hindi 201.

203. **Hindi Composition and Conversation I.** Continuing study of current Hindi structure, usage, and vocabulary. Practice in expository writing and in speaking, to increase fluent active command of the language; problems of translation. Prerequisite: Hindi 202 or permission of instructor.

204. **Hindi Composition and Conversation II.** A continuation of Hindi 203. Prerequisite: Hindi 203 or permission of instructor.

205. **Hindi Reading I.** Controlled readings in general prose as a preparation for further work with the written language. Prerequisite: Hindi 202, or permission of instructor.

206. **Hindi Reading II.** A continuation of Hindi 205. Prerequisite: Hindi 205 or permission of instructor.

PALI: An ancient literary language of India in which most of the early texts of Buddhism are written.

434. **Pali I.** Textual analysis of synchronic elements of ancient Pali. Selected texts from the corpus of the Pali Buddhist Canon. Throughout an emphasis on development of techniques for independent study of early Buddhist source materials. Prerequisite: permission of instructor.

435. **Pali II.** Continuation of Pali 434. Prerequisite: permission of instructor.

SANSKRIT: The major literary language of ancient India in which the principle classics of Indian literature as well as the major religious, philosophical and scientific texts of Hinduism are written.

231. **Sanskrit I.** Textual analysis of synchronic and diachronic elements of the classical language stressing acquisition of vocabulary and the significance of Sanskrit in the Indian civilization.

232. **Sanskrit II.** Continuation of Sanskrit 231 with additional attention devoted to the basic terminology and certain methodological contributions of the Sanskrit grammarians. Prerequisite: permission of instructor.

431. **Sanskrit III.** Reading and analysis of selected *kavya*, drama, or scientific texts. Emphasis on semantics and adequate translation techniques. Prerequisite: permission of instructor.

432. **Sanskrit IV.** Continuation of Sanskrit 431. Prerequisite: permission of instructor.

433. **Vedic Sanskrit.** Textual analysis of synchronic and diachronic elements of the language of the rigvedasamhitā. Special consideration to basic hermeneutical problems. Prerequisite: permission of instructor.

In addition, a variety of courses dealing with the civilization of India are available:

FOREIGN AND COMPARATIVE LITERATURE

INDIAN

201. **An Introduction to the Indian Civilization I.** The culture of ancient and medieval India from the prehistoric "Harrapa Culture" to the threshold of the Indo-Turkish period. Examination of the essential background for an understanding of Hinduism.

202. **An Introduction to the Indian Civilization II.** The impact of Islamic and western European culture on Indian intellectual traditions with emphasis on those elements of the traditional culture employed by 20th century Indians to symbolize an Indian identity.

ANTHROPOLOGY

249. **Peoples of India.** Ethnology of South Asia with emphasis upon the relationship between tribal and village cultures and the high civilizations of the area.

FINE ARTS

103. **Introduction to the Art of India and the Far East.** A selective survey of the art of India, China, and Japan. Examples of architecture, sculpture, painting, and metal work are discussed in their historic sequence and interpreted with regard to form and content.

190. **Preceptorial: The Art of East and West.** A comparative study of masterworks of painting and sculpture. Selected works are analyzed in detail and interpreted with reference to the aesthetic ideals of the civilization which produced them. This course is an introduction to the great traditions of world art.

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. Factors of art style as well as those of iconographical and iconological character are considered.

GEOLOGY AND GEOGRAPHY

GEOGRAPHY

260. **Geography of Asia.** A geographical study of the continent of Asia, including China, Japan, southeast Asia, India, and the Soviet Far East. Stresses the influence of the physical environment on the cultural and economic development of the various regions.

RELIGION

103. **History of Religion.** An introductory comparative survey of the major religions in the world today in terms of their basic ideas and practices. Special attention will be given to Hinduism, Buddhism, Taoism, Confucianism, Judaism and Christianity.

Printed materials concerning the program are available in the office of the Director (Room 238, Administration Building) or the Assistant Director (Room 205, Fauver Hall). Students wishing to get further information about courses or to plan a program of study should consult Professor Guy Welbon, Assistant Director, Room 205, Fauver Hall.

COURSES OF INSTRUCTION

Offered in Fields Where There are no Departments

195. Preceptorial: A Tragic View of Science. Tragic views of life in great literature compared with the scientific view; explorations of the nature of the scientist's work in relation to society, of science and art as creative attempts to find significance in experience, and of the possibilities, using the approaches of literary criticism, in a tragic view of science.

One three-hour meeting a week.
Dr. Lotspiech
Omitted 1966–67

RELIGION

**Vinjamuri Everett Devadutt,* TH.D. (Toronto) ..... Professor of Religion (Term II)
**William Hughes Hamilton,* PH.D. (St. Andrews) ..... Professor of Religion (Term I)

**Robert Haddow Beaven,* PH.D. (Chicago) ..... Assistant Professor of Religion
**Grace Harris,* PH.D. (Cambridge) ..... Assistant Professor of Religion

*Part-time.

101. Introduction to Biblical Thought. A study of the major elements in the thought of the Hebrew-Christian tradition with emphasis on careful analysis of Biblical material, and on the contemporary significance of this tradition. Lecture and discussion.
Omitted 1966–67

103. History of Religion. An introductory comparative survey of the major religions in the world today in terms of their basic ideas and practices. Special attention will be given to Hinduism, Buddhism, Taoism, Confucianism, Judaism and Christianity.

104. Religion and Our Civilization. An introductory survey of the role of the Judaeo-Christian tradition in Western civilization, with special reference to the contemporary significance of the New Testament.
Omitted 1966–67

121. Problems in Religious Thought. An advanced course, open to any student who has completed one of the two introductory religion courses, dealing with selected subjects in the development of and in the rebellion against the Hebrew-Christian religious tradition. Among the works discussed will be those of Augustine, Aquinas, Luther, Shakespeare, Bach, Pascal, Dostoevsky, Tolstoy, Freud, and Camus. Prerequisite: Religion 101 or 103.
Omitted 1966–67

CREATIVE ARTS

101. Fundamentals of Dance Composition. Students will compose and perform dance studies for individuals and groups, using modern dance techniques. Readings in history of the dance will be required. Prerequisite: three semesters of non-credit dance technique classes, or their equivalent, and permission of the instructor.
Two three-hour supervised periods, plus additional studio work on assignments.

103. Modern Dance Technique I. Beginning level. This course will be taught for two semesters for one course credit.
Three classes per week plus individual work.

105. Modern Dance Technique II. Intermediate level. This course will be taught for two semesters for one course credit.
Three classes per week plus individual work.

131. Arts Workshop I. Comparison and application of the elements, structures and processes of composition in dance, drama, sculpture, painting, music, poetry as individual and interrelated creative activities. The main concern of the semester will be the use of space.
Two three-hour supervised periods and one period of independent work.

132. Arts Workshop II. This course is a continuation of Creative Arts 131 and is concerned with sequence and the use of time in art forms.

Introduction to Sculpture. (See Fine Arts 111–112)

Drawing and Painting. (See Fine Arts 113–114)

Advanced Sculpture Studio I, II. (See Fine Arts 251, 252)

Advanced Painting Studio. (See Fine Arts 255–256)

COLLEGE OF BUSINESS ADMINISTRATION

William H. Meckling, M.B.A. (Denver) ..... Dean of the College
Richard W. Fortner, D.B.A. (Indiana) ..... Assistant Dean
Richard R. Schulz, M.B.A. (Syracuse) ..... Director of Academic Office

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John M. Brophy, PH.D. (Cornell) ..... Professor
Donald F. Gordon, PH.D. (Cornell) ..... Professor
†*Myron J. Gordon*, PH.D. (Harvard) ..... Professor
Edwin R. Henry, PH.D. (Ohio State) ..... Professor
Julian Keilson, PH.D. (Harvard) ..... Professor
Melvin R. Marks, PH.D. (Tulane) ..... Professor
William H. Meckling, M.B.A. (Denver) ..... Professor
Eric C. Vance, M.A. (Columbia) ..... Professor
H. Martin Weingartner, PH.D. (Carnegie Institute of Technology) ..... Professor
William C. Wichman, B.S. (Iowa State) ..... Professor

Marcus Alexis, PH.D. (Minnesota) ..... Associate Professor
George J. Benston, PH.D. (Chicago) ..... Associate Professor
James M. Ferguson, PH.D. (Chicago) ..... Associate Professor
†*Marshall Freimer*, PH.D. (Harvard) ..... Associate Professor
Joseph W. Gavett, PH.D. (Cornell) ..... Associate Professor
Vernon G. Lippitt, PH.D. (Harvard) ..... Associate Professor
†*Jack H. Matthews*, D.B.A. (Indiana), C.P.A. Kansas, New York ..... Associate Professor
Philip T. Meyers, M.S. (Oklahoma State), C.P.A. Oklahoma ..... Associate Professor

Daniel N. Braunstein, PH.D. (Purdue) ..... Assistant Professor
Patricia I. Eberlein, PH.D. (Michigan) ..... Assistant Professor
Richard W. Fortner, D.B.A. (Indiana), C.P.A. Indiana ..... Assistant Professor
George H. Haines, Jr., PH.D. (Carnegie Institute of Technology) ..... Assistant Professor
Bertrand N. Horwitz, PH.D. (Minnesota) ..... Assistant Professor
Poduri S. Rao, PH.D. (Harvard) ..... Assistant Professor
Leonard S. Simon, PH.D. (Columbia) ..... Assistant Professor
Allan Wolk, LL.B. (Syracuse) ..... Assistant Professor
Charles C. Ying, PH.D. (Harvard) ..... Assistant Professor

Kenneth F. Gordon, S.M. (M.I.T.) ..... Instructor

†On leave 1966–67.

PART-TIME FACULTY

N. Joseph Houghton, M.B.A. (Harvard) ..... Senior Lecturer
Leslie J. Knox, M.B.A. (Syracuse) ..... Senior Lecturer
Richard K. Schalk, B.S. (Iowa State) ..... Senior Lecturer
Charles H. Schwartz, B.A. (Niagara) ..... Senior Lecturer

Richard R. Schulz, M.B.A. (Syracuse) ..... Lecturer

Jerry H. Curnutt, PH.D. (Illinois) ..... Associate Lecturer
Robert S. Hager, M.B.A. (Syracuse) ..... Associate Lecturer
Frank P. Hart, M.B.A. (Detroit), C.P.A. Illinois ..... Associate Lecturer
Laurance G. Locke, B.A. (George Washington) ..... Associate Lecturer
William I. Stolze, S.M. (M.I.T.) ..... Associate Lecturer
Vincent Swoyer, M.A. (Rochester) ..... Associate Lecturer
Robert M. Tyle, LL.B. (Syracuse), C.P.A. New York ..... Associate Lecturer
Nathan B. Winstanley, PH.D. (Purdue) ..... Associate Lecturer

Edward J. Carstens, B.S.I.E. (Oklahoma State) ..... Assistant Lecturer
Allan E. Kappelman, B.S. (Rochester), C.P.A. ..... Assistant Lecturer
James R. Mills, M.S. (Columbia) ..... Assistant Lecturer
Alfred M. Pierce, M.S. (Rochester) ..... Assistant Lecturer

HISTORY

A growing sense of responsibility for aiding the development of administrative talent in an expanding business and industrial economy resulted in the University offering business subjects in the early 1920's. Increasing student interest and a corresponding need for higher education among business men led in 1945 to degree programs in business administration both in the College of Arts & Science and in University School. Continued growth in interest and need resulted in the establishment of a separate School of Business Administration in 1958 and to its designation as a College of Business Administration in 1961.

PURPOSE

The objectives of the College of Business Administration are:

1. To improve understanding of the role of business in society, the function of the administrator in business, and the forces and relationships conditioning administrative performance; further to foster the development of those values, insights and skills required to analyze, decide, and act effectively in the presence of new business experience.
2. To encourage and support research and publication.
3. To provide, in cooperation with the business and industrial community, special non-degree programs and services designed for employed managers wishing to improve their present performance or to increase their potential.

ADMISSION REQUIREMENTS

Students are admitted to the College of Business Administration at the beginning of their junior year or its equivalent in credit hours. Due to limited housing facilities on campus, students with two or more full years of college work elsewhere are encouraged to apply as early as possible with the purpose of arranging appropriate living accommodations.

Applications for admission to the College are received from students in the College of Arts and Science and University School by the Office of Admissions and referred to the College's Committee on Admissions for formal action by the faculty.

To qualify for unconditional admission, a student must have satisfactorily completed, at the University of Rochester or at some other accredited institution, not less than 16 courses, distributed as follows:

Distribution Requirements for Majors in Accounting

I. Preprofessional Study in Business Administration		**2 courses**
ACC 153, Principles of Accounting	1 course	
QNT 205, Business Statistics	1 course	
II. Minimum Study in Liberal Arts and Science		**13 courses**
English*	1 course	
ENG 102, Continental Masterpieces	1 course	
ENG 103, Eng. & Amer. Masterpieces	1 course	
ECO 101, Principles of Economics	1 course	
Laboratory Science	2 courses	
Mathematics (Two of following, Math. 100, 150, 161, 162)	2 courses	
History and Political Science Electives	2 courses	
Humanities Elective	1 course	
Liberal Arts and Science Electives	2 courses	
III. General Elective		**1 course**
TOTAL		**16 courses**

Distribution Requirements for Majors in Business Economics

Minimum Study in Liberal Arts and Science		**16 courses**
English*	1 course	
ECO 101, Principles of Economics	1 course	
MATH 100, Finite Mathematics	1 course	
MATH 150, Analytic Geometry & Calculus *or* MATH 161, Analysis I	1 course	
Foreign Language (Unless Exempted)	3 courses	
Laboratory Science	2 courses	
Literature Electives	2 courses	
Group I Electives (Humanities)	2 courses	
Group II Electives (Social Sciences, excepting Economics)	3 courses	
TOTAL		**16 courses**

Distribution Requirements for Majors in Management Science

I. Preprofessional Study in Business Administration		**2 courses**
ACC 153, Principles of Accounting	1 course	
QNT 205, Business Statistics	1 course	
II. Minimum Study in Liberal Arts and Science		**13 courses**
English*	1 course	
ECO 101, Principles of Economics	1 course	
MATH 161, Analysis I	1 course	
MATH 162, Analysis II	1 course	
MATH 163, Analysis III	1 course	
PHY 101, 102, General Physics	2 courses	
Group I Electives (Humanities)	2 courses	
Group II Electives (Social Sciences)	2 courses	
Laboratory Science	2 courses	
III. General Elective		**1 course**
TOTAL		**16 courses**

*Any English course at the 100 level except courses numbered 120–129.

Some deviation from the above specific distributions of courses, particularly in evening session programs, may be permitted if it can be demonstrated that the student will be able to meet all the distribution requirements for the Bachelor of Science degree in not over two more years of full-time study (or the equivalent in part-time study).

Normally it will be expected that the admission requirements have been completed in a period of not over two years of full-time study in the case of students from the College of Arts and Science and transfer students from other institutions where a full-time course of study has been pursued.

The student's grades in the courses presented in fulfillment of these requirements must have been such as to give him a total of quality points of credit not less than double the hours of credit. A full course is considered as carrying four credit hours.**

DEGREE PROGRAMS OFFERED

The College administers programs of study leading to the degree Bachelor of Science, with majors either in Accounting, Business Economics, or Management Science; to the degree Master of Science with a major in Business Administration or the professional degree, Master of Business Administration; and to the degree Doctor of Philosophy with a major in Business Administration.

Although the undergraduate student is not formally admitted to the College until the beginning of his junior year, the requirements for the Bachelor's degrees are stated in terms of four years of full-time study (or the equivalent in part-time study).

Students who wish to complete an undergraduate degree elsewhere in the University and a graduate degree in Business Administration within a five year period by appropriate combinations of electives and advanced business administration courses should consult the Director of the Academic Office in the College of Business Administration.

REQUIREMENTS FOR BACHELOR'S DEGREE WITH DISTINCTION

The Bachelor degrees are awarded in three grades of distinction: with *distinction*, with *high distinction*, and with *highest distinction*.

This award is based primarily on a point-hour ratio: at least 3.25 for distinction, 3.60 for high distinction, and 3.85 for highest distinction. However, a piece of creative work or a paper (critical or creative, or a report of the results of original research) may be offered in support of a recommendation for a distinction award not more than one level higher than would be indicated by the point-hour ratio.

Except in unusual cases, no student shall be considered for a degree with distinction who has not had at least two years of academic work at the University of Rochester. Ordinarily nothing higher than a degree *with distinction* will be given in such cases.

BACHELOR OF SCIENCE WITH A MAJOR IN ACCOUNTING

The degree program in Accounting is designed for students interested in careers in accounting and related areas for which a strong accounting background is preferred. Intensive professional study, combined with a core of other courses in Business Administration, builds upon a base of two or more years of study in the arts, sciences, and humanities.

Completion of this program also provides a desirable preparation for Public Accounting and meets the educational requirements for admission to the Uniform Certified Public Accounting examination used by all states. Experience requirements vary from state to state and interested students should write the appropriate board in their own states for specific requirements.

**For purposes of this computation, quality points of credit per hour of credit are assigned as follows: A—4; B—3; C—2; D—1; E—0. Intermediate grades such as C+ are assigned corresponding intermediate values, such as 2.5, when such grades are recognized as part of the granting institution's official grading system.

The Accounting curriculum has been registered with and unconditionally approved by the Division of Professional Education, New York State Education Department; accordingly, graduates may be certified to the New York Board of Examiners as having completed the Registered Curriculum necessary to admission to the examination. Students who wish only to establish equivalency with the College's Registered Accounting Curriculum and who have completed the basic degree in another institution should obtain counselling from the College of Business Administration at the earliest opportunity and register with the Office of Admissions as special students.

A synopsis of the general distribution of requirements for the degree *Bachelor of Science with a major in Accounting* follows:

A. Study in Business Administration:* 14½–15½ courses.
B. Study in Economics: 3–4 courses.
C. Minimum study in Liberal Arts and Science: 12 courses.
D. General Electives: 3 courses.**
E. Physical Education.

Total minimum requirement is 33½ courses. Specific courses required for the degree *Bachelor of Science with a major in Accounting* are listed on the typical program which follows.

TYPICAL PROGRAM[1]
B.S. in Accounting

FIRST YEAR

1. English[2]	1. English 102
2. Mathematics[3]	2. Mathematics[3]
3. Laboratory Science	3. Laboratory Science
4. History or Political Science Elective	4. History or Political Science Elective

SECOND YEAR

1. English 103	1. Economics 101
2. Accounting 153	2. QNT 205
3. General Elective	3. Humanities Elective
4. Liberal Arts & Science Elective	4. Liberal Arts & Science Elective

THIRD YEAR

1. Accounting 233	1. Accounting 221
2. Finance 205	2. Business Economics 203 or Economics 207
3. Law 203 (½ course)	3. BSI 205
4. General Elective	4. Marketing 203
5. Economics 211, Business Economics 236, or Finance Elective	

FOURTH YEAR

1. Production 208	1. Accounting 261
2. Accounting 275	2. Accounting 236
3. Law 223 (½ course)	3. Law 226 (½ course)
4. BSI 251	4. Economics Elective
5. General Elective	5. General Elective

*See Admission Requirements, page 170.

**Work in Aerospace Studies or Naval Science courses may be credited toward the fulfillment of the requirements of the B.S. degree to the maximum extent of *three* academic courses.

[1]Students participating in Officer Candidate programs should consult with the appropriate ROTC unit for program planning.

[2]Any English course at the 100 level except courses numbered 120-129.

[3]The two-course mathematics requirement may be satisfied by Math. 100 and 150, 100 and 161, or 161 and 162.

BACHELOR OF SCIENCE WITH A MAJOR IN MANAGEMENT SCIENCE

The major in Management Science replaces the major in Industrial Management as described in bulletins for 1964–65 and earlier. (The new program will apply to all students admitted to the program after September 1, 1965, or who expect to complete their degree requirements after June, 1966. Students majoring in Industrial Management who expect to complete their degree requirements after June, 1966 should consult with their faculty advisors.) The Management Science program, like its predecessor, meets the growing need for managers and staff with ability to use the quantitative techniques of mathematics, statistics, accounting, and operations research to identify, analyze, and solve problems involved in management decisions. The change in the name of the program reflects a reduced emphasis on production and a freer choice of electives.

The curriculum for a B.S. degree with a major in Management Science is broadly based; about one-half of the required courses are in arts and sciences, including the humanities, economics, and basic mathematics. The remaining half includes quantitative techniques and behavioral science as tools, plus courses in the functional areas of marketing, accounting-finance, and production. Six electives are to be distributed in the humanities, social sciences, and natural sciences; two electives may be in either business administration or economics, and finally, there are four unrestricted electives.

A synopsis of the general distribution of requirements for the degree *Bachelor of Science with a major in Management Science* follows:

A. Minimum study in Business Administration: 13½ courses.

B. Business or Economics Electives: 2 courses.

C. Minimum Study in Liberal Arts and Science: 13 courses.

D. General Electives: 4 courses.

E. Physical Education.

Total minimum requirement is 32½ courses. Specific courses required for the degree *Bachelor of Science with a major in Management Science* are listed in the typical program which closely follows.

Completion of this program provides a solid background in the rapidly developing field of management science—including the theory and application of conventional and quantitative methods to the solution of a wide variety of business problems. The student who desires to do so may specialize further through graduate study. Most important, the inclusion of a broad spectrum of the arts and sciences precludes the development of narrow specialization at the undergraduate level.

TYPICAL PROGRAM*

B.S. in Management Science

FIRST YEAR

1. English**	1. Group I Elective
2. Group II Elective	2. Group II Elective
3. MTH 161 Analysis I	3. MTH 162 Analysis II
4. PHY 101 Survey	4. PHY 102 Survey

SECOND YEAR

1. Group I Elective	1. General Elective
2. ECO 101 Principles of Economics	2. ACC 153 Principles of Accounting
3. MTH 163 Analysis III	3. QNT 205 Business Statistics
4. Laboratory Science Elective	4. Laboratory Science (continuation of first term)

THIRD YEAR

1. FIN 205 Financial Management
2. MKT 203 Marketing
3. QNT 235 Computers and Numerical Analysis
4. QNT 241 Operations Research I

1. BEC 203 Managerial Economics
2. BSI 205 Behavioral Science
3. PRD 208 Production Management
4. QNT 242 Operations Research II

FOURTH YEAR

1. LAW 236 Legal Constraints on Business (½ course)
2. Business Elective***
3. Business Elective***
4. General Elective
5. General Elective

1. GBA 285 Seminar in Management Science
2. Business or Economics Elective
3. Business or Economics Elective
4. General Elective

*Students participating in Officer Candidate programs should consult with their ROTC Unit for appropriate planning. Naval Science or Aerospace Studies courses may be credited toward the requirements for the B.S. degree to the extent of three courses.

**Any English course at the 100 level except courses numbered 120–129.

***Advanced courses in Marketing, Finance, Production or Accounting selected with approval of faculty advisor.

BACHELOR OF SCIENCE WITH A MAJOR IN BUSINESS ECONOMICS

This four-year program, leading to the degree Bachelor of Science with a Major in Business Economics, provides approximately three years of study in the liberal arts and sciences and approximately one year of intensive study in business administration.

A unique feature of the program is that in his senior year the student completes the first half of the two-year graduate program leading to the degree Master of Business Administration. Thus he acquires an advantageous foundation either for immediate employment in a business firm or for entering an M.B.A. program with advanced standing at this University or at most other universities offering a broad M.B.A. program.

Formal admission to the College of Business Administration to pursue this program is granted at the end of sophomore year to assure adequate control over completion of over-all liberal arts requirements as well as the required junior-year courses in economics. Transfer students may be admitted at the beginning of their senior year if their previous academic achievement is considered the equivalent, in quality and course coverage, to that of those students in the program who completed their first three years of study at the University of Rochester.

As most if not all of the student's senior-year study will be in first-year-graduate-level courses, admission to the program is limited to those students who can be expected to complete the program with a B average. Upon completion of the four-year program the student will receive the B.S. degree.

Students who complete the program with at least a B average will be admitted to advanced standing in this University's M.B.A. program, and ordinarily will be able to complete the M.B.A. program in one year of additional study.

The synopsis of the general distribution of requirements for the degree *Bachelor of Science with a major in Business Economics* follows:

A. Business Administration: 5½–8½ courses.
B. Economics, including Business Economics: 5–8 courses.
C. Other Liberal Arts and Sciences: 19 courses.
D. Physical Education
Total: 32½ courses.

TYPICAL PROGRAM*

B.S. in Business Economics

Inasmuch as the program has been designed to afford the student maximum flexibility, the requirements for the first two years parallel closely those of a program leading to a Bachelor of Arts degree. (See p. 82.)

The following requirements apply for the first two years of the program:

English**
Foreign language (3 courses, unless exempted)
Eco. 101: Principles of Economics (in sophomore year)
Group I electives: 4 courses, including at least 2 in literature
Group II electives: 3 courses, other than economics
Group III electives: 4 courses, including 2 laboratory science courses, Math. 100, and either Math. 150 or Math. 161.

THIRD YEAR

ECO 207: Intermediate Economic Theory
ECO 209: National Income Analysis
ECO 211: Money, Credit, & Banking
QNT 205 or ECO 231 Statistics
Arts & Science Elective***
Arts & Science Elective***
Arts & Science Elective***
Arts & Science Elective***

FOURTH YEAR

BEC 403: Managerial Economics
ACC 403: Management Use of Accounting Information
BSI 418: Survey of Behavioral Sciences in Management
FIN 405: Financial Management
MKT 403: Introduction to Marketing
PRD 408: Production Management
LAW 236: Legal Constraints on Business (½ course)
Business or Economics Elective
Business or Economics Elective

*Students participating in Officer Candidate programs should consult with appropriate ROTC unit in program planning.

**Any English course at the 100 level except courses numbered 120–129.

***Other than economics and sufficient to complete requirement of 19 courses in Arts and Sciences. Work in Aerospace Studies or Naval Science courses may be credited toward the fulfillment of the B.S. degree to the maximum extent of *three* academic courses.

THE BUSINESS ADMINISTRATION LIBRARY

The Business Administration Library shares its quarters with the Education Library in the lower level of the Rush Rhees Library. It serves special needs of the faculty and students by providing a collection composed of reserve and reference books, current periodicals, pamphlets, research reports, business and financial services and recent corporation annual reports. The back issues of corporation annual reports are gradually being supplemented with reports on microcards. Except for reference books, all materials are circulated.

The core of the business books, approximately 30,000 volumes and back issues of periodicals, is part of the main library collection which contains over 931,000 volumes.

The University of Rochester Library is a depository library for United States Government publications and New York State documents. Non-depository documents are received on microcards.

The library resources are available for the use and benefit of the College of Business Administration community.

(A.I.E.S.E.C.)
INTERNATIONAL ASSOCIATION OF STUDENTS IN ECONOMICS AND COMMERCE

(Association Internationale des Etudiants en Sciences Economiques et Commerciales)

(A.I.E.S.E.C.) is an international exchange program for upperclass and graduate students who intend to pursue a career in business or economics. Participants have the opportunity of gaining practical business experience with a firm in one of fifty foreign countries, thus enabling the student to understand better foreign business methods and to further his world understanding. Exchanges are usually made in the summer of the junior or senior year. Freshmen are encouraged to participate in AIESEC's campus activities.

Students wishing further information should consult the Director of the Academic Office of the College of Business Administration early in the Fall semester.

COURSES OF INSTRUCTION

EXPLANATION OF COURSE NUMBERING SYSTEM

1–99	Non-credit courses.
100–199	Introductory courses—usually at the freshman and sophomore level—no graduate credit.
200–289	Courses at the junior and senior level; may also carry graduate credit unless otherwise specified.
290–299	Undergraduate reading or research courses.
400–489	Graduate courses at the master's level or the first year of graduate study. Open to undergraduates only by special arrangement.
490–499	Master's level, reading or research courses.

ACCOUNTING

ACC153. Principles of Accounting. *(Fall and Spring)* 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.

ACC221. Cost Accounting I. *(Fall and Spring)* 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: ACC153.

ACC222. Cost Accounting II. *(Spring)* Special topics in cost accounting and the use of cost information for managerial decision-making. Prerequisites: ACC221, QNT205.

ACC233. Intermediate Accounting. *(Fall)* An analysis of the accounting theory underlying the preparation of financial statements. Topics include: the form and content of corporate financial statements; accounting for assets, liabilities and net worth; problems of income determination; and analysis of financial statements and flow of funds. Prerequisite: ACC153.

ACC236. Advanced Accounting. *(Spring)* Topics include: partnerships, consignments, installment sales, accounting for business in financial difficulty, trusts and estates, consolidated statements, foreign exchange and governmental accounting. Prerequisite: ACC-233.

ACC261. Auditing I. *(Spring)* While emphasis is placed upon the work of the professional accountant, due consideration is given internal auditing procedure. Includes: purpose of audits, types of audits, methods of auditing procedure, the auditor's report and the legal and professional responsibility of the auditor. Prerequisite: ACC236 or corequisite.

ACC275. Income Tax Accounting I. *(Fall)* After brief attention to the development of the income tax law since 1913, a careful study of the present Federal Income Tax law is made, supplemented by numerous problems in income tax accounting. Prerequisite: ACC236 or corequisite.

ACC276. Income Tax Accounting II. *(Spring)* A continuation of ACC275 with special emphasis on tax planning.

BEHAVIORAL SCIENCES IN INDUSTRY

BSI205. Behavioral Science in Management. *(Spring)* Survey course of those aspects of management which involve dealing with people. Behavioral science bases of the following topics are approached through lecture, case studies, class discussion, and original readings: Selection, Training, Human Engineering, Performance Evaluation, Supervision-Leadership, Motivation-Morale-Attitudes, Consumer Behavior, Labor Relations, and Organization Theory.

BSI241. Fundamentals of Personnel Administration. *(Fall)* A study of organized approaches to employing, developing, compensating and servicing a workforce so as to assure optimum return to the employing organization, the cooperative effort of individuals and groups involved, and maximum satisfaction consistent with the need for coordination and control. Personnel Administration as a staff function is given special attention together with research bearing on the validity of personnel concepts, requirements, and practices. Emphasis is on administrative considerations rather than application of refined technique. Prerequisite: BSI205.

BSI251. Organization, Theory and Administration. *(Fall)* An analysis based on theoretical concepts and related research of the human factors in business and industrial organizations which influence administrative decision-making. Cases and lectures focus on

mechanisms used in functioning organizations to influence and develop decisions, and to insure uniformity in interpretation, consistency in application, and compatibility with organization goals. The topics of authority, communication, and leadership are given special attention. Prerequisite: BSI205.

BSI262. Management-Union Relationships and Public Control. *(Spring)* Relationships between management, unions and government at the plant and industry level as they influence managerial decision-making. Topics include a comparative analysis of union-company philosophies, structures, and functions; issues and conditions leading to cooperation and conflict; sources of power; alternatives to force, the character and effect of agreements and settlements; administration of agreements; and conditions influencing governmental participation and control. Prerequisites: ECO101 and BSI205 or consent of instructor.

BUSINESS ECONOMICS

BEC203. Managerial Economics. *(Spring)* Business problems are analyzed in this course in terms of economic principles and methods. The theory of demand, supply, market equilibrium, and types of competition are established. Economic reasoning is then applied to managerial decisions in the analysis and forecasting of demand, production methods and costs, price and marketing policy, and profitability measurements. Measurement and forecasting as aids to managerial decision-making under uncertainty are emphasized. Prerequisite: QNT205.

BEC236. Financial Institutions and Markets. *(Fall)* Functions and theories of money and credit, principles of commercial banking and international finance, structure and operations of the Federal Reserve system. Description and functions of other financial institutions and their role in the economy. Structure of the market for short-term and long-term funds; description of money and capital market instruments. Monetary and credit policy. Prerequisites: ACC153 and ECO101.

BUSINESS LAW

LAW203. Business Contracts I. *(Fall)* Basic principles of contract law, including the doctrines of offer and acceptance, consideration, effect of mistakes, fraud and undue influence, the necessity of a writing, and rights of enforcement where there has been failure of performance. Case material from factual situations faced in everyday business, with special reference to laws of New York State.

Half course.

LAW204. Business Contracts II. *(Spring)* A continuation of LAW203.

Half course.

LAW223. Law of Sales and Negotiable Instruments. *(Fall)* Law of sales under the Uniform Sales Act and the law of negotiable instruments, including promissory notes, drafts, bills of exchange, warehouse and trust receipts.

Half course.

LAW226. Agency, Partnerships, and Corporations. *(Spring)* Legal aspects of agencies, partnerships, and corporations as a means of carrying on business. Creation and incidents of the agency relationship; rights of partners as between themselves and third parties; formation and powers of corporations; rights of stockholders; and problems arising from business liquidation.

Half course.

LAW236. Legal Constraints on Business. *(Fall)* A survey of the principles and philosophy necessary to comprehend the legal concepts constraining a business environment. Objectives are: acquiring skills to enable the businessman to foresee legal problems involved in various circumstances through a process of analytical reasoning and the ability to make, alter, and justify related conclusions; recognizing the legal consequences involved in acts relating to business ventures and the need for professional counselling in this area; reviewing the informal judicial process, e.g. negotiation and settlement, and the formal judicial procedures, e.g. commencement of suit to final judgment.

Half course.

FINANCE

FIN205. Financial Management. *(Fall and Spring)* Financial policies and practices essential to business administration. Major emphasis is on corporation finance. Topics include: corporation securities, capital budgeting, long-term financing, short-term financing, administration of funds, administration of income, expansion, and reorganization. Adaptation of financial principles to specific business situations. Prerequisite: ACC153.

FIN246. Investment Management. *(Spring)* General principles of successful investment, as applied to the management of individual and institutional investors' funds. Topics include: determining investment objectives, formulating general investment policies, classifying investment media, interpreting and forecasting general market trends, analyzing leading industries, and developing criteria for the selection of individual security issues. Prerequisite: ECO101.

GENERAL BUSINESS ADMINISTRATION

GBA157. Fundamentals of Business Administration. *(Fall and Spring)* An introduction

to the principal activities, types of policy problems, and interrelationships of the main phases of business, including procurement, production, marketing and finance. Frequent use is made of business cases for illustrative purposes and to introduce the student to the methods of business problem analysis.

GBA282. Business Policy. *(Spring)* Integrates the student's previous studies and further develops his ability to deal more effectively with business problems. Series of cases on policy formulation and administration, involving the functions of purchasing, production, personnel marketing, finance and accounting. These deal with such problems as promotion, expansion, reorganization, and adjustment to changing economic conditions and social forces. During the term, business executives are invited to present and discuss cases developed from their own experience. Prerequisites: FIN205, MKT203, PRD208, and QNT205.

GBA285. Seminar in Management Science. *(Spring)* Analysis and presentation of an empirical or theoretical study in any of the tool or functional areas of Business Administration. Prerequisite: written approval of the supervising faculty member.

GBA293. 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 both the supervising faculty member and the Dean of the College of Business Administration.

MARKETING

MKT203. Marketing. *(Fall and Spring)* 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.

MKT241. Marketing Research. *(Fall)* An investigation and critical examination of facts as a basis for formulating marketing policies and planning sales and promotional strategy. Topics include: scientific method and research design, basic methods of collecting data, formulating the research problem and planning the research project, application of sampling methods to marketing problems, analysis of data collected, motivation research, advertising research, product research, and sales control research. Cases are used to familiarize the student with various types of research problems which confront marketing executives. A basic course in statistical methods is recommended before enrolling in MKT241. Prerequisite: MKT203 or permission of the instructor.

MKT245. Marketing Analysis. *(Fall)* The principal policy areas in marketing, including distribution, pricing, promotion and product development are studied through the use of mathematical and statistical tools. Particular emphasis is placed on the structuring of marketing decision-models. Prerequisites: MKT203, QNT242.

PRODUCTION

PRD208. Production Management. *(Fall and Spring)* Issues, concepts and practices encountered in effectively managing the production function. Topics include: analysis of facilities; research and product development; production planning; organizing and controlling characteristics of the manufacturing processes; control of quality, quantity and cost; and consideration of increased automation. Case analysis is emphasized, and field studies of industrial plants may be included. Prerequisite: QNT205.

PRD220. Design of Production Facilities. *(Spring)* Concepts and techniques involved in the design of production systems. Topics include the translation of product or service specifications into production requirements, design of operations and processes, and location of facilities. Emphasis is placed on the use of mathematical and simulation models for the evaluation of alternative designs. Prerequisite: PRD208.

PRD225. Production Planning and Control. *(Fall)* Concepts and techniques of production quantity planning and control. Topics include tactical demand forecasting, aggregate planning of employment, inventory and production levels; inventory models, scheduling and dispatching decision rules, and the design of general control systems. Prerequisite: PRD208.

QUANTITATIVE METHODS

QNT205. Business Statistics. *(Fall and Spring)* Methods of collection, presentation, analysis, and interpretation of quantitative data commonly associated with business operations. Typical topics: sampling, probability, descriptive values, statistical inference, correlation and time series. Prerequisites: Two courses in college mathematics.

QNT231. Electronic Data Processing. *(Fall)* General principles of computer processing

and of commercial information systems. Includes: nature and use of input, output, communications and processing equipment; principles and limited practice in programming; analysis of data processing requirements; principles of computer systems design; problem areas in the implementation and operation of computer systems, procurement of equipment, and the structure and operation of the data processing organization.

QNT235. Computers and Numerical Analysis. *(Fall and Spring)* Introduction to numerical techniques used in the solution of various business problems. Typical topics include: solution of linear and nonlinear equations and systems, characteristic values of matrices, interpolation and approximation, numerical integration and differentiation, computer simulation methods. FORTRAN programming will be used to apply these methods. Prerequisites: Two courses in college mathematics.

QNT241. Operations Research I. *(Fall)* Development and application of the principal techniques used in the mathematical analysis of business situations. Topics covered include: linear programming and inventory models. Prerequisites: MTH100 and 162 or the permission of the instructor.

QNT242. Operations Research II. *(Spring)* Continuation of the above. Topics covered include: equipment replacement models, queuing, and dynamic programming. Prerequisite: QNT241 or the permission of the instructor.

SPECIAL NON-CREDIT PROGRAMS

The courses listed do not include many others of non-credit character which are planned and conducted in cooperation with individuals, firms, trade and professional associations and governmental agencies. Attendance at these clinics, short-courses, institutes and seminars typically is sponsored by an employer concerned with keeping managers abreast of changing technological, economic, legal, social and political aspects of business. Courses may be either residential or non-residential and organized for varying lengths of time relative to the regular semester programs.

Certified Public Accountant (C.P.A.): Requirements and courses in this area are listed on pages 172 and 173 of this bulletin. To complete these courses a student need not be registered for a degree in this College. Students who wish only to establish equivalency with the College's Registered Accounting Curriculum and who have completed their basic degree in another institution should obtain counselling from the College of Business Administration at the earliest opportunity and register with the Office of Admissions as special students. However, a non-degree candidate is strongly advised to obtain guidance either from the College or the Professional Education Division, The State Education Department (Albany, New York) prior to beginning study to qualify for admission to the Certified Public Accountant examination.

COLLEGE OF EDUCATION

William A. Fullagar, ED.D. (Columbia) ..... Dean

Robert B. Howsam, ED.D. (California) ..... Associate Dean for Graduate Studies

Edward E. Kennedy, ED.M. (Rochester) ..... Counselor of Students

Bettie B. Garland, A.B. (West Virginia) ..... Coordinator, Educational Placement Bureau

FACULTY

William A. Fullagar, ED.D. (Columbia) ..... Professor of Education
Thomas J. Hill, ED.D. (Florida) ..... Professor of Education
Frances L. Horler, PH.D. (Chicago) ..... Professor of Education
Robert B. Howsam, ED.D. (California) ..... Professor of Education
James V. Mitchell, PH.D. (Chicago) ..... Professor of Education
Byron B. Williams, PH.D. (Ohio State) ..... Professor of Education

Arthur L. Assum, A.M. (Ohio State) ..... Associate Professor of Education
Irene J. Athey, PH.D. (California) ..... Associate Professor of Education
Henry E. Butler, Jr., PH.D. (California) ..... Associate Professor of Education
William H. Clark, PH.D. (Columbia) ..... Associate Professor of Education and German
Joseph W. Cole, ED.D. (Harvard) ..... Associate Professor of Education
Dean Corrigan, ED.D. (Columbia) ..... Associate Professor of Education
Gerald A. Gladstein, PH.D. (Chicago) ..... Associate Professor of Education
Norman G. Gunderson, PH.D. (Cornell) ..... Associate Professor of Education and Professor of Mathematics
Elizabeth Z. Howard, PH.D. (Chicago) ..... Associate Professor of Education
Glenn L. Immegart, PH.D. (Ohio State) ..... Associate Professor of Education
Clarence J. Karier, PH.D. (Wisconsin) ..... Associate Professor of Education
Thomas R. Knapp, ED.D. (Harvard) ..... Associate Professor of Education
Eleanor E. Larson, ED.D. (Illinois) ..... Associate Professor of Education
John J. Montean, PH.D. (Syracuse) ..... Associate Professor of Education
Harold L. Munson, ED.D. (New York) ..... Associate Professor of Education
Milton V. Pullen, ED.M. (Rochester) ..... Associate Professor of Education
Catherine J. Sullivan, A.M. (Columbia) ..... Associate Professor of Education
Clarence M. Williams, ED.D. (Michigan State) ..... Associate Professor of Education
Ellsworth S. Woestehoff, PH.D. (Minnesota) ..... Associate Professor of Education

Barry K. Beyer, PH.D. (Rochester) ..... Assistant Professor of Education
Hilliard Jason, ED.D., M.D. (Buffalo) ..... Assistant Professor of Education and Psychiatry
Jerome P. Lysaught, ED.D. (Rochester) ..... Assistant Professor of Education and Research Associate in Medical Education
Robert L. Osborn, PH.D. (Indiana) ..... Assistant Professor of Education
Mitchell Salim, ED.D. (Wyoming) ..... Assistant Professor of Education
Francis M. Trusty, ED.D. (Stanford) ..... Assistant Professor of Education
David G. Zimpfer, ED.D. (Buffalo) ..... Assistant Professor of Education

H. Hunter Fraser, ED.M. (Rochester) ..... Lecturer in Education
Bernard Greenberger, A.M. (Syracuse) ..... Lecturer in Education
Vivian T. Harway, PH.D. (Rochester) ..... Lecturer in Education

Herbert Greenberg, PH.D. (Chicago) ..... Associate Lecturer in Education

Calvin Lauder, M.A. (Syracuse) ..... Assistant Lecturer in Education

*Part-time.

THE COLLEGE OF EDUCATION offers study designed to prepare students for a wide range of careers in education. The programs available to undergraduates prepare students for positions as classroom teachers in elementary and secondary school.

The College of Education believes strongly that a good general education background is essential for a teacher at any level. A person, therefore, who wishes to become a teacher in the elementary or secondary school must first complete two years of study in the College of Arts and Science. During these two years of college the student should complete as many of the distribution requirements as possible.

A student planning to teach in the elementary school will do all of his course work in the College of Education during his senior year. This professional preparation for teaching includes some course work on campus and some direct experience with children in elementary schools. The prospective elementary school teacher will receive the degree Bachelor of Science in Education.

A student planning to teach in the secondary school will begin his professional course work in the College of Education in either the junior or the senior year. He will follow the course of study outlined by his major department in the College of Arts and Science toward the Bachelor of Arts degree.

A student who is planning a career in teaching or who wishes to explore the prospect of any career in education is invited to make an appointment with the Counselor of Students in the College of Education as early as possible during the freshman year. The Counselor will discuss with the student the various career opportunities in education and the appropriate preparation. No student may enter the programs of the College of Education without having had such a conference with the Counselor. In addition, he must make application, as described below, for the program in which he is interested.

Students who wish to prepare themselves for public school teaching must remember that there are state certification or licensing requirements to be met, and these are not identical with degree requirements at this university. The Counselor in the College of Education has information concerning requirements for teaching in the various states. It is important that attention be given to these requirements early enough in one's college career so that appropriate planning of his course program may be arranged.

The following procedures are necessary for admission to undergraduate programs of the College of Education:

1. Student reports to the College Counselor's office for an interview during his freshman or sophomore year.
2. Student gets instruction and application forms for College of Education programs from the Counselor during the semester prior to the one in which he expects to enter the program of the College of Education.
3. When application has been submitted and records are complete, the Counselor directs the student to the appropriate faculty member for an interview and preliminary program planning.
4. The Undergraduate Committee of the College of Education considers the student's application, and he is notified whether or not he has been accepted.
5. Students who have been accepted then proceed, at the next regular registration, to sign up for the appropriate courses as they have been outlined in the conference with the faculty member of the College of Education.

A student from another institution wishing to be admitted to programs of the College of Education with advanced standing must first apply to the Office of

Admissions of the University of Rochester River Campus. That office will confer with the Counselor in the College of Education to evaluate the student's previous courses and to provide necessary application forms.

The College of Education does accept a limited number of well-qualified part-time students who wish to pursue a degree in Education. Part-time students are accepted on the condition that the program selected will be pursued without interruption. This condition might mean, for example, that a part-time student would take at least one course a semester (including summers) until the degree is completed; or it might mean that a student would carry a full load for several consecutive summers until the degree is completed. The condition will be applied in the way that is most appropriate for the individual student, upon the recommendation of the Counselor and the judgment of the Undergraduate Committee.

PROGRAM IN ELEMENTARY EDUCATION

After the completion of the first two years of college, qualified students may follow a program of study which leads to the degree of Bachelor of Science in Education and certification for elementary school teaching in New York State. This program prepares students to teach in grades K through 6. Students who plan to concentrate in elementary education should report to the College Counselor's Office for instructions and forms no later than March 1 of the sophomore year.

In order to apply for admission to the College of Education at the close of the sophomore year, a student must have completed a minimum of 64 semester hours of selected course work and have achieved at least a 2.0 honor point average based upon all course work taken prior to admission. Acceptance into the College will be based upon the student's record and an interview with an appropriate faculty member, and will be determined by the Undergraduate Committee of the College.

Upon admission to the College of Education, each student is assigned to a faculty adviser in the College. The student then arranges to meet with the adviser to plan his program for the final two years of college.

During the junior year the student will take no courses in the College of Education. However, his program of academic course work must be approved by his College of Education adviser. During the junior year the student will complete all liberal arts requirements, including an area of concentration. Also during the junior year each student who has been accepted by the College of Education will be required to devote some time to working with children in selected community agencies and to participate in occasional activities sponsored by the College of Education. These junior year activities are prerequisites for participation in the senior year professional program in elementary education.

The general outline below describes the courses which meet New York State certification requirements for elementary school teachers. All the Education Requirements are fulfilled by a student's participation in the senior year program in the College of Education; all other requirements must be fulfilled prior to the senior year. Students who wish to prepare for certification in other states should consult the Counselor of Students in the College of Education.

BACHELOR OF SCIENCE IN EDUCATION (ELEMENTARY)

	Number of Courses
I. General Requirements	
A. English 111 (unless excused)	0–1
B. Foreign Language (proficiency required)	0–3
C. Physical Education (4 semesters, non-credit)	0
II. Distribution Requirements	
A. Humanities English, Fine Arts, Religion, etc.	4
B. Social Sciences 1. Three courses in an approved combination of American History and Geography 2. Two courses selected from other social sciences	5

C. Natural Sciences 4
1. Psychology 101
2. Two laboratory sciences
3. One mathematics course (Mathematics 140 recommended)

III. Group Concentration 4–5

Four or five courses in one group or related courses from more than one group beyond distribution requirements, and including at least two courses at the upper division level. The group concentration must be approved by the College of Education, and must constitute a minimum of nine courses, including those that are part of the distribution requirements.

IV. Education Requirements 8

1. One course in social foundations.
2. Two courses in educational psychology and child development.
3. Three courses in curriculum and instruction.
4. Student teaching (two course credits).

V. Additional Electives 2–7

Total 32 courses

PROGRAM IN SECONDARY EDUCATION

Undergraduate students preparing to teach an academic subject in the secondary schools, grades 7 through 12, pursue one of two degree programs. The normal avenue for preparation to teach in the secondary school is to complete an A.B. program, with a departmental concentration in the College of Arts and Science, as well as the Teacher Education Sequence[1] (Education 200, Ed. 210, Ed. 231–2, 4, 5 or 6 and Ed. 239) in the College of Education.

Students completing degree requirements in the College of Arts and Science follow the programs described in the department of their interest. Since degree and certification requirements vary, students will find it necessary to take certain courses not required in their departmental concentration. Certification requirements for the State of New York and other States are available at the Counselor's Office in the College of Education.

The Bachelor of Science, in the College of Education, is available for those students who, in consultation with the College, find it inadvisable to pursue the A.B. degree. The admission requirements for the student entering this program at the end of the sophomore year are the same as the requirements for the concentration in elementary education. Students accepted into the B.S. program are also expected to make application for the Teacher Education Sequence.

Those preparing for secondary school teaching should apply for admission to the Teacher Education Sequence after February 1 but not later than March 25 of their junior year. Applications and instructions should be obtained from the Counselor's Office.

The requirements for admission to the Teacher Education Sequence are:

a. Normal academic progress that will permit classification as a senior during the academic year the sequence is completed and that will permit completion of certification requirements in a subject field by the end of that year.
b. An accumulative point ratio of 2.5 or higher in the subject field selected for student teaching.
c. A satisfactory health record.
d. A satisfactory interview with the appropriate faculty member.
e. Acceptance by the Undergraduate Committee of the College.

[1]The Fall semester of the senior year will be reserved for courses required in the sequence. Students should not register for additional course work during this semester.

COURSES OF INSTRUCTION

EXPLANATION OF COURSE NUMBERING SYSTEM

1–99	Non-credit courses.
100–199	Introductory courses—usually at the freshman and sophomore levels—no graduate credit.
200–289	Courses at the junior and senior level; may also carry graduate credit unless otherwise specified.
400–489	Graduate courses at the master's level or the first year of graduate study. Open to undergraduates only by special arrangement.
490–499	Master's level, reading or research courses.
500–589	Advanced or specialized graduate courses.
590–599	Advanced reading or research courses, usually at the doctoral level.

The ordinary unit of undergraduate instruction is the *course*. Each course requires one quarter of the student's working time for one term. Each course, unless otherwise stated, has the equivalent of four hours of credit.

EDUCATIONAL FOUNDATIONS

Education 200. Education in the American Social Order. A survey of the historical background of modern education: the purposes and organization of education in the United States, the status of contemporary educational problems and the proposals for their solution.

Education 210. Educational Psychology. A general survey of concepts and data covering growth, learning, psychological measurement, personality, and problems of adjustment as they relate to the school.

Education 211. Child Development. A study of the patterns of development of children from birth to adolescence with special emphasis on school age children. Techniques and methods of child study are reviewed.

Education 212. Children's Behavior Problems. Analysis of children's behavior problems, preschool through secondary levels. Evaluation of classroom techniques for handling behavior problems. Prerequisite: Psychology 101 and Education 210.

CURRICULUM AND INSTRUCTION

Elementary Education

Education 220, 221. The Elementary School Curriculum I & II (three courses). Examines principles, methods and materials of teaching appropriate to the elementary school curriculum (reading and the language arts, arithmetic and science, social studies, arts and crafts, music, creative dramatics, health and recreation). Planning of instructional activities, the measurement and evaluation of pupil progress, and the use of audio-visual methods and materials of instruction. Observation and participation in classroom activities of area elementary schools.

Education 229. Student Teaching in the Elementary School (two courses). Each student is provided the opportunity to gradually assume increasing responsibility for the total instructional program in a classroom of an elementary school in the Rochester area. Through regular seminar meetings, the students critically analyze problems, principles, and techniques of teaching with special reference to their student teaching experiences and children's behavior problems.

Secondary Education

Education 230. Principles of Teaching in the Secondary School. Critical analyses of principles and techniques of teaching in secondary schools. Interpretation of the objectives of teaching and evaluation of typical procedures. Education 210 prerequisite, except by special permission of the instructor.

Education 231. The Teaching of English in the Secondary School. A study of recognized

methods of teaching English in the secondary schools. The selection and examination of materials for the teaching of language, literature and composition; the means of providing for individual differences, interests and capacities; ways of developing proper habits of reading and study; lesson planning, the construction of objective tests, and evaluation of teaching materials.

Education 232. The Teaching of Social Studies in the Secondary School. The aims, present trends, and suggested programs in the social studies in relation to the general aims of instruction. Opportunities provided for the examination of textbooks, collateral readings, professional periodicals, visual aids, standard reference works, and other materials. Construction of lesson plans and objective tests.

Education 234. The Teaching of Science in the Secondary School. Content of the high school sciences, methods of selection and organization of curriculum materials and equipment, and procedures for teaching and evaluation.

Education 235. The Teaching of Modern Foreign Languages in the Secondary School. Provides experience in lesson planning and in the use of audio-visual materials and evaluation of instruction. Consideration of the methods of teaching and the content of high school courses.

Education 236. The Teaching of Mathematics in the Secondary School. Survey of desirable methods in the teaching of mathematics. The objectives, content, and methods of presenting the basic topics in arithmetic, algebra, geometry, and trigonometry. Some discussion of typical curriculum procedures for testing and evaluation.

Education 239. Student Teaching in the Secondary School (two courses). Observation, participation and classroom teaching are done in the public high schools of Rochester and vicinity.

General Course

Education 248. Programming for Automated Teaching. The development, use and analysis of sequences of items designed for automated teaching devices. All participants will receive a portion of the course material from a programmed sequence and will engage in preparing programs in an area of their own interest. In addition, methods of analyzing programmed experiences of students will be developed.

COLLEGE OF ENGINEERING AND APPLIED SCIENCE

AIMS AND OBJECTIVES

SOCIETY IS DEMANDING more and more of its educated men and women; this is especially true of those educated in the engineering disciplines, for it is they who will compress the time scale between scientific discovery—in physics, chemistry, biology, mathematics, psychology—and the practical application of this new knowledge. As the world of the engineer becomes more stimulating and more challenging, the College, in its objective of educating an increasing number of engineers equal to the challenge and opportunities ahead, is demanding more and more of its faculty and of its students. There can be no compromise in the pursuit of the College's four objectives in undergraduate education, graduate education, research, or service.

First, it is the aim of the College to prepare undergraduate students with the fundamental knowledge of engineering (and the related sciences) and to develop their ability to apply the principles of these sciences to ever-new situations. Such students will be able and even eager to accept the responsibilities of professional life because of their education here, and more important because they are aware of their duties and obligations to the complex society of which they, as educated engineers, are an important part.

Second, it is the aim of the College to educate especially qualified students at the graduate level to fill the continuing need in teaching, in research, and in advanced positions in industry. As a corollary, a strong graduate program adds vigor to the academic environment in which to educate undergraduate engineers and applied scientists.

Third, it is the aim of the College to foster active research programs designed to teach graduate students the aims and methods of research, to provide a stimulating and challenging environment for both students and faculty, and to add to the store of human knowledge.

Fourth, it is the aim of the College to be of service to its community—both local and national. To meet this objective, opportunity is provided the individual for part-time study in the College; the consulting and research resources of the College are available to help solve special problems which are appropriate to these resources.

THE ADMINISTRATIVE OFFICERS

John William Graham, Jr., D.SC. (Carnegie Institute of Technology).....Dean

Robert Howard Perry, PH.D. (Delaware).....Associate Dean

Oscar Edward Minor, B.S. (Rochester).....Assistant Dean

Shelby Alexander Miller, PH.D. (Minnesota)....
....Chairman of the Department of Chemical Engineering

Daniel Ward Healy, Jr., PH.D. (Harvard)....
....Chairman of the Department of Electrical Engineering

Martin Lessen, SC.D. (M. I. T.).....Chairman of the Department of Mechanical and Aerospace Sciences

Walter Lewis Hyde, PH.D. (Harvard).....Director of the Institute of Optics

UNDERGRADUATE PROGRAMS

In Engineering and Optics

The undergraduate curricula in engineering and optics are described in the material which follows in this catalog. The graduate programs in engineering and optics, Master's and Doctoral, are described in the separate Bulletin of Graduate Studies of the University. Information about research activities and programs of service to industry may be obtained on request from the Dean of the College of Engineering and Applied Science.

Four-Year Programs

Four-year courses of study are offered in Chemical Engineering, Electrical Engineering, Mechanical Engineering, and in Optics. These curricula, all of which lead to the Bachelor of Science degree, provide thorough training in the basic and applied sciences and in specialized studies in engineering and optics. But education for leadership in engineering calls for more than knowledge of science and applied science; over one-fifth of the curriculum time is devoted to work in the humanities, social sciences, and subjects elected without restriction (free electives). In each curriculum the emphasis is placed upon a thorough understanding of the fundamental principles of science and engineering, rather than on a detailed knowledge of specific engineering and industrial practice. The aim is to motivate and prepare the graduate for continued learning—either in industrial employment or other professional engineering service, or in study beyond the Bachelor's degree. Full accreditation of the engineering programs in electrical, chemical, and mechanical engineering has been given by the Engineers' Council for Professional Development.

Enriched Five-Year Programs

Although undergraduate programs are normally completed in four academic years, a student may extend his undergraduate work over a five-year period. The additional time may be used to broaden his formal education by including courses in the liberal arts or in the sciences. A student wishing to follow such a program should consult with his Faculty Adviser toward the end of his freshman year. The proposed program must meet, during each of five years, the normal minimum load requirements.

By properly choosing the electives in a five-year program the requirements for both the B.S. degree in the College of Engineering and Applied Science and an A.B. degree in a chosen field of liberal arts concentration may be completed (see below).

Two-College Program

The Two-College Program offers a broad training in the humanities and social sciences combined with professional training in engineering. In this five-year program the student attends the College of Arts and Science at the University of Rochester, or a participating liberal arts college,* for three years. After satisfactorily completing the liberal arts phase of study, he then transfers to the College of Engineering and Applied Science for his professional training. This program is especially valuable as an educational preparation for those who wish to prepare for careers which combine knowledge of the precise world of scientific engineering along with the ability of understanding people, their needs and how to serve them.

Application for admission into the Two-College Program is made to the liberal arts college of the student's choice, and is subject to the admission procedures of that institution. After three years of successful study, acceptance into the College of Engineering and Applied Science at Rochester is guaranteed upon the recommendation of the participating college. The following requisites are considered essential to be recommended for admission to Rochester:

*A list of participating colleges may be secured by writing to the Office of the Dean, College of Engineering and Applied Science, University of Rochester.

1. The planned sequence of courses as specified has been satisfactorily completed.
2. A satisfactory academic average has been maintained.

Upon satisfactory completion of the program, the Bachelor of Science degree is awarded by the College of Engineering and Applied Science, and the Bachelor of Arts degree may be awarded by the participating college.

Specialized Coursework

Flexibility is provided in each of the curricula, both four-year and five-year, so that a student may incorporate in his Bachelor's program certain specialized courses of particular interest to him. For instance, by planning his program early (before the end of the sophomore year) an engineering student may pursue a sequence of elective work in such fields as materials science, or in other selected areas in which the University has special competencies.

Degree Requirements

In addition to satisfactorily completing the specific courses stipulated in the degree programs listed by each of the four departments, the student must complete certain of the following.

1. *English:* Any course at the 100 level (excluding those numbered 120–129). See page 83.

2. *Foreign Language:* There is no language requirement for the undergraduate programs in the College of Engineering and Applied Science.

3. *Physical Education:* All students are required to take physical education during each of their first four terms. Physically handicapped students may be excused or given modified programs on recommendation of the University health service.

4. *Distribution Requirement:* Students following the mechanical, electrical, or optics programs must complete three humanities courses and three social science courses. Classification of courses offered in the various Colleges of the University is listed on page 83 of this catalog; however, there are certain exceptions for engineering students:

For students enrolled in the College of Engineering and Applied Science, the first year courses in a foreign language will be considered as humanities courses. And similarly, Psychology 101 will be accepted as a social science subject.

Students in chemical engineering programs must complete at least 20 credits (5 courses) in the humanities and social sciences with these stipulations: at least two courses must be in the humanities; at least two courses must be in the social sciences.

5. A minimum of one year's academic coursework must be completed in the College.

6. ROTC students majoring in engineering or optics must take certain Aerospace Studies or Naval Science courses in addition to the regular courses listed.

Work-Study Program

It is our conviction that undergraduate engineering education is best accomplished by supplementing the academic program with significant work experience in an engineering environment. The College of Engineering and Applied Science therefore urges all undergraduates, freshmen through seniors,

to spend their summers in educationally gainful employment. In support of this conviction, and in the interest of providing the students with the best possible preparation for a lifetime of learning and professional service, the College is committed to aiding students in procuring proper summer work.

The work-study program was established in cooperation with a wide variety of industrial and research organizations to offer a planned program of summer employment to the student. The work is planned to achieve specific objectives for the student, namely: to have each work period contribute in a significant way to a better understanding of engineering; to develop enthusiasm for the profession; and to have the satisfaction of being a productive employee.

The College cannot guarantee that all students will be placed in meaningful summer jobs, although efforts will be made to aid all who are interested. The advantages of participating in the work-study program are apparent. The student who integrates three summers of significant work experience with four years of superior quality academics should have a head start toward being a truly professional engineer.

Admission Policy

The College of Engineering and Applied Science is an upper division College. Accordingly, two avenues lead to admission—one by intramural transfer, the other by extramural transfer. Students enrolled in the College of Arts and Science of the University of Rochester file an application for intramural transfer upon satisfactory completion of the pre-engineering work prescribed in one of the engineering departmental synopses. Students from two-year colleges or other institutions who desire to transfer to the College of Engineering and Applied Science apply to the University Admission Office (for more details see page 30). To be admitted to the College, a student is expected to:

a) have completed the freshman and sophomore courses of the appropriate departmental four-year synopsis, or equivalent work satisfactory to the College,

b) have a point-hour ratio of at least 2.00 in the work specified in (a),

c) satisfy the appropriate department with regard to his professional promise, interest, and character.

Under certain circumstances, applicants not meeting all of the above requirements may be admitted as special or probationary students. The status of such students is subject to review at the end of the first semester in the College.

Common Freshman Year

Students following the Bachelor of Science programs in chemistry, physics, optics, and all branches of engineering take substantially the same courses during their freshman year, and may change among these curricula with relative ease until the end of the first year.

EXPLANATION OF COURSE NUMBERING SYSTEM

1–99	Non-credit courses.
100–199	Introductory courses—usually at the freshman and sophomore level—no graduate credit.
200–289	Courses at the junior and senior level carrying graduate credit unless otherwise specified.
290–299	Undergraduate reading or research courses.
300–399	Courses in the Honors Division.

400–489 Graduate courses at the master's level or the first-year of graduate study. Open to undergraduates only by special arrangement.

490–499 Master's level, reading or research courses.

Each course carries credit for *one* course unless otherwise specified.

Titles of 400-level courses which are open to undergraduate students by special arrangement are listed with the undergraduate course descriptions; these advanced courses are described in the Graduate Studies Bulletin.

Chemical Engineering

THE DEPARTMENT OF CHEMICAL ENGINEERING offers an accredited undergraduate curriculum that provides thorough and vigorous preparation for entrance to the profession directly or through subsequent graduate programs. The major mission of the Department is the development of competent chemical engineers who will be adequately prepared to contribute effectively in all phases of chemical engineering from process industry to research. The curriculum is designed to provide a balanced experience of education and training in the humanities and social sciences, in science and mathematics, and in applied science and engineering. Chemical engineering involves at once applications of rigorous theory, and methods that are largely empirical. Both require sound engineering judgment and professional standards in their successful practice, and both are dealt with in the curriculum. In its pursuit, the Department faculty endeavors to induce in its students attitudes of scientific curiosity, engineering objectivity, and professional dedication.

FACULTY

Shelby Alexander Miller, PH.D. (Minnesota).... ....Professor and *Chairman of the Department of Chemical Engineering*

Robert Howard Perry, PH.D. (Delaware).....Professor of Chemical Engineering and *Associate Dean of the College of Engineering and Applied Science*

Gouq-Jen Su, SC.D. (M.I.T.).....Professor of Chemical Engineering

James Merrill Douglas, PH.D. (Delaware).....Associate Professor of Chemical Engineering

Richard Frederick Eisenberg, M.S. (Rochester).....Associate Professor of Metallurgy

Richard Reist Kraybill, PH.D. (Michigan).....Associate Professor of Chemical Engineering

Stanley Middleman, DR. ENG. (Johns Hopkins).....Associate Professor of Chemical Engineering

John Wesley Bartlett, PH.D. (Rensselaer).....Assistant Professor of Chemical Engineering

William David Smith, Jr., D.ENG. (Yale).....Assistant Professor of Chemical Engineering

Ronald Edward Glegg, PH.D. (McGill).....Associate Lecturer in Chemical Engineering

Burton Cosden Gibbons, B.S. CH.E. (Carnegie Institute of Technology).... ....Assistant Lecturer in Chemical Engineering

*Part-time.

FOUR YEAR DEGREE PROGRAM

Freshman Year

Fall Term

Chem. 123	General Inorganic Chemistry
Math. 161[1]	Analysis I
Phys. 115[2]	Physics I
English Requirement	
Ph. Ed. 11 or 12	Physical Education

Spring Term

Chem. 124	General Inorganic Chemistry, Qual. Anal.
Math. 162[1]	Analysis II
Phys. 116[2]	Physics I
Elective[3]	Humanities or Social Science
Ph. Ed. 13 or 14	Physical Education

Sophomore Year

Fall Term

Chem. 163	Organic Chemistry II
*Math. 163[1]	Analysis III
Phys. 125[2]	Physics II
*Ch.E. 100	Introduction to Chemical Engineering
Ph. Ed. 21 or 22	Physical Education

Spring Term

Chem. 164	Organic Chemistry II
*Math. 164[1]	Analysis IV
Phys. 126[2]	Physics II
*Ch. E. 102	Material and Energy Balances
Elective[3]	Humanities or Social Science
Ph. Ed. 23 or 24	Physical Education

Junior Year

Fall Term

Chem. 251	Physical Chemistry I
Ch. E. 180	Eng. Materials I
Ch. E. 243	Transport Phenomena I
Elective[3]	

Spring Term

Chem. 252	Physical Chemistry II
Ch. E. 280	Eng. Materials II
Ch. E. 244	Transport Phenomena II
Ch. E. 225	Chemical Engineering Thermodynamics
Ch. E. 294	Plant Visits
Elective[3]	

Intersession (3 weeks)

Ch. E. 245[4]	Chemical Engineering Laboratory

Senior Year

Fall Term

Ch. E. 231	Applied Kinetics, Reactor Design
Ch. E. 250	Unit Operations
Elective[3]	
Elective[3]	

Spring Term

Ch. E. 273	Chemical Engineering Process Design
Elective[3]	
Elective[3]	
Ch. E. 294	Plant Visits

*Students with a passing grade less than C may be required to repeat the course.

[1]An alternate approved sequence is Mathematics 171, 172, 173, 174 for those considered eligible by the Mathematics Department.

[2]An alternate approved sequence is Physics 117-118, 127-128 for those considered eligible by the Physics Department.

[3]The Chemical Engineering curriculum contains eight electives, including one in the freshman year. Of these, at least five must be selected from Humanities and Social Science courses in the College of Arts and Science, with the following stipulations and exceptions: at least two Humanities courses; at least two Social Science courses; a fifth course that must be in either Humanities or Social Science. For the purpose of electives distribution in this program, Psychology 101 may be considered a Social Science. The remaining three courses (12 credits) may be satisfied by any courses offered by the U. of R. for which the student is eligible, provided that their content is not already included in the Chemical Engineering curriculum. Students planning graduate study in Chemical Engineering or Chemistry are encouraged to include one or more years of German or Russian among their Humanities or free electives.

[4]Conducted during a period of 18 full working days (consecutive except for Sundays), usually in the first three weeks of June.

Students enrolled in Naval or Air Force ROTC programs may apply two ROTC courses (eight hours) toward their degree as electives in their Chemical Engineering curriculum. The other ROTC courses required must be taken as an over-load. Faculty and Departmental Advisers or the Dean of Students may be consulted for copies of a synopsis specifically applicable to ROTC students.

The student who wishes to complete both his Chemical Engineering degree and his commission in four years may find it expedient to take at least one summer session course. A more reasonable work load will result if the ROTC (particularly NROTC) student plans his degree-commission program for nine semesters.

THE METALLURGICAL AND MATERIALS CONCENTRATION in Chemical Engineering consists of the use of the three free electives for courses in metallurgy or materials which, when properly selected, form with ChE 280 a four-course composite that is tantamount to a "minor" in materials engineering. Examples of courses that might be selected as part of the option are:

ChE 281, 282	Physical Metallurgy (in lieu of ChE 280)
ChE 283	The Structure and Properties of Solids
ChE 284	Applied Physical Metallurgy
ChE 285	Contemporary Problems in Materials Engineering
ChE 295	Metallurgical Engineering Projects
ChE 481	Corrosion
Opt 221	Introduction to Quantum Mechanics and Atomic Structure
Opt 222	Introduction to the Theory of the Solid State
ChE 263	The Chemistry of Plastic Materials
ChE 482	Colloidal and Amorphous Materials
ChE 483	Physics and Chemistry of Vitreous Materials
Geol. 227	Intermediate Mineralogy
Geol. 241	Introductory Petrology

Students interested in the Metallurgical and Materials Concentration should plan their sequence of courses by the beginning of their junior year. They are invited to discuss the option with their adviser or with Professor R. F. Eisenberg, director of the option program.

Two-College Program

After three years in the College of Arts and Science at the University of Rochester, or at a cooperating college or university, a student may transfer to the College of Engineering and Applied Science and complete a two-year course of study in the professional aspects of chemical engineering. In this program the student may receive two

degrees, as outlined on page 189. To enter the program in chemical engineering, the transferring student must have substantially completed the science and mathematics course requirements of the first two years of the four-year curriculum. A transferring student would also find it extremely helpful, but not necessary, to have completed a year of physical chemistry before coming to Rochester. The student takes the usual junior and senior year course of study as given except that ChE 100 and ChE 102 are substituted for electives in the fall and spring terms of the junior year.

COURSES OF INSTRUCTION

100. Introduction to Chemical Engineering. An introduction to the profession of chemical engineering; techniques and fundamental methods of problem formulation and solution.

Three lectures and one recitation or laboratory a week.

102. Material and Energy Balances. First law of thermodynamics and the principles of equilibrium. Combined with the principle of conservation of matter, they are used to solve a variety of chemical engineering problems involving physical and chemical changes of material and accompanying heat effects.

Three lectures and one recitation or laboratory a week.

145, 146. Elements of Chemical Engineering. Analysis of chemical engineering problems and techniques for their solution. The principles of conservation, equilibrium, transport behaviour, and economics applied to problems of stoichiometry, unit operations, and reactor design. Intended as an engineering supplement for chemists and a theoretical background for technicians employed in the process industries. Prerequisites: general chemistry, general physics, and calculus.

Credit—three hours each term.

180. Engineering Materials I. A review of statics followed by a study of the principles of strength of materials with application to engineering structures. Topics include: properties of materials, simple and combined stresses, theories of failure and design of engineering structures. The laboratories will be devoted to training in engineering graphics and shop practice, and will include experiments and demonstrations in testing and evaluation of material properties. Prerequisites: Math 163 and Physics 115–116.

Three lectures and two laboratories a week.

200. Process Control and Instrumentation. Review of the principles of measurement, followed by a survey of established techniques for measuring and controlling process variables. Selection and engineering of instruments for the chemical process industries.

Credit—three hours.

Two lectures and one recitation or laboratory a week.

211. Chemical Engineering Computer Calculations. An introduction to digital and analog computers with emphasis on programming techniques and their application in the solution of chemical engineering problems.

Credit—three hours.

Two lectures and one recitation or laboratory a week.

212. Analysis of Chemical Engineering Data. Graphical and statistical methods of analyzing, correlating, and interpreting both lab-

oratory and industrial data are developed. A brief study of the important economic and statistical factors underlying the optimum design of experimental programs.

Credit—three hours.
Three lectures-recitations a week.

225. Chemical Engineering Thermodynamics. A study of the fundamental laws and principles of classical thermodynamics with special emphasis on their application to problems in chemistry and chemical engineering. Main topics covered are: PVT relationships for real gases and liquids; the Second Law; thermodynamic properties of fluids; production of work from heat; refrigeration; and phase and chemical equilibria. Prerequisite: ChE 102.

Three lectures and one recitation or laboratory a week.

231. Applied Kinetics and Reactor Design. Review of chemical kinetics, followed by a study of the methods of kinetic data collection, analysis, and interpretation. Simple reactor designs are calculated. Emphasis is on homogeneous uncatalyzed reactions, but heterogeneous and catalyzed reactions are considered. Chem. 252 and ChE 244 prerequisite. Illustration of principles in the laboratory and by means of an analog computer.

Three lectures and one or two laboratories a week.

243. Transport Phenomena I. A rigorous treatment of the theory of fluid flow is presented. The theory is applied to problems of laminar and turbulent flow through pipes, flow through particulate masses, and separation and mixing processes.

Three lectures and one recitation or laboratory a week.

244. Transport Phenomena II. The theory of heat and mass transfer is presented, with application to problems of transfer to and from static and flowing systems by molecular and convective mechanisms.

Three lectures and one recitation or laboratory a week.

245. Chemical Engineering Laboratory. Demonstration of certain of the unit operations and of the physical principles of chemical engineering. Data taking, equipment operation, and methods of data calculation and correlation. Experience in writing effective technical reports is an important part of the course. CHM 124 and ChE 244 are prerequisite.

Credit—three to four hours.
Equivalent of nine to twelve hours a week.

250. Unit Operations. Selected problems for such basic unit operations as distillation, absorption, extraction, drying, humidification, filtration, sedimentation and evaporation.

Three lectures and one laboratory a week.

261. Introduction to Nuclear Engineering. An introductory course dealing briefly with a number of problems in the nuclear field. Draws extensively on the engineering student's earlier educational background. Topics studied: introduction to nuclear physics; reactor components and analysis; materials of construction; power systems and controls; waste disposal and safety.

Three lectures and one laboratory a week.

263. The Chemistry of Plastic Materials. Discussion of sources of chemical raw materials and conversion of these materials to resins. General principles of polymer formation. Description of each important class of plastic materials, with reference to methods of manufacture, compounding and molding. Emphasis will be placed on the physical properties of materials and the variation of these properties with plastic composition.

Credit—two hours.
Two lectures a week.

265. Process Laboratory. Simple process development campaigns in which kinetic data are obtained and process conditions are investigated and established. Each campaign culminates in a reactor design. The approach to the multi-variable experiment is demonstrated.

Credit—one or two hours.
One or two three-hour laboratories a week.

268. Analysis of Industrial Chemical Processes. Critical examination of selected industrial chemical processes that illustrate the successful applications of mass and energy balances, thermodynamics, reaction kinetics, and engineering economics.

Credit—two hours.
Two lectures a week.

273. Chemical Engineering Process Design. An intensive course for seniors. Fundamental material in transport phenomena, thermodynamics, reaction kinetics, unit operations, and materials science, inter-related and applied to the design of complete chemical plants. Advanced optimization techniques, process control theory, and manufacturing and capital cost estimation applied to design. Emphasis on fundamental and advanced techniques with decision among process alternates based on economic considerations.

The entire staff cooperates in the teaching of the course so as to offer the student the most recent knowledge in a number of specialties. ChE 231 and 250 are prerequisite.

Credit—eight hours.
Four afternoons a week.

278. The Chemical Industry and Its Operation. Review of the history of chemical technology and the emergence of the modern chemical industry. Study of the organization, financing, and economic profile of the process industries. Interplay between technical and economic factors. Exercise of the managerial function with respect to them, particularly in the organization and management of research and development. The current status of patent practice.

Credit—two hours.
Two lectures a week.

280. Engineering Materials II. Structure and properties of materials including metals, glass and polymers. Major emphasis is on metal systems involving solidification, alloying, equilibrium phase diagrams, non-equilibrium phase transformation, corrosion, and high temperature behavior. Prerequisites: Chem. 251, ChE 180, Phys. 125-126.

Three lectures and one laboratory a week.

281, 282. Physical Metallurgy. Fundamentals of physical metallurgy. Emphasis is placed on the structure of metals, phase diagrams, physical and mechanical properties, and heat treatment. The first-term laboratory emphasizes experimental techniques and equipment; the second-term laboratory deals with metallurgical operations and application of the principles of physical metallurgy to specific metals and alloys.

Credit—four hours each term.
Three lectures and a laboratory a week.

283. The Structure and Properties of Solids. A treatment of the principles underlying the behavior and use of engineering materials. Topics covered: structure of matter, X-ray diffraction, phase diagrams, rate processes, mechanical and other physical properties of solids. Prerequisites: ChE 280, sophomore physics and math.

Three lectures and one three-hour laboratory a week.

284. Applied Physical Metallurgy. A study of alloy systems, relating phase diagrams, heat treatments, and microstructure to mechanical and other physical properties.

Three lectures and one three-hour laboratory a week.

285. Contemporary Problems in Materials Engineering. A study of current literature relating to materials research and development. Class periods will be devoted to discussion and critiques of the assigned reading. Prerequisites: ChE 283 or Optics 222.

Three lectures a week.

290. Special Topics. A senior seminar course. Current practices and current research developments in chemical engineering. Students of particular technical aptitude concentrate on advanced topics of theoretical character; others concentrate on design practice, engineering economics and cost considerations, and plant practice. ChE 244 prerequisite.

Credit—three hours.
Two 75-minute meetings a week.

292. Chemical Engineering Projects. The student is placed on his own initiative in the pursuit of an original problem related to chemical engineering. The work may be experimental, theoretical, or computational. Only highly qualified students may enroll. ChE 244 is prerequisite and consent of the Department is required.

Credit—one to four hours.

294. Plant Visits. Appropriate industrial plants that illustrate chemical engineering in practice are visited. The visits are preceded by explanation and followed by discussion.

No credit.

295. Metallurgical Engineering Projects. The student will be placed on his own initiative and responsibility in the study of an original problem in some field of metallurgical engineering, involving library or laboratory work. A complete engineering report required. Permission of instructor and the department required.

Credit—two to four hours.

411, 412. Analysis of Chemical Engineering Problems.

Credit—three hours each term.

421. Advanced Chemical Engineering Thermodynamics.

Credit—three hours.

431. Chemical Engineering Kinetics and Catalysis.

Credit—three hours.

441. Advanced Transport Phenomena.

Credit—three hours.

450. Advanced Unit Operations.

Credit—three hours.

451. Filtration.

Credit—two hours.

452. **Agitation.** *Credit—two hours.*

481. **Corrosion.** *Credit—two hours.*

482. **Amorphous and Colloidal Materials.** *Credit—three hours.*

483. **Vitreous Materials.** *Credit—three hours.*

Electrical Engineering

THE DEPARTMENT OF ELECTRICAL ENGINEERING seeks to give students the background for entrance into the profession of engineering directly from the completion of their baccalaureate degree as well as to prepare students for further study at the graduate level. To meet these requirements the electrical engineering faculty believes it is most essential that the curriculum be based upon a firm foundation of fundamental sciences, particularly physics and mathematics. Students study these subjects during the first three years of their program at Rochester.

Courses in electrical engineering "proper," which are given from the sophomore year on, are selected from a large number of possible alternatives on the basis of their potential for broad application to electrical engineering. The normal academic load of four courses per term reduces the time spent in formal instruction compared to many engineering curricula. This reduction in class time permits a correspondingly greater amount of time to be spent on individual assignments and projects, and stresses the responsibility of the student to learn on his own. The engineering profession demands continuous self study and these habits are best inculcated early in one's career.

While the primary objective of the curriculum is to prepare the student for the practice of electrical engineering, the University's responsibility to the student transcends the professional. For this reason a course in one of the humanities or social sciences is required in each term of the student's program.

In summary, the electrical engineering program at Rochester is fundamental, sophisticated, individualistic, broad, and carefully designed to help the student prepare himself for a lifetime of continued learning and professional service as both an engineer and a citizen.

FACULTY

Daniel Ward Healy, Jr., PH.D. (Harvard).....Professor and *Chairman of the Department of Electrical Engineering*

Gerald Howard Cohen, PH.D. (Wisconsin).....Professor of Electrical Engineering

Lloyd Philip Hunter, D.SC. (Carnegie Institute of Technology).....Professor of Electrical Engineering

Hideya Gamo, D.SC. (Tokyo).....Professor of Electrical Engineering

David Theobald Blackstock, PH.D. (Harvard).....Associate Professor of Electrical Engineering

Edwin Lorenz Carstensen, PH.D. (Pennsylvania)....Associate Professor of Electrical Engineering

Hugh Guthrie Flynn, PH.D. (Harvard).....Associate Professor of Electrical Engineering

Edwin Kinnen, PH.D. (Purdue).....Associate Professor of Electrical Engineering

William Streifer, PH.D. (Brown).....Associate Professor of Electrical Engineering

Herbert Bernhardt Voelcker, Jr., PH.D. (London)...Associate Professor of Electrical Engineering

Edward Lawrence Titlebaum, PH.D. (Cornell)....Assistant Professor of Electrical Engineering

John Blake S. Waugh, M.SC. (New South Wales).....Senior Research Associate in Electrical Engineering

FOUR YEAR DEGREE PROGRAM

Freshman Year

1st Term

Math. 161[1]	Analysis I
Phys. 115[2]	Physics I
Chem. 121[3]	General Chemistry I
English Requirement	
Ph. Ed. 11 or 12	Physical Education I

2nd Term

Math. 162[1]	Analysis II
Phys. 116[2]	Physics I
Chem. 122[3]	General Chemistry II
**Elective	Humanities or Social Science
Ph. Ed. 13 or 14	Physical Education II

†Sophomore Year

1st Term

Math. 163[1]	Analysis III
Phys. 125[2]	Physics II
E. E. 110	Network Analysis I
**Elective	Humanities or Social Science
Ph. Ed. 21 or 22	Physical Education I

2nd Term

Math. 164[1]	Analysis IV
Phys. 126[2]	Physics II
E. E. 111	Network Analysis II
**Elective	Humanities or Social Science
Ph. Ed. 23 or 24	Physical Education II

†Junior Year

1st Term

E. E. 202	Engineering Analysis II
E. E. 221	Electronics
Opt. 221	Introduction to Quantum Mechanics and Atomic Structure
**Elective	Humanities or Social Science

2nd Term

E. E. 201	Engineering Analysis I
E. E. 222	Systems Analysis
Opt. 222	Introduction to the Theory of the Solid State
**Elective	Humanities or Social Science

†Senior Year

1st Term

E. E. 231	Electricity and Magnetism
E. E. 241	Communications Systems I
Elective[4]	Technical
**Elective	Humanities or Social Science

2nd Term

E. E. 232	Wave Motion
Elective[4]	Technical
Elective[4]	Technical
Elective	Open

[1]An alternate approved sequence is Mathematics 171, 172, 173, 174 for those considered eligible by the Mathematics Department.

[2]An alternate approved sequence is Physics 117–118, 127–128 for those considered eligible by the Physics Department.

[3]An alternate course is Chemistry 123, 124 for students considered eligible by the Chemistry Department.

**To satisfy the distribution requirements, a student must elect three Humanities courses and three Social Science courses.

†Especially selected students may be permitted to carry one additional elective during each term for a maximum of 36 courses total.

[4]Technical Electives available to Electrical Engineering students include:

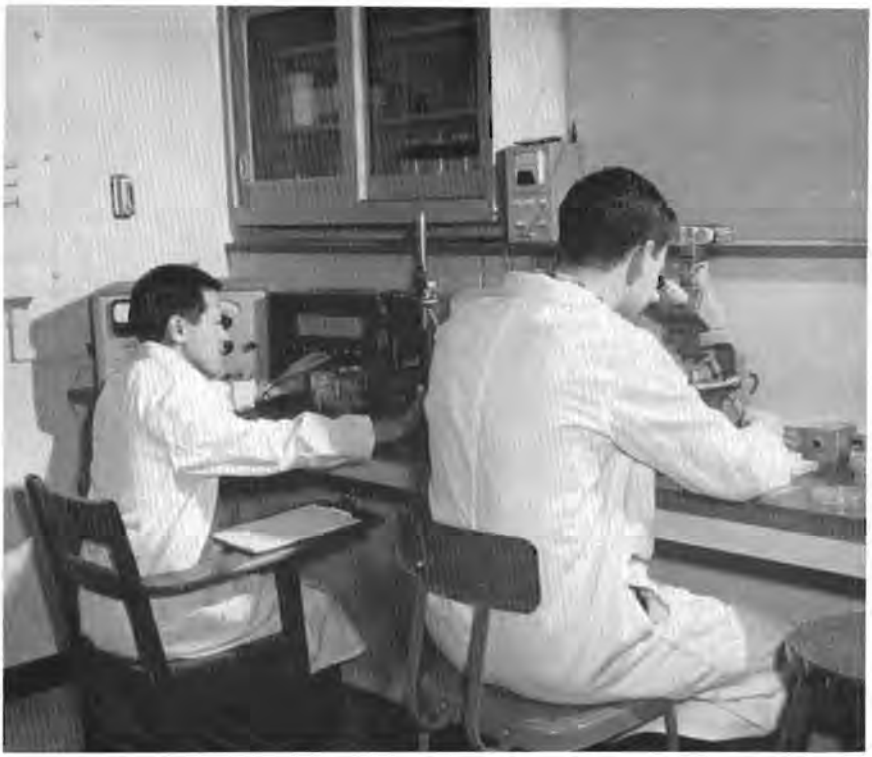
E.E. 243 Communication Systems II
E.E. 206 Transistor Characteristics and Circuits
E.E. 264 Electronic Circuit Analysis II

and, upon the approval of the department, courses selected from the 400-numbered series. In addition, students are invited to consider, with the guidance of their adviser, suitable courses in Mathematics, Physics, and the other Engineering Sciences. Students interested in the Biomedical Engineering field are urged to choose as electives courses in Biology, as well as Organic Chemistry.

Two-College Program

THE DEPARTMENT OF ELECTRICAL ENGINEERING offers a B.S. degree upon completion of a program of study in two colleges. The first three years are taken at an approved liberal arts college and the last two in the professional College of Engineering and Applied Science at Rochester. (See special section for more complete description of the Two-College Program.) Under this Plan EE 110 is taken either in the cooperating liberal arts college or is taken in a special class conducted in the summer just prior to entrance at Rochester. Other freshman and sophomore courses, except EE 111, listed in the four year synopsis are substantially completed in the arts college. A special section of EE 111 replaces the humanities or social science elective listed in the first semester of the junior year. All other courses of the junior and senior years remain the same.

NOTE: Students enrolled in Naval or Air Force ROTC programs may use two ROTC courses (eight hours) as allowable electives in their electrical engineering curriculum. The other ROTC courses required must be taken as overloads. Detailed programs combining ROTC with engineering are available from the department counselors.



COURSES OF INSTRUCTION

110, 111. Network Analysis I, II. An introductory course in circuit analysis considering both passive LRC elements and active elements as defined by their terminal characteristics. Topics include steady-state and transient analyses, equivalence theorems, harmonic waveform analysis, and problem solutions using the Laplace transform. A laboratory introduces instruments and techniques of electrical measurements, methods for solving network problems on a digital computer, Fortran programming language and basic operative skills for an IBM 1620 computer.

157. Elementary Electrical Engineering. A basic course for chemical engineers covering elements of circuit theory, an introduction to electrical measurements, electronic devices or rotating machinery. Physics 125–126 and Math. 164 prerequisite.
Credit—three hours.

201. Engineering Analysis I. A course divided between topics in theory of probability and statistics and the theory and application of vectors and tensors.

202. Engineering Analysis II. An introduction to the theory of functions of a complex variable with emphasis on the background leading to an understanding of Fourier analysis and Laplace Transform Theory.

206. Transistor Characteristics and Circuits. A study of the physical characteristics of semiconductor devices, particularly junction transistors, and the analysis and design of transistor circuits emphasizing the unique properties of the transistor. EE 221 prerequisite.

207. Solid State Electronics Laboratory. A laboratory providing training in certain techniques of solid state electronics component fabrication. These involve semiconductor crystals and junctions, magnetic cores and thin films, superconducting films, and passive element films and structures. Two project-type experiments will be required per semester. This course may be taken for credit more than once. Admission by permission of the instructor.

Credit—three hours.

221. **Electronics.** An analysis of the basic active devices and circuits which are the building blocks of electronic systems, i.e., rectifiers, amplifiers, oscillators, and trigger or pulse circuits.

222. **Systems Analysis.** Theory of lumped parameter system analysis. Topics include parameter and energy definitions, system equations, analogs, graphs, matrix characterization, Lagrangian fotmulation, electromechanical devices, state concepts and feedback control. Use is made of the theory of functions of a complex variable developed in EE 202, and matrix and vector techniques developed in a companion course, EE 201. EE 111 is also prerequisite.

231. **Electricity and Magnetism.** Foundations of electromagnetic field theory: boundary value problems of time in varient electric and magnetic fields, multipole description of stationary distributions, quasi stationary fields and solution of Maxwell's equations for special cases.

232. **Wave Motion.** A general treatment of wave phenomena. Topics studied include characteristics of partial differential equations; fundamental solutions of the one-dimensional wave equation; transient and steady-state behavior of physical systems that may be represented as transmission lines; and boundary-value problems for rectangular, spherical, and cylindrical geometries. Examples are drawn from a variety of fields, such as electromagnetic theory, mechanics, acoustics, hydrodynamics, elasticity, and so on. Laboratory instruction is included.

241. **Principles of Communication I.** An introduction to theoretical and practical communication engineering, including studies of: signal analysis and linear filtering; sampling theory; amplitude, frequency, and pulse modulation; simple noise phenomena; comparative system analysis; elements of information theory.

243. **Principles of Communication II.** A continuation of EE 241 offered as a senior elective or preparatory course for new graduate students. After a review of elementary probability and statistics, topics such as stochastic processes and physical origins of noise will be discussed as the background and interests of the class warrant.

263. **Electronic Circuit Analysis I.** A study of electronic circuits, including power supplies, ac amplifiers, dc amplifiers, sinusodial wave form generators, modulators and demodulators. A course primarily offered for other than electrical engineers and not normally acceptable for credit in Electrical Engineering.

264. **Electronic Circuit Analysis II.** A continuation of EE 263. Pulse circuitry and transient analysis are emphasized. This course may, with permission, be taken for credit in Electrical Engineering.

290. **Special Problems in Electrical Engineering.** A reading or research course open to electrical engineering seniors by special permission.

401. **Computer Electronics.**

405. **Electronic Physics.**

409. **Acoustics of Liquids and Solids I.**

451. **Linear Systems.**

452. **Advanced Network Analysis.**

Mechanical and Aerospace Sciences

A BACHELOR OF SCIENCE DEGREE in Mechanical Engineering has been offered for more than fifty years at the University of Rochester. In accordance with recently re-oriented and broadened objectives and graduate programs, the department name was recently changed to Department of Mechanical and Aerospace Sciences. The change also reflects the desire of the University to participate more effectively in meeting the nation's growing need for well-prepared, creative engineers capable of assuming leadership roles in their profession. It is to be noted, however, that the undergraduate program continues to be a program in Mechanical Engineering.

The program of the Department of Mechanical and Aerospace Sciences might best be described as a program in the applied sciences with emphasis in the direction of energetics. It is felt very strongly that the principal interest of mechanical engineering remains as it always has been in the broad field of energy conversion. Recent developments have indicated possibilities of converting energy in new and exotic ways such as magnetohydrodynamic energy conversion, thermionic and thermoelectric direct energy conversion, fuel cell energy conversion, and fusion and fission nuclear energy conversion. Along with these specific applications, of course, comes the necessary preparation in the basic engineering sciences for students deciding to work in this area. Hence, great emphasis in the mechanical engineering program is laid upon mechanics and physics of plasmas, fluids and solids as pertaining to the field of energetics.

Although the mechanical and aerospace sciences program provides a particularly good foundation for moving into graduate work, it is at the same time equally effective for providing the basic preparation needed by the graduate who plans to enter industry immediately upon graduation where he must have an adequate background to keep abreast of the rapid advances in science and technology.

FACULTY

Martin Lessen, SC.D. (M. I. T.).....Professor and *Chairman of the Department of Mechanical and Aerospace Sciences*

Lewis Dalcin Conta, PH.D. (Cornell).....Professor of Mechanical and Aerospace Sciences

Robert Gustav Loewy, PH.D. (Pennsylvania)....Professor of Mechanical and Aerospace Sciences

Albert Simon, PH.D. (Rochester).....Professor of Mechanical and Aerospace Sciences

Helmut Dietrich Weymann, DR.SC. (Aachen)....Professor of Mechanical and Aerospace Sciences

John Arthur Fox, PH.D. (Pennsylvania State).....Associate Professor of Mechanical and Aerospace Sciences

Oscar Edward Minor, B.S. (Rochester)..Associate Professor of Mechanical and Aerospace Sciences and *Assistant Dean of the College of Engineering and Applied Science*

Alfred Clark, Jr., PH.D. (M. I. T.).....Assistant Professor of Mechanical and Aerospace Sciences

Gary Hamilton Conners, PH.D. (Michigan State).....Assistant Professor of Mechanical and Aerospace Sciences

Harold Searl Dunn, PH.D. (Brown).....Assistant Professor of Mechanical and Aerospace Sciences

Moshe Lubin, PH.D. (Cornell).....Assistant Professor of Mechanical and Aerospace Sciences

John E. Molyneux, PH.D. (Pennsylvania).....Assistant Professor of Mechanical and Aerospace Sciences

Horace William Leet, M.E. (Cornell).....Professor Emeritus of Mechanical Engineering

FOUR-YEAR DEGREE PROGRAM

Freshman Year

1st Term

Math 161[1]	Analysis I
Phys. 115[2]	Physics I
Chem. 121[3]	General Chemistry I
English Requirement	
Ph. Ed. 11 or 12	Physical Education I

2nd Term

Math. 162[1]	Analysis II
Phys. 116[2]	Physics I
Chem. 122[3]	General Chemistry II
Elective[4]	Humanities or Social Science
Ph. Ed. 13 or 14	Physical Education II

†Sophomore Year

1st Term

Math. 163[1]	Analysis III
Phys. 125[2]	Physics II
M.A.S. 120	Introduction to Mechanical Engineering
Elective[4]	Humanities or Social Science
Ph. Ed. 21 or 22	Physical Education I

2nd Term

Math. 164[1]	Analysis IV
Phys. 126[2]	Physics II
M.A.S. 121	Introduction to Mechanical Engineering
Elective[4]	Humanities or Social Science
Ph. Ed. 23 or 24	Physical Education II

†Junior Year

1st Term

M.A.S. 201	Engineering Analysis I
M.A.S. 221	Analytical Mechanics
M.A.S. 223	Thermodynamics
Elective[4]	Humanities or Social Science

2nd Term

M.A.S. 202	Engineering Analysis II
M.A.S. 222	Continuum Mechanics
M.A.S. 224	Transport Phenomena
Elective[4]	Humanities or Social Science

†Senior Year

1st Term

Opt. 221	Introduction to Quantum Mechanics and Atomic Structure
M.A.S. 203	Mechanical Engineering Systems Design I
Elective	Technical
Elective[4]	Humanities or Social Science

2nd Term

Opt. 222	Introduction to the Theory of the Solid State
M.A.S. 204	Mechanical Engineering Systems Design II
Elective	Technical
Elective	Open

NOTE: Students enrolled in Naval or Air Force ROTC programs may use two ROTC courses (eight hours) as allowable electives in their mechanical engineering curriculum. The other ROTC courses required must be taken as overloads. Detailed programs combining ROTC with engineering are available from the departmental counselors.

[1]An alternate approved sequence is Mathematics 171, 172, 173, 174 for those considered eligible by the Mathematics Department. Students so approved are encouraged to elect this sequence.

[2]An alternate approved sequence is Physics 117–118, 127–128 for those considered eligible by the Physics Department. Students so approved are encouraged to elect this sequence.

[3]An alternate course is Chemistry 123, 124 for students considered eligible by the Chemistry Department.

[4]To satisfy the distribution requirements, a student must elect three Humanities courses and three Social Science courses.

†Especially selected students may be permitted to carry one additional elective during each term to a maximum of 36 courses.

Two-College Program

After three years in the College of Arts and Science at Rochester, or at a cooperating liberal arts college or university, a student may transfer to the College of Engineering and Applied Science for two more years of study in the professional aspects of mechanical engineering. (See special section for more complete description of the Two-College Program.) To enter the program in mechanical engineering, the transferring student must have substantially completed the science and mathematics course requirements of the first two years of the four-year curriculum shown. The student then takes the usual junior and senior year courses of study as given except that MAS 121 replaces the second term elective in the junior year, and the open elective of the senior year becomes a technical elective. MAS 120 of the sophomore year is not required. However, students who do not have a demonstrated competence in computer programming will be required to attend that part of MAS 120 devoted to this subject.

COURSES OF INSTRUCTION

120, 121. Introduction to Mechanical Engineering. Introduction to engineering systems; applications of analytical and graphic methods to statics and dynamics, one-dimensional elasticity and hydrodynamics, engineering thermodynamics including heat transfer, one-dimensional gasdynamics and propulsion.

201, 202. Engineering Analysis I, II. The development and application of analysis to engineering problems. Tools of analysis developed and used include: Matrix algebra, vector algebra, vector calculus, Green-Gauss theorem, Stokes theorem, tensor calculus, metric tensor, covariant derivative, curvature tensor. Infinite series, power series and convergence, foundations of theory of functions of a complex variable, calculus of residues, conformal mapping, special functions.

203. Mechanical Engineering Systems Design I. Development and application of integral transform techniques to solution of transients in lumped and distributed mechanical, electrical, thermal and mixed linear systems.

204. Mechanical Engineering Systems Design II. Analysis, synthesis and design of closed loop control systems, including steady state and transient operation, stability criteria and performance design factors. Illustrations from various fields with emphasis on electromechanical and hydraulic systems.

221. Analytical Mechanics. Statics of a particle and rigid body, motion of a particle, kinematics, Euler's dynamical equations, work and energy, relative motion, Lagrange's equations, Hamilton's canonical equations, D'Alembert's principle, Hamilton's principle and principle of least action.

222. Continuum Mechanics. Stresses and strains in a continuum, principal stresses and strains, stress-strain and stress-rate of strain relations for elastic solids and fluids, Kelvin's theorem, potential flow, Bernoulli's theorem, parallel viscous flow, compressible flow, velocity of sound, introduction to rheology.

223. Thermodynamics. The basic laws of thermodynamics and some of their consequences as applied to ideal and real gases. Thermodynamic potential functions, equilibrium considerations, reactive mixtures. Applications to engineering problems.

224. Transport Phenomena. Transport properties will be developed from kinetic theory, and then used to solve classical problems in heat and mass transfer.

225. Fundamentals of Fluid and Aero-Mechanics. Application of continuum fluid mechanics, two-dimensional ideal fluid flow, airfoil theory, finite wing theory, compressibility effects, supersonic and viscous flow phenomena.

226. Applied Elasticity. Two-dimensional elasticity problems, engineering theories of structural elements, redundant structures, inelastic behavior and its importance in structural analysis and design.

238, 239. Mechanical Design I, II. Fundamentals underlying modern mechanical design. Topics include translational and torsional vibrations (including multiple degrees

of freedom); advanced mechanics of materials, including analysis of curved beams, disks, thick cylinders, etc.; mechanical properties of materials and theories of failure; model studies using photoelastic and other techniques.

252, 253. Modern Energy Conversion. A study of the conversion of chemical and nuclear energy into mechanical or electrical energy. The course will range from steam and gas turbine plants through fuel cell thermoelectric and magnetohydrodynamic conversion methods. Subjects such as combustion, heat transfer, and gas dynamics covered as needed.

290. Project Course for Mechanical Engineers. A project course for qualified seniors in which a specific investigation is carried out under the supervision of a member of the faculty. The work may involve the analysis, adaptation or modification of equipment or it may be the development of equipment for a specific function.

401, 402. Engineering Analysis III, IV.

430. Introduction to Elasticity and Plasticity I.

431. Introduction to Elasticity and Plasticity II.

436. Foundations of Fluid Mechanics I —Inviscid Flow.

437. Foundations of Fluid Mechanics II —Viscous Flows.

Optics

THE INSTITUTE OF OPTICS prepares students for industrial and research positions in optical physics or applied optics. In this, the Institute has the cooperation and interest of the optical and related industries. The course of study offers extensive training in geometrical, physical, and physiological optics, with an opportunity for specialization in such subjects as photography, spectroscopy, polarized light, optical and mechanical design of instruments (including lasers), colorimetry, spectrophotometry, and optical properties of thin films. The curriculum includes basic courses in mathematics, chemistry, and physics, and electives in other fields. By suitable choices of electives in his senior year, the student may prepare himself to go directly into industry or to enter research through graduate work in optics and related areas of physics and engineering. Graduate programs leading to the M.S. and Ph.D. degrees in optics are available at Rochester.

FACULTY

Walter Lewis Hyde, PH.D. (Harvard) ..... Professor of Optics and *Director of the Institute of Optics*

Miles Parker Givens, PH.D. (Cornell) ..... Professor of Optics

Robert Earl Hopkins, PH.D. (Rochester) ..... Professor of Optics

Robert Merrill Boynton, PH.D. (Brown) ..... Professor of Optics* and Psychology and Director of Center for Visual Science

****Rudolf Kingslake,*** D.SC. (London) ..... Professor of Optics

* Part-time.

Philip Werner Baumeister, PH.D. (California).....Associate Professor of Optics
Albert Gold, PH.D. (Rochester).....Associate Professor of Optics
James Charles Peskin, PH.D. (Illinois).....Associate Professor of Optics
Kenneth James Teegarden, PH.D. (Illinois).....Associate Professor of Optics

Patrick George Harrison, PH.D. (Alfred).....Assistant Professor of Optics
Michael McCarthy Hercher, PH.D. (Rochester).....Assistant Professor of Optics
Douglas Coll Sinclair, PH.D. (Rochester).....Assistant Professor of Optics

Francis Allen Collins, PH.D. (Harvard).....Research Associate
Ettore Hora Panizza, PH.D. (Milan).....Research Associate
Kazuo Sayanagi, PH.D. (Tokyo).....Research Associate
Hoshang Ardeshir Unvala, M.SC. (Bombay).....Research Associate

FOUR-YEAR DEGREE PROGRAM

Freshman Year

1st Term

Math. 161[1]	Analysis I
Phys. 115[2]	Physics I
Chem. 121[3]	General Chemistry I
English Requirement	
Ph. Ed. 11 or 12	Physical Education I

2nd Term

Math. 162[1]	Analysis II
Phys. 116[2]	Physics I
Chem. 122[3]	General Chemistry II
**Elective	Humanities or Social Science
Ph. Ed. 13 or 14	Physical Education II

†Sophomore Year

1st Term

Math. 163[1]	Analysis III
Phys. 125[2]	Physics II
Opt. 121	Fundamentals of Optics I
**Elective	Humanities or Social Science
Ph. Ed. 21 or 22	Physical Education I

2nd Term

Math. 164[1]	Analysis IV
Phys. 126[2]	Physics II
Opt. 122	Fundamentals of Optics II
**Elective	Humanities or Social Science
Ph. Ed. 23 or 24	Physical Education II

†Junior Year

1st Term

Opt. 221	Introduction to Quantum Mechanics and Atomic Structure
E. E. 221	Electronics
E. E. 202	Engineering Analysis II
**Elective	Humanities or Social Science

2nd Term

Opt. 222[3]	Introduction to the Theory of the Solid State
E. E. 201	Engineering Analysis I
Opt. 224	Atomic and Molecular Spectroscopy
**Elective	Humanities or Social Science

†Senior Year

1st Term

One of the following two courses

Opt. 253	Radiometry I
Opt. 241	Testing of Optical Units and Lens Systems I
and	
Opt. 261	Physical Optics I
Opt. 231	Fundamentals of Electromagnetic Theory
Elective	Open

2nd Term

One of the following two courses

Opt. 254	Radiometry II
Opt. 242	Testing of Optical Units and Lens Systems II
and	
Opt. 262	Physical Optics II
**Elective	Humanities or Social Science
Elective	Open

NOTE: Students enrolled in Naval or Air Force ROTC programs may use two ROTC courses (eight hours) as allowable electives in their optics curriculum. The other required ROTC courses must be taken as overloads. Detailed programs combining ROTC with optics are available from the departmental counselors.

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[1]An alternate approved sequence is Mathematics 171, 172, 173, 174 for those considered eligible by the Mathematics Department.

[2]An alternate approved sequence is Physics 117–118, 127–128 for those considered eligible by the Physics Department.

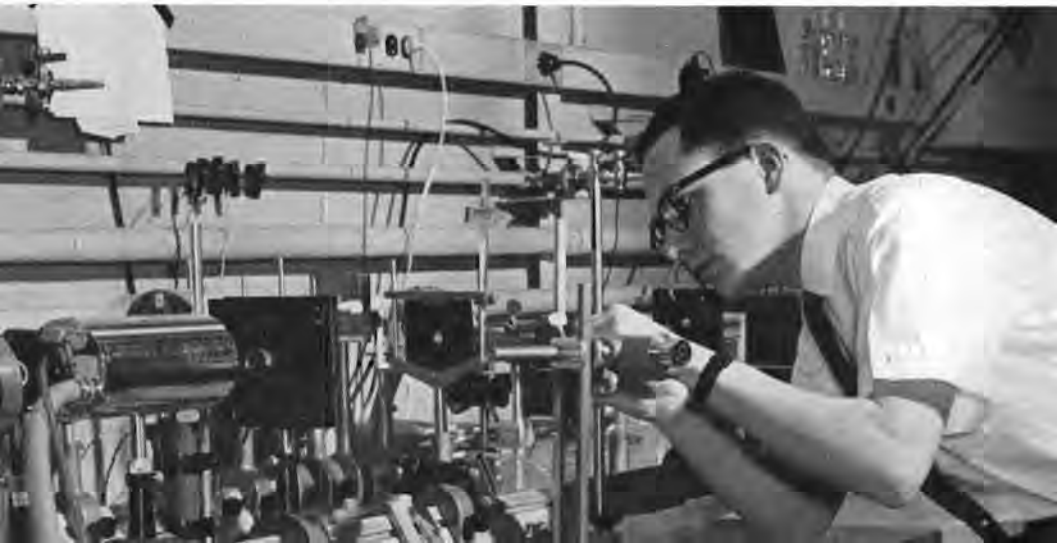
[3]A student may substitute a technical elective with approval of his faculty adviser.

**To satisfy the distribution requirements, a student must elect three Humanities courses and three Social Science courses.

†Especially selected students may be permitted to carry one additional elective during each term for a maximum of 36 courses.

Two-College Program

After three years in the College of Arts and Science at Rochester, or at a cooperating college or university, a student may transfer to the College of Engineering and Applied Science and complete a two-year course of study in the professional aspects of optics. To enter the program in optics, the transferring student must have substantially completed the science and mathematics course requirements of the first two years of the four-year program as listed. The student then takes the usual junior and senior year courses of study as given except that Optics 121 and 122 are taken in place of the liberal arts elective in the junior year.



COURSES OF INSTRUCTION

121, 122. **Fundamentals of Optics I, II.** An introductory survey course in optics. The general aims of the course are to provide a foundation for further studies in optics and to familiarize the student with the scope of the field of optics. Subject matter to be covered includes first order optics, Fermat's principle, thin and thick lenses, mirror optics, basic types of optical instrumentation, sources of optical radiation, photometry, radiation detectors, spectroscopic instrumentation, and photography. During the second semester the emphasis will be on physical optics, interference and diffraction, lasers, and selected topics in areas of current research. Prerequisites: Physics 115–116 or equivalent; Mathematics 161, 162 or equivalent. Laboratory.

152. **Physiological Optics.** A survey of the fundamentals of the visual process, including light as the visual stimulus, the eye as the optical system, photoreception, transmission of information through the visual system, visual sensation and resulting behavior. The characteristics of the total visual system as a light-sensing device will be stressed. Prerequisites: Physics 115–116 and Mathematics 161, 162.

221. **Introduction to Quantum Mechanics and Atomic Structure.** The course will include the special theory of relativity, an introduction to quantum theory and solutions to the Schroedinger equation for simple atomic systems, quantum statistics, and atomic spectroscopy. Prerequisites: Mathematics 164 and Physics 126. Laboratory.

222. **Introduction to the Theory of the Solid State.** The course will include a study of the energy band theory of solids, conduction in solids, thermionic and photoelectric emission, semiconductors, dielectrics, crystalline imperfections, mechanical properties of solids, luminescence, and photoconductivity. Prerequisite: Optics 221. Laboratory.

224. **Atomic and Molecular Spectroscopy.** The course will cover topics in semiclassical radiation theory, electric dipole selection rules for one electron atom, Russell-Saunders coupling, J-J coupling, vector model of the atom, energy level diagrams of complex atoms and simple molecules. Optical pumping and stimulated emission will be discussed and applied to the theory of lasers. Prerequisite: Optics 221.

231. **Fundamentals of Electromagnetic Theory.** Boundary value problems for electrostatic and magnetic fields; Maxwell's equations and the solution for special cases; the wave equation and boundary value problems; application to selected optical phenomena; introduction to wave guides and cavities. Prerequisites: Physics 125–126; Mathematics 163; EE 201–202 (concurrently). (See EE 231.)

241, 242. **The Testing of Optical Units and Lens Systems I, II.** This is a laboratory course, intended to accompany Optics 471–472, which will familiarize the students with the standard methods of testing optical units and measuring their properties. The experiments include the testing of surfaces, plates, and prisms by Haidinger, Foucault, and interferometer methods; the lens-testing bench for measurement of aberrations; Hartmann and other tests on telescope objectives and concave mirrors; star tests on microscope objectives; the resolving power, sine-wave response, and energy distribution of photographic objectives; the use of a high-quality spectrometer; and complete tests on a prism binocular. Light transmission measurements are made on photographic and telescopic systems.

251. **Advanced Physiological Optics.** A detailed discussion of selected topics pertaining to the visual process. Ordinarily given in alternate years. Prerequisite: Optics 152 or permission of the instructor.

252. **Colorimetry.** A course dealing with the chromatic sensations, color theory, the measurement and specification of color, and the quantitative consideration of color vision. Physics 125–126 is prerequisite. Laboratory.

253. **Radiometry I.** A course dealing with the generation, detection, and measurement of optical radiation. Topics include: elementary quantum theory of radiation, generation of coherent and incoherent radiation, propa-

gation of radiation through optical systems, photometry. Prerequisite: Optics 221.

254. **Radiometry II.** A continuation of Optics 253, which is prerequisite. Topics include: optical radiation detectors, electrical measurements, photographic measurements, noise limitations in optical measurements, radiometric instruments.

257. **Technical Photography.** An introductory course in the technical and scientific aspects of photography, photographic equipment and materials; photographic sensitometry; exposure and exposure devices; light sources; characteristics of developers and other processing solutions; tone reproduction, methods of color photography. (Two years of college physics prerequisite.) Laboratory.

258. **Physics of Photography.** Latent image theory; mechanism of development; special exposure and development phenomena; image structure; photographic photometry; photography with ultraviolet, infrared, X-ray radiation; special topics in modern photographic theory. Prerequisite: Optics 257. There is no formal laboratory, but a term paper or term project is required.

261. **Physical Optics I.** The following subjects are treated by classical electromagnetic theory: propagation, reflection, and refraction of light, optical properties of metals, and optical dispersion. Recommended as prerequisites or taken concurrently: Optics 231; MAS 201, 202; or EE 201, 202.

262. **Physical Optics II.** The course covers the Kirchhoff treatment of diffraction and the application of the Fourier transform to practical diffraction problems. The propagation of waves in anisotropic (i.e., crystalline) media is also treated. Laboratory.

263. **Polarized Light.** An examination of the theoretical and applied aspects of polarized light including: the production and detection of plane polarized light; propagation of light in anisotropic media; birefringence, pleochroism and optical activity; the detection, measurement and application of elliptical polarization of light.

265. **Spectrographs and Interferometers.** The design, calibration, and use of grating and prism spectrographs and interference spectroscopes. The design and use of interferometers; interference microscopes; interferometers in metrology.

283. **Design of Optical Instruments I.** A study of instrument design procedures; the judicious choice of a design plan and the mechanical, optical, and electronic elements necessary for practical realization; principles of systematic design; mechanical structures, motions, and environments; optical design to reduce system difficulties; electro-optical detection, measurement, and control. Laboratory experiments, analysis of existing instruments, and at least one original design project. Prerequisite: two years of college physics. Laboratory.

284. **Design of Optical Instruments II.** A continuation of Optics 283, which is prerequisite. Laboratory.

293. **Special Problems in Optics.** A reading or research course open to seniors in optics by special permission.

471, 472. **The Design of Lenses and Optical Systems.**

474. **Methods of Image Evaluation and Optical Systems Analysis.**

DEPARTMENT OF NURSING
of the School of Medicine and Dentistry

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Winifred Nelson, R.N., C.N.M., B.S. (Nebraska) ..... Assistant in Nursing (Maternal-Child)

*Part-time.

UNDERGRADUATE PROGRAM
In Nursing

The undergraduate curriculum leading to the degree Bachelor of Science with a Major in Nursing is described in the material which follows in this bulletin. More detailed information about the undergraduate and graduate offerings of the Department of Nursing is included in the official bulletin of the Department. Requests for this bulletin should be addressed to:

Registrar
Department of Nursing
School of Medicine and Dentistry
260 Crittenden Blvd.
Rochester, N. Y. 14620

The University of Rochester offers a course of study which extends over a four-year period and which includes two summers of required work.

Students enroll in the College of Arts and Science for two years and are formally admitted to the Department of Nursing at the beginning of the junior year. Qualified transfer students from other accredited colleges may be admitted to the Department of Nursing.

The Department of Nursing, as an integral part of the University of Rochester, subscribes to its philosophy and shares in its major functions—teaching, service and research.

The faculty believes that nursing is a service rendered by one human being for another—or for a group—in which the nurse acts as a representative of the interests of the person or persons served. It assists people to meet crises in living from birth to death. It takes a humanistic view of man and makes a rational application of knowledge from the health sciences to the maintenance and restoration of health. While the settings may vary in which nursing is practiced, its components are identifiable and its quality measurable.

Education for professional responsibility in nursing is a medium through which an intelligent person, motivated to help others, can use her intellectual and creative talents. At the completion of undergraduate study the student has acquired knowledge and skills, has developed attitudes and has given evidence of a growing capacity to use these in the practice of nursing.

The Department of Nursing is ideally situated for the development of sound professional education in nursing. The hospitals and clinics of the University of Rochester Medical Center afford complete experiences in the nursing care of adults and children with physical and emotional illnesses. Official and voluntary agencies in Rochester and Monroe County provide public health nursing instructional opportunities. The students' total program is directed by members of the University faculty.

At the satisfactory completion of the undergraduate program, a student is eligible to write the examination for Registered Nurse in New York State. If a graduate wishes to be registered in a state other than New York, she should secure information on requirements for eligibility in the particular state in which she intends to practice.

Accreditation

The undergraduate program leading to the degree of Bachelor of Science with a Major in Nursing is accredited by the National League for Nursing for the preparation of professional practitioners of nursing.

Admission

Students who plan to major in nursing should file application for transfer to the Department of Nursing during the last semester of the sophomore year. Students from other colleges applying for junior standing in the Department of Nursing are encouraged to consult the Department of Nursing during their first two years for specific information regarding suitable courses to meet admission requirements. They may secure application forms and information concerning admission from the Office of Registrar, Department of Nursing. Requirements for admission include:

a. Completion (at the University of Rochester or at another approved institution) of a minimum of 60 semester hours of course work, including introductory courses in:

English
Biology (including laboratory)
Microbiology (including laboratory)
Psychology
Chemistry (2 semesters) (including laboratory)
Sociology (2 semesters)

In addition, the program of study should include a distribution of courses from the humanities, social sciences, and natural sciences. At least three courses in the humanities and two in the social sciences are recommended.

Vocational courses and courses in physical education required in the college attended are NOT accepted as fulfilling admission requirements.

b. A 2.0 honor-point average (Grade of C) based upon all course work taken prior to admission. (Transfer credit is not given for a grade below C.)

c. A satisfactory health record.

d. A strong desire to make nursing a career, together with evidence of aptitude for such a career.

e. Acceptance by the Committee on Admissions of the Department of Nursing.

Registered nurses who wish to work toward the baccalaureate degree are admitted to this program. They must have achieved junior standing as outlined above. The opportunity to achieve advanced placement in the Department of Nursing, through examination, is available. Arrangements to take selected examinations are made during the year prior to admission to the Department of Nursing. Achievement on a test which does not meet the standard set by the faculty will be regarded as a deficiency which may be removed only by taking and passing the course in the subject tested.

The student who has completed the required 60 hours of study in the arts and sciences and who has earned the maximum amount of advanced standing by examination can complete degree requirements by enrolling in the undergraduate program in the Department of Nursing on a full-time basis for one academic year and a summer session.

RESIDENCE

Undergraduate students live at Helen Wood Hall, women's residence at the Medical Center, during the junior and senior years of the basic baccalaureate program.

TUITION AND FEES

NURSING

Junior Year	*1st Term*	*2nd Term*	*Summer*
Tuition	$485.00	$485.00	$280.00
Room	150.00	150.00	85.00
Meals	247.50	247.50	100.00
Health Fee	17.50	17.50	5.00
Student Activity Fee	12.50	12.50	——
	$912.50	$912.50	$470.00

Senior Year			
Tuition	$485.00	$485.00	$280.00
Room	150.00	150.00	100.00
Meals	247.50	247.50	100.00
Health Fee	17.50	17.50	5.00
Student Activity Fee	12.50	12.50	——
	$912.50	$912.50	$485.00

Other Expenses

Application fee (if transferring from another University) $10. Uniforms—approximately $100 at beginning of junior year. Books, field trips and miscellaneous expenses associated with public health experience—approximately $100 a year. Insurance premium—Extended Medical Care—$17.00 per year.

Admission Deposit

Students transferring from another University who receive notification of admission are required to post an admission deposit of $50 by the date stated in the letter of admission. *The deposit is not refundable. It is not an additional fee.* It will be credited to the first term bill.

COURSE OF STUDY

(TYPICAL PROGRAM)

*Freshman Year**

First Term Course	Hours	*Second Term* Course	Hours
English Requirement	4	Elective	4
Chemistry 121 General Chemistry I	4	Chemistry 122 General Chemistry II	4
Sociology or Anthropology	4	Sociology or Anthropology	4
Elective**	4	Elective	4
Physical Education		Physical Education	

*Sophomore Year**

First Term		*Second Term*	
Biology 101 General Biology	4	Psychology 101 Introduction	4
Elective	4	Biology 117 Microbiology	4
Elective	4	Elective	4
Elective	4	Elective	4
Physical Education		Physical Education	

In the Department of Nursing

Junior Year

First Term

NUR200 Fundamentals of Nursing Practice 6
NUR212 Anatomy and Physiology 5
NUR210 Nutrition 3
14

Second Term

NUR218 Medical-Surgical Nursing I 11
NUR214 Pharmacology 3
14

Summer Session (9 Weeks)

NUR220 Medical-Surgical Nursing II 7

Senior Year

First Term

NUR222 Maternal and Child Nursing ...14

Second Term

NUR226 Psychiatric Nursing 10
NUR230 Public Health 3
NUR240 Senior Seminar 3
16

Summer Session (12 weeks)

NUR232 Public Health Nursing 6
NUR236 Management of Nursing Care .. 2
8

*Students in other colleges should plan a similar course of study for the freshman and sophomore years.

**To satisfy the distribution requirements, a student should elect three courses in humanities and two in social sciences.

The degree will be granted on recommendation of the faculty in nursing and upon fulfillment of the following requirements:

1. The candidate shall have completed a minimum of 133 semester hours of course work and shall have satisfied the general University requirements.

2. The candidate shall have maintained at least a 2.0 honor point average (Grade of C) in all work taken.

Graduating students participate in the University Commencement in June and complete their studies in August.

COURSES OF INSTRUCTION

200. Fundamentals of Nursing Practice. An introduction to the functions and responsibilities of the professional nurse. Application of theory and skills to the identification and solution of patient care problems under direct supervision of faculty members.

210. Nutrition. A study of the fundamentals of nutrition based on current scientific knowledge, coordinated with and built upon the other basic sciences. The study of biochemistry, as it relates to the utilization of nutrients by the human organism, is an integral part.

212. Anatomy and Physiology. A study of the gross and microscopic structure and functions of the human organism with appropriate applications to nursing.

214. Pharmacology. The origin, preparation, dosage, action, therapeutic use and toxic effects of drugs commonly used with emphasis on the nurse's responsibilities in relation to drugs.

218. Medical-Surgical Nursing I. In the classroom and at the patient's bedside students learn to identify and meet nursing needs of adults undergoing medical therapy or surgical intervention for pathological conditions. Care in emergencies, in the operating room and in clinics is incorporated. Study of care in long-term illness is provided.

220. Medical-Surgical Nursing II. A continuation of Medical-Surgical Nursing I dealing with more complex nursing problems. Emphasis is placed on the nurse's role as a member of the health team.

222. Maternal and Child Nursing. The developmental approach is utilized in the study of physiological, psychological and cultural factors affecting maternal and child health. Clinical practice is provided in the care of mothers throughout the maternity cycle and in the care of their infants as well as nursing of sick children.

226. Psychiatric Nursing. Mental illness as a family and community problem is examined and the student provided with experiences in the psychiatric setting which enable her to develop skills and understandings pertinent to the nursing care of patients. Emphasis is placed on the relationships between the nurse, the individual patient and groups of patients. Nursing roles and trends in psychiatric nursing are explored.

230. Public Health. History, organization, purposes and activities of public health agencies; their relationship to other governmental and voluntary health and social agencies. Major public health problems, epidemiology and the control of disease, and the use and interpretation of biostatistics are included.

232. Public Health Nursing. Concurrent theory and supervised practice in selected public health nursing activities are provided to assist the student to develop understanding of the principles, functions and scope of public health nursing in a community health program.

236. Management of Nursing Care. Students plan and provide nursing care for a group of patients by participation in a leadership role. Principles and concepts of management are explored.

240. Senior Seminar. The identification and exploration of problems within or related to the nursing profession. A substantial paper is required.

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Official Bulletins

OF THE UNIVERSITY OF ROCHESTER

The following issues of the Bulletins of the University of Rochester are available upon request:

Address requests to:

Undergraduate Studies College of Arts and Science College of Business Administration College of Education College of Engineering and Applied Science	Director of Admissions 142 Administration Building University of Rochester Rochester, New York 14627
Eastman School of Music *(Regular and Summer Sessions)*	Director of Admissions Eastman School of Music 26 Gibbs Street Rochester, New York 14604
School of Medicine & Dentistry	Dean, School of Medicine & Dentistry Medical Center, The University of Rochester 260 Crittenden Blvd. Rochester, New York 14620
Department of Nursing	Chairman, Department of Nursing Helen Wood Hall The University of Rochester 260 Crittenden Blvd. Rochester, New York 14620
Graduate Studies	The Secretary of Graduate Admissions Office of Admissions Administration Building University of Rochester Rochester, New York 14627
University School	Dean, University School Administration Building The University of Rochester Rochester, New York 14627