H. Braun

OFFICIAL BULLETIN

UNIVERSITY OF ROCHESTER

1963 | 1964

Undergraduate Studies

College of Arts and Science
College of Business Administration
College of Education
College of Engineering and Applied Science
Department of Nursing

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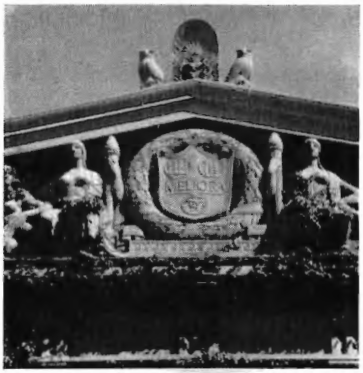


UNIVERSITY OF ROCHESTER

COLLEGE OF ARTS AND SCIENCE
COLLEGE OF BUSINESS ADMINISTRATION
COLLEGE OF EDUCATION
COLLEGE OF ENGINEERING AND APPLIED SCIENCE
DEPARTMENT OF NURSING

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 attention.

Calendar

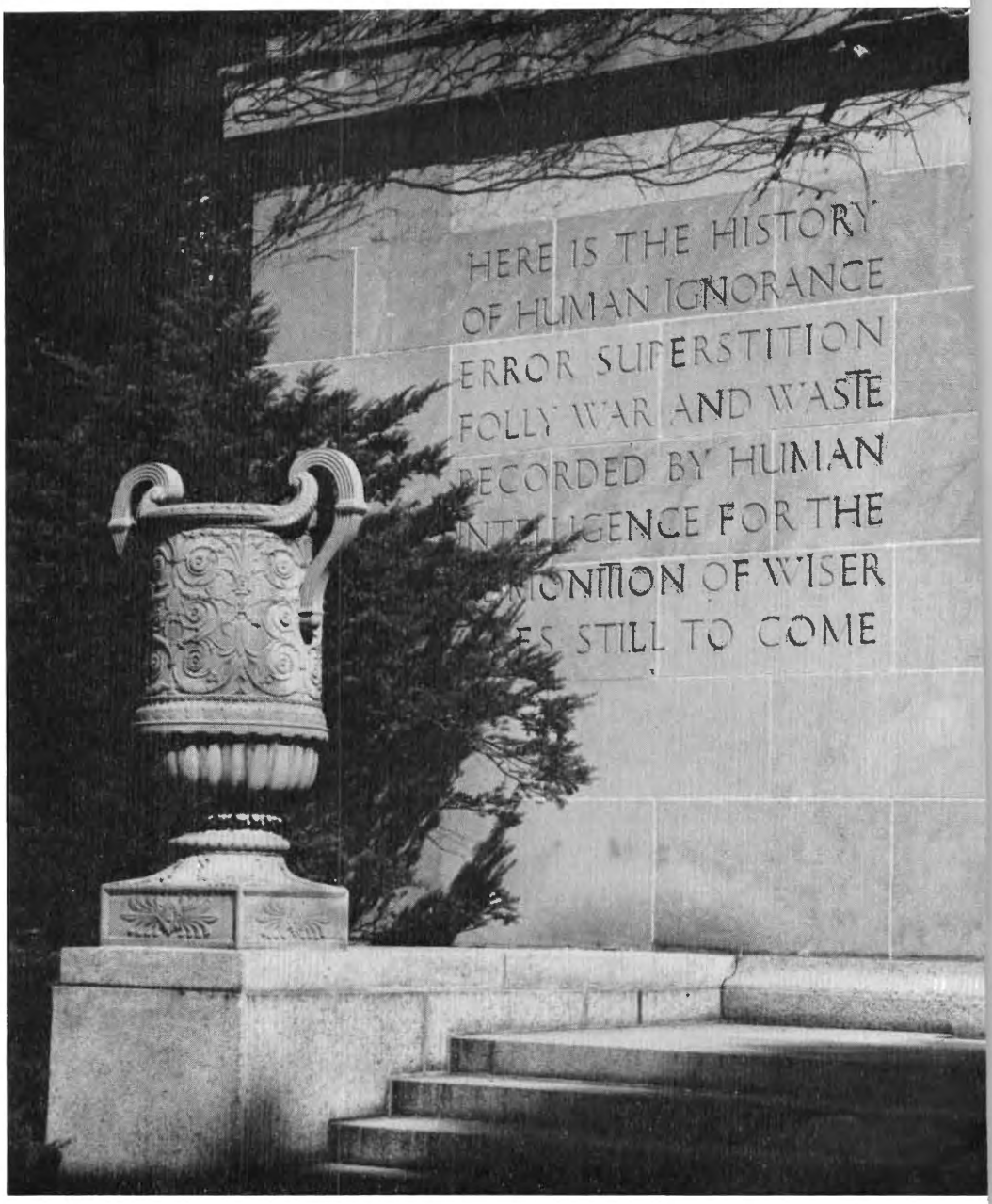
FALL 1963

September	12—*Thursday*	Registration begins
	16—*Monday*	Classes begin
October	4—*Friday*	Last day for payment of undergraduate tuition
November	27—*Wednesday*	Thanksgiving recess begins at noon
December	2—*Monday*	Classes resume
	21—*Saturday*	Christmas recess begins after last class
January	6—*Monday*	Classes resume
	11—*Saturday*	Classes end
	14—*Tuesday*	Term examinations begin
	24—*Friday*	Term examinations end

SPRING 1964

January	29—*Wednesday*	Classes begin
February	14—*Friday*	Last day for payment of undergraduate tuition
March	21—*Saturday*	Spring recess begins after last class
	31—*Tuesday*	Classes resume
May	6—*Wednesday*	Dandelion Day
	15—*Friday*	Classes end
	18—*Monday*	Term examinations begin
	28—*Thursday*	Term examinations end
	30—*Saturday*	Memorial Day Holiday
June	7—*Sunday*	Commencement

Contents


HERE IS THE HISTORY
OF HUMAN IGNORANCE
ERROR SUPERSTITION
FOLLY WAR AND WASTE
RECORDED BY HUMAN
INTELLIGENCE FOR THE
ADMONITION OF WISER
AGES STILL TO COME

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, non-sectarian institution.

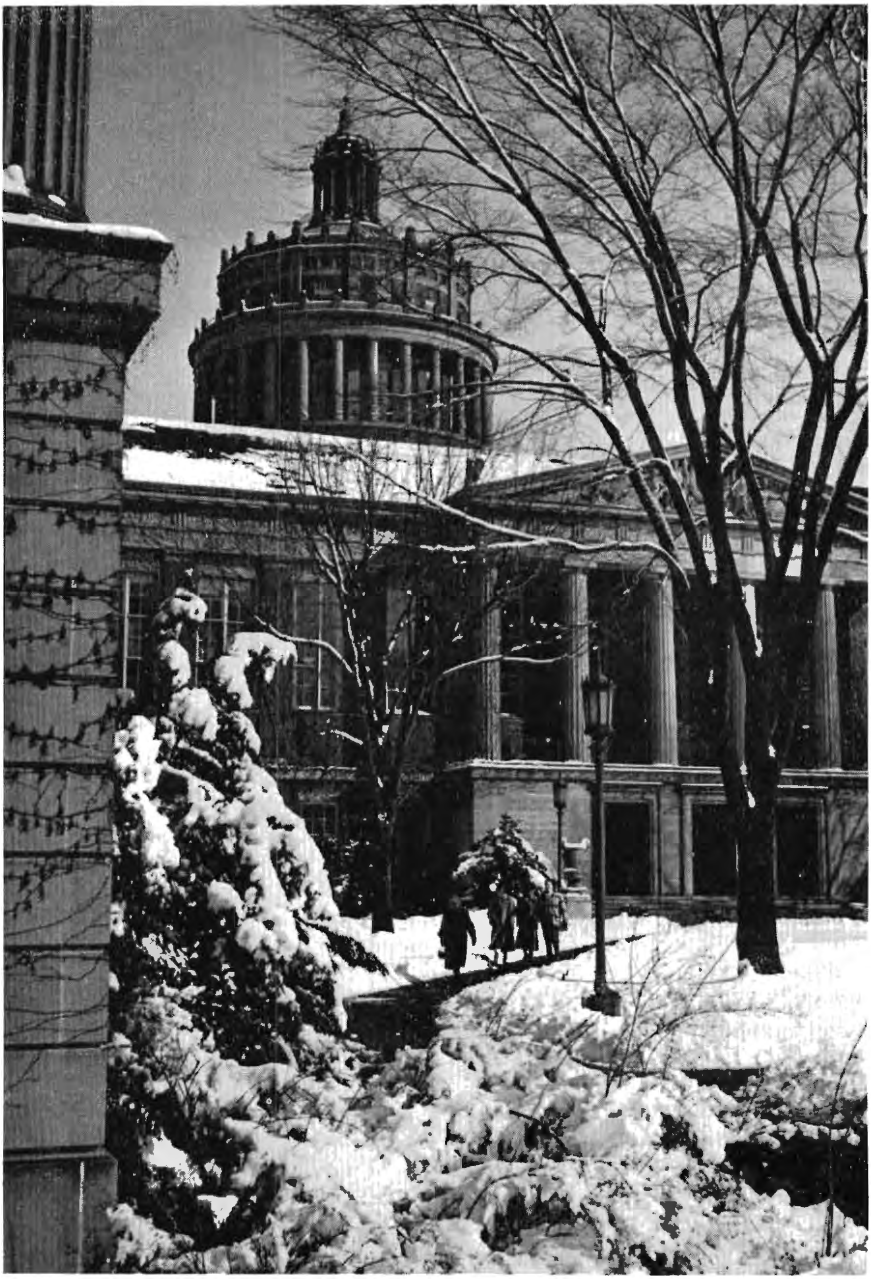
The University consists of seven colleges and schools. On the River Campus are the College of Arts and Science, which offers degree programs in twenty-one fields; the College of Engineering and Applied Science, with programs in chemical engineering, electrical engineering, mechanical engineering, and 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 under contract with the Atomic Energy Commission.

The University's School of Music, in downtown Rochester, has its 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 750,000 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 high 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 2400 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 religious 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 high 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 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 Uni-

versity 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 your junior and senior years in the College of Arts and Science you may have an opportunity to participate in the University's Honors Program. The Honors Program is offered in comparative literature, economics, English, history, philosophy, and political science, 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

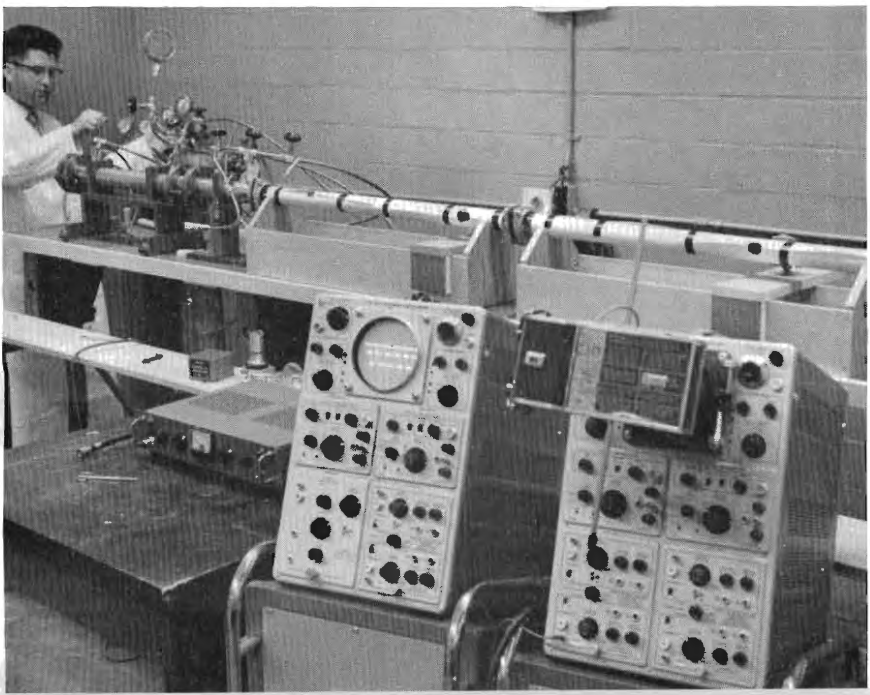
THE UNIVERSITY OF ROCHESTER is accredited by the Middle States Association of Colleges and Secondary Schools and is a member of the Association of American Universities.

A brief description of the University's major divisions follows: Information on undergraduate courses appears on pages 85 to 199.

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-one 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 business administration, accounting, or industrial management. Graduate study leads to a Master of Business Administration (M.B.A.) or Master of Science (M.S.).

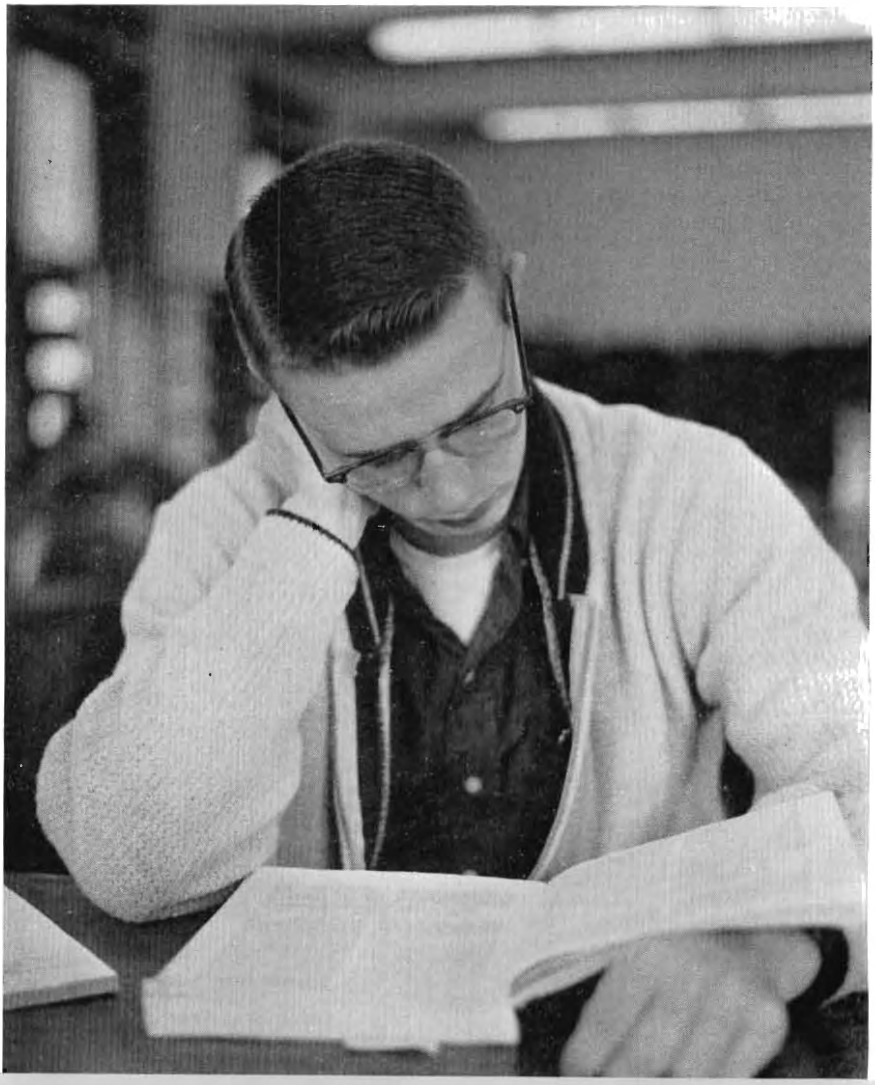
COLLEGE OF EDUCATION provides undergraduate and graduate courses in teacher education. Degrees offered are Bachelor of Science with majors in elementary or secondary education, Master of Education, Master of Arts in Education, Doctor of Education, and the Certificate of Advanced Study for completion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



College of Engineering and Applied Science, an 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, Bachelor of Science with a major in general 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.

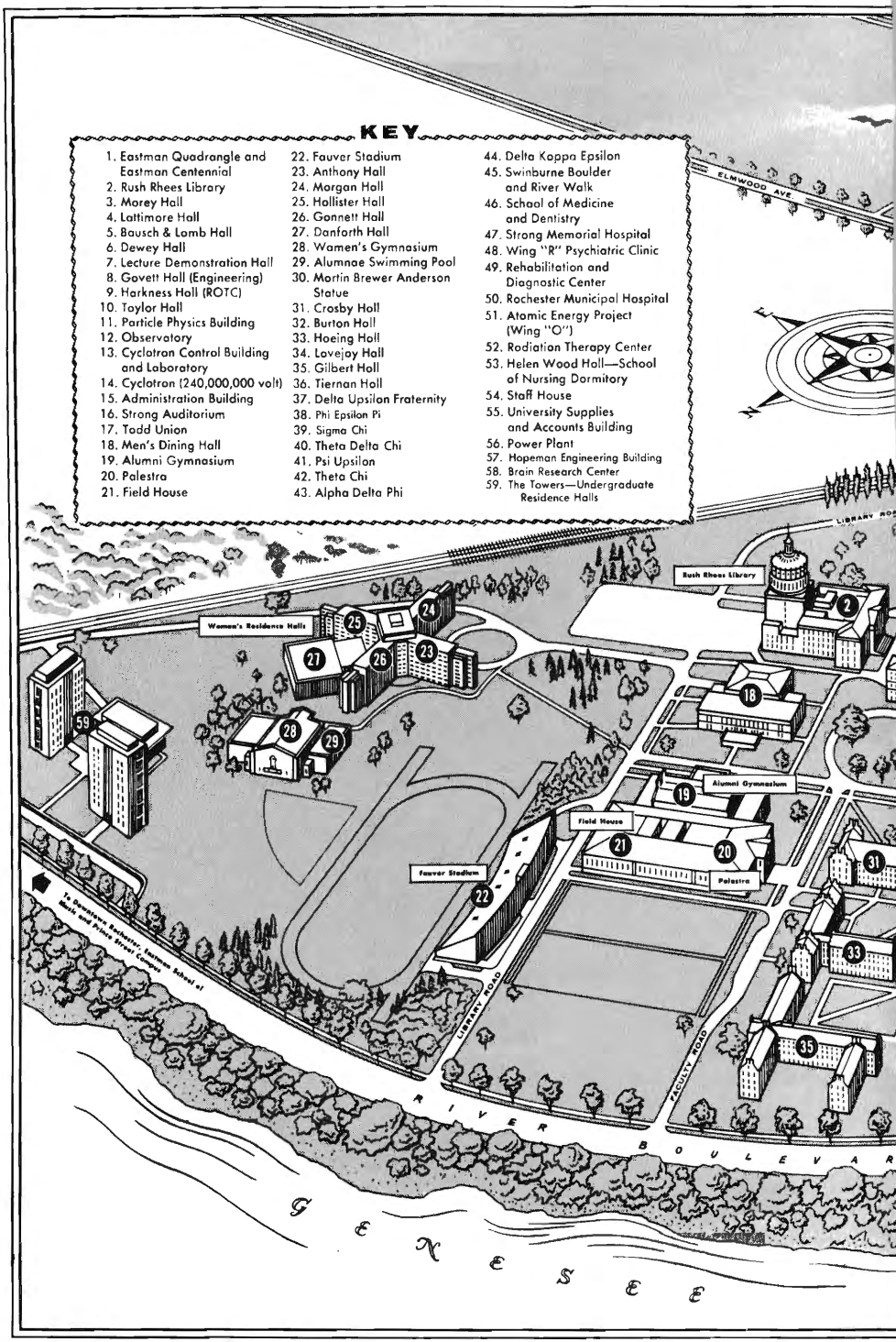
GRADUATE STUDIES

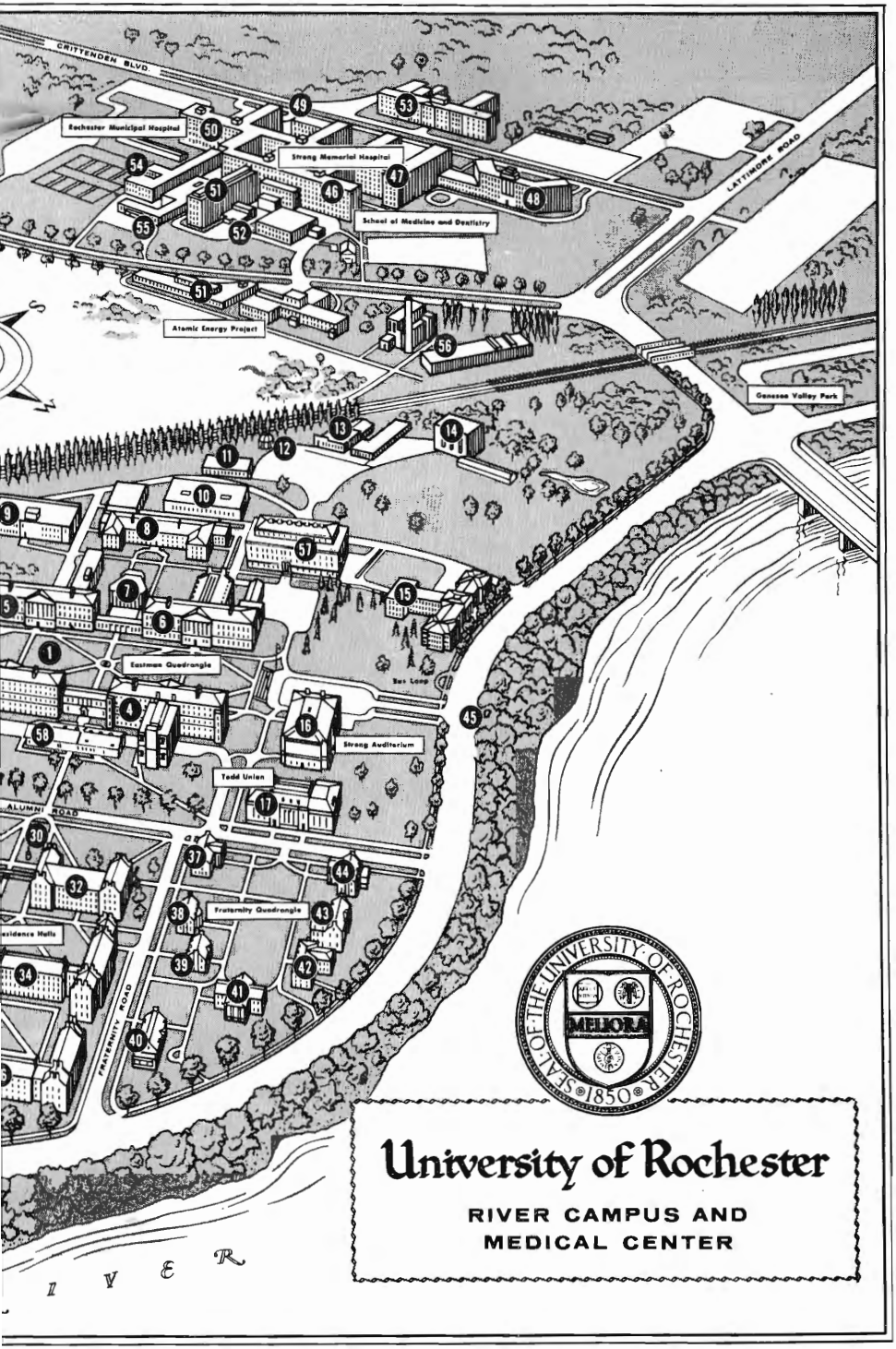
The first graduate degree in course, Master of Arts, was voted by the Board of Trustees of the University in 1851. With the establishment of the Schools of Medicine and Music, the expansion of University library facilities and the provision of equipment and fellowships for research in the College of 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. Bausch & Lomb Hall
6. Dewey Hall
7. Lecture Demonstration Hall
8. Govett Hall (Engineering)
9. Harkness Hall (ROTC)
10. Taylor Hall
11. Particle Physics Building
12. Observatory
13. Cyclotron Control Building and Laboratory
14. Cyclotron (240,000,000 volt)
15. Administration Building
16. Strong Auditorium
17. Todd Union
18. Men's Dining Hall
19. Alumni Gymnasium
20. Palestra
21. Field House
22. Fauver Stadium
23. Anthony Hall
24. Morgan Hall
25. Hollister Hall
26. Gonnett Hall
27. Danforth Hall
28. Women's Gymnasium
29. Alumnae Swimming Pool
30. Martin Brewer Anderson Statue
31. Crosby Hall
32. Burton Hall
33. Hoeing Hall
34. Lovejoy Hall
35. Gilbert Hall
36. Tiernan Hall
37. Delta Upsilon Fraternity
38. Phi Epsilon Pi
39. Sigma Chi
40. Theta Delta Chi
41. Psi Upsilon
42. Theta Chi
43. Alpha Delta Phi
44. Delta Kappa Epsilon
45. Swinburne Boulder and River Walk
46. School of Medicine and Dentistry
47. Strong Memorial Hospital
48. Wing "R" Psychiatric Clinic
49. Rehabilitation and Diagnostic Center
50. Rochester Municipal Hospital
51. Atomic Energy Project (Wing "O")
52. Radiation Therapy Center
53. Helen Wood Hall—School of Nursing Dormitory
54. Staff House
55. University Supplies and Accounts Building
56. Power Plant
57. Hopeman Engineering Building
58. Brain Research Center
59. The Towers—Undergraduate Residence Halls
ELMWOOD AVE.
LIBRARY ROAD
Rush Rhees Library
Women's Residence Halls
Alumni Gymnasium
Field House
Fauver Stadium
Palestra
To Downtown Rochester, Eastman School of Music and Prince Street Campus
LIBRARY ROAD
FACULTY ROAD
RIVER BOULEVARD
GENESEE



University of Rochester

RIVER CAMPUS AND MEDICAL CENTER

River Campus Facilities

*2. ***Rush Rhees Library,*** center of the University Library system, contains some half-million volumes of the University's total of 750,000 volume collection. Annually, more than 5,000 periodicals are received by the University Library.

In Rush Rhees Library are regularly used books and periodicals for assigned and collateral course reading and a number of important collections. Outstanding collections include the papers of William H. Seward, Thurlow Weed, and Thomas E. Dewey.

In the Treasure Room are rare books, first editions, priceless manuscripts. The Welles-Brown Room, a browsing room in Rush Rhees, contains choice editions of the classics and a selection of the best work of modern authors.

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 the same administration and are joined by a delivery system which makes any book in the total collection available to any campus.

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.

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

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

5. ***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.

6. ***The Chester Dewey Building*** is shared by the Departments of Biology and Geology and Geography, and the College of Business Administration.

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

8. ***Gavett Hall,*** of the College of Engineering and Applied Science, provides 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.

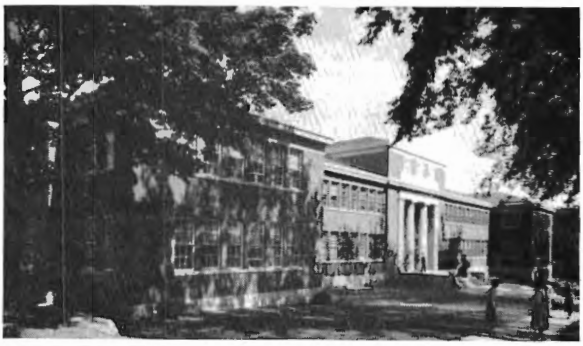
9. ***Harkness Hall,*** the naval and air science building, contains classrooms, a practice range, naval reference library, and other facilities for the instruction of the Naval Reserve and Air Force Officers' Training Corps units, and offices of the Departments of Anthropology and Sociology, Economics,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

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

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

13–14. 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.

15. ***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.



16. ***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.

17. ***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.

18. ***Men's Dining Hall*** facilities include a spacious students' lounge, the faculty lounge with a main faculty dining room and two smaller rooms, the main student dining hall, and four smaller dining rooms.

19–21. ***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.

22. ***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.

23–27. ***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 living rooms, dining hall, and house director. This arrangement provides an intimate and homelike 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 living room opens on a terrace. Other facilities are a large game room for coeducational use, snack bar, floor lounges, and a clinic and infirmary.

31–36. ***Crosby, Burton, Lovejoy, Hoeing, Tiernan, and Gilbert Halls*** form a pleasant men's residence area adjacent to Fraternity Quadrangle with accommodations for approximately 1,050 students.

37–44. ***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.

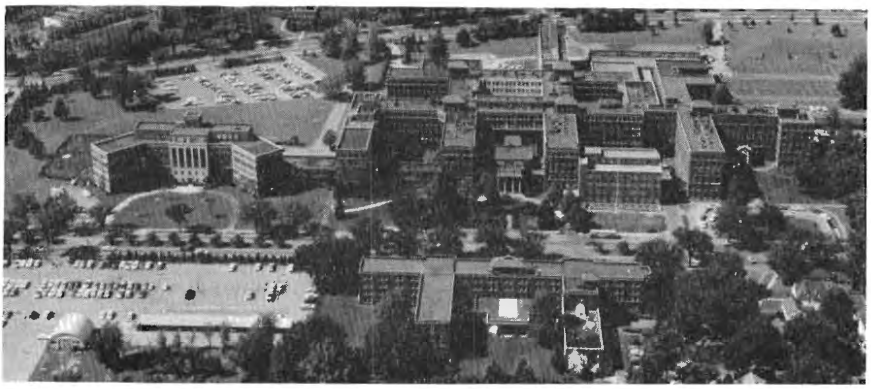
57. ***Hopeman Engineering Building*** is the newly-constructed, four-story headquarters for all offices and laboratories of the Department of Electrical Engineering and more than half of the facilities for the Department of Mechanical Engineering. Facilities provided by this new building for electrical engineering include: seven major research laboratories (such as 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 engineering include: research laboratories for fundamental studies in energy conversion, gas dynamics materials science, and related projects.

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

59. ***The Towers,*** two newly-constructed nine-story buildings, house 520 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 and four person suites, with a lounge, individual rooms and a bath for each unit. An adjacent dining room accommodates five hundred.

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 and Rochester Municipal Hospitals have a total bed capacity of 775 and provide unusual facilities for clinical teaching. Current enrollment at the Medical Center is 265 students.



The principal units of the center are:

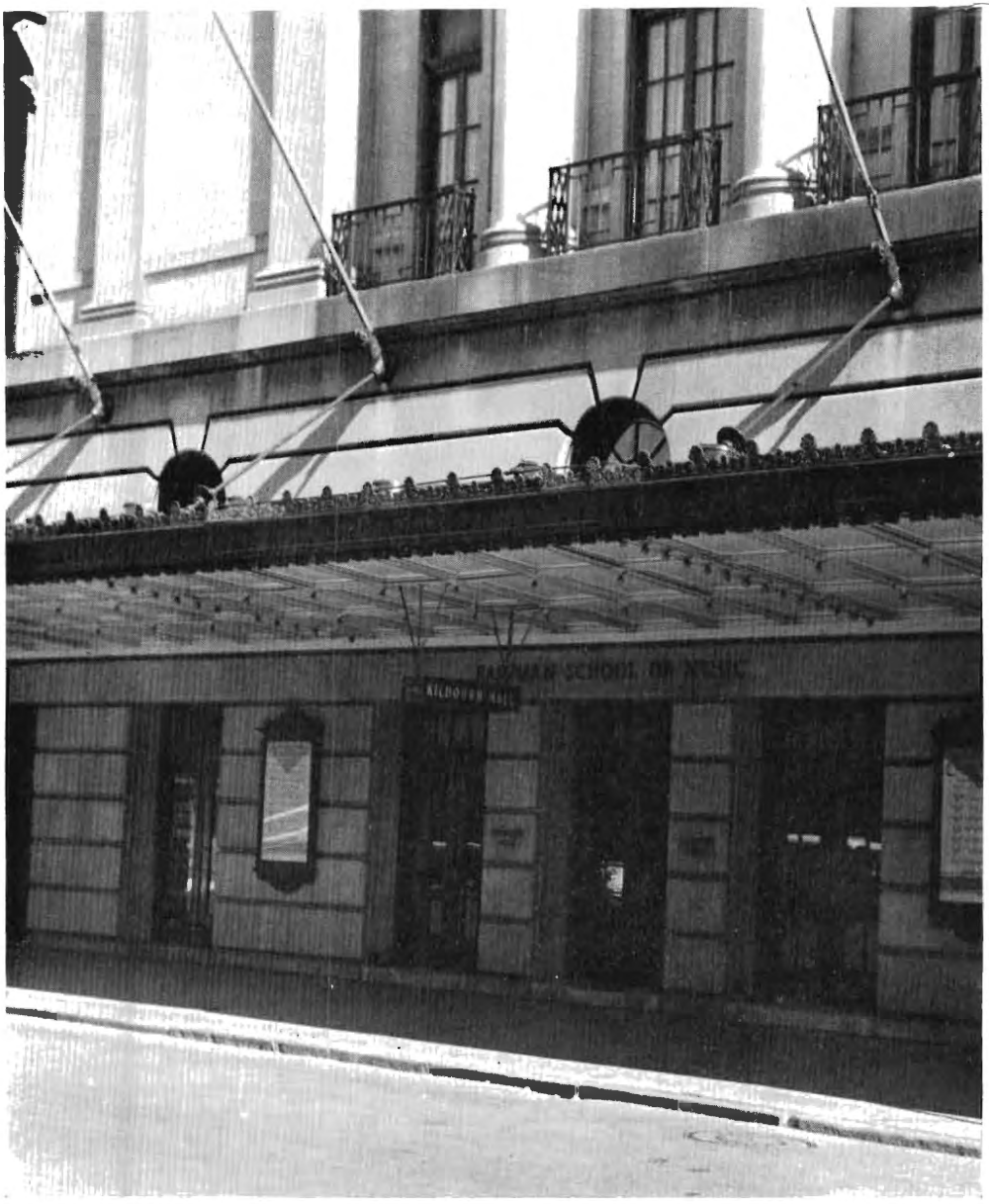
Strong Memorial Hospital, with a capacity of 475 beds, is a teaching hospital. It is devoted to the care of the sick in internal medicine, surgery, pediatrics, obstetrics-gynecology, and psychiatry.

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.

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 under contract with the United States Atomic Energy Commission.


EASTMAN SCHOOL OF MUSIC
KILBOURN HALL

FACILITIES OF 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 3,300-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. Nearby Hutchison House provides additional facilities for recitals, social events, and professional meetings. Eastman School has a current enrollment of 455 undergraduate students and 175 graduate students.

THE MEMORIAL ART GALLERY

The Memorial Art Gallery, center of creative art activities 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, and others.

Year-round services of the Art Gallery include scholarships for underprivileged children, special classes for the handicapped and aged, a lending library of more than 200 original works, and lectures and demonstrations at schools, hospitals, industrial plants and other institutions. The Gallery also sponsors an annual Clothesline Show, 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 in painting, sculpture, ceramics, weaving, and enameling classes.

Remodeling of the Gallery and erection of a new building are planned in order to provide new and expanded services to students and to meet the cultural needs of the area. Groundbreaking for the new Gallery building was begun in summer 1963.

Admissions

GENERAL STATEMENT

ADMISSION is selective. The Committee on Admission has two principal objectives. It seeks first to admit only those students who have the qualifications for a successful college experience at Rochester. In that evaluation the Committee is concerned with the character, motivation, and interests of the candidate as well as the candidate's academic preparation and aptitude. Secondly, the Committee must limit the size of the class to a number consistent with the best teaching and the most efficient use of the River Campus facilities.

In considering applications for admission, the Committee places particular emphasis upon the following:

1. The secondary school record.
2. The results of the College Entrance Examination Board Scholastic Aptitude and Achievement Tests.
3. The recommendation of the principal or headmaster.
4. The candidate's character, health, and personal qualifications.

RECOMMENDED SUBJECT PREPARATION *The Committee on Admission places emphasis upon the quality of the applicant's secondary school record rather than upon any prescribed pattern of courses and credits.* In determining the adequacy of a student's preparation for admission, the Committee on Admission will be influenced by several factors. These factors include the distribution and balance in the secondary school program, the quality of the achievement in that program, and its suitability in content for the course of study which the student proposes to follow.

The subjects listed below are recommended as a safe guide for students in planning their high school programs for admission to the various courses offered by the University, *but do not constitute an inflexible list of admission requirements:*

For the Bachelor of Arts degree: Concentration in English, history, government, economics, psychology, foreign language, mathematics, and other fields listed on page 77. (Pre-medical, pre-dental, and pre-law students normally fall within this category.)

	UNITS
English	4
Foreign language	2 or 3
College Preparatory Mathematics (to include the study of algebra and plane geometry)	3*
Chemistry, Physics, or Biology	1
Social Studies	1
Electives	5 or 4
Total	16

*Although trigonometry is not required, it will be helpful to students who will include mathematics in their college programs.

For the Bachelor of Science degree programs: Astrophysics, biology, business administration, engineering, industrial management, chemistry, geology, physics, optics, education, or nursing. These Programs of Study are listed under individual listings: see page 204 for an index to the courses.

	UNITS
English	4
College Preparatory Mathematics (to include the study of algebra, geometry and trigonometry)	3 or 4**
Social Studies	1
***Chemistry or Physics	1
Electives	7 or 6
Total	16

**Applicants for business administration, industrial management, education, biology, geology, chemistry or nursing should follow the Bachelor of Arts mathematics recommendation.

***Chemistry required as preparation for chemistry, chemical engineering, and biology. Physics required for physics and astrophysics and recommended for all departments in The College of Engineering and Applied Science.

Students who transfer from one program of study to another after admission may be required to make up any deficiencies in their preparation for the program to which transfer is made.

In general, preferred subjects to be offered as electives for either the Arts or the Science degree programs include additional units in language, mathematics, history and science. Other appropriate elective units may be accepted.

Candidates for the degree Bachelor of Science in Education will be better prepared for college by following the guide for candidates for the degree Bachelor of Arts rather than that for the Bachelor of Science.

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 $10.00 which is non-refundable.

Applicants for admission are encouraged to submit their applications between October 1 and February 1 of the final year in secondary school. Applicants are also required to take the College Entrance Examination Board Scholastic Aptitude and Achievement Tests. It is to the advantage of the applicant to take either the December or January tests (see section on Scholastic Aptitude and Achievement Tests on page 29). Applications completed before February 1 will receive best consideration. Applications completed after that date will receive consideration as vacancies permit.

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 resumé 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. 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 $10.00 application fee.

PERSONAL INTERVIEW Applicants are encouraged to arrange a personal interview on campus whenever possible; however, an interview is not a requirement for admission consideration. Such an informal conference is usually very helpful in making college plans. It affords the applicants an opportunity to gain a first-hand impression of the colleges. There is no adequate substitute for this in determining a college choice. Applicants are urged to arrange appointments during the summer and fall months, whenever possible, and to avoid February and March when applications are being processed.

The Admission Office is open for appointments on week days 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.

Applicants are urged to make an appointment for an interview by letter or telephone. This will avoid delays and assure the presence of an interviewer.

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. The months in which the tests will be given are shown below:

December 1963	May 1964
January 1964	July 1964
March 1964	

Applicants for admission should take the Scholastic Aptitude Test in December or January (December preferred) 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, the recommended test pattern for engineering and science candidates is English composition, mathematics, chemistry, or physics. Applicants may offer achievement tests taken 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 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. A Bulletin of Information, sent to all candidates registered for the tests, will acquaint applicants with the character of the questions asked.

Application forms for the test may be secured from your secondary school or the College Entrance Examination Board, Post Office Box 592, Princeton, New Jersey, or the Pacific Coast Office of the Board, Post Office Box 27896, Los Feliz Station, Los Angeles 27, California. The test will be given at numerous centers specified in the Bulletin of Information published by the Board.

NOTIFICATION OF ACTION ON APPLICATIONS FOR ADMISSION Applicants will be notified of action taken on their applications about April 1. Included with all application forms for admission is a sheet of instructions outlining the steps to be taken in completing the application for admission. Action on an application will be withheld until the applicant fulfills the requirements outlined in the instructions.

ADMISSION DEPOSIT Students receiving notification of admission prior to April 20 are required to post an Admission Deposit of $50 by May 1. Any students admitted after April 20 will be required to make the deposit promptly upon receipt of the letter of admission. This procedure has been established to provide ample time for students admitted at an early date to reach a decision on college choice. *The deposit is not refundable. It is not an additional fee.* It will be credited to the first term bill, and in case of dormitory residents, part of it will be used to cover the dormitory deposit and breakage fee referred to elsewhere in this bulletin.

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 early decision upon their application for admission.

To be eligible for such early action the applicant must:

1. Complete formal applications for admission prior to November 1 including College Entrance Examination Board Scholastic Aptitude and appropriate Achievement Test scores taken in the junior year.
2. 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 will be expected to pay the regular deposit within two weeks of notification of acceptance.

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

ADVANCED PLACEMENT AND ADVANCED STANDING CREDIT The College is a participant in the Advanced Placement Program of the College Entrance Examination Board. Students desiring consideration for such placement or credit through college grade 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 In general, candidates for admission who have been enrolled in other colleges or universities must meet the entrance requirements and present satisfactory evidence that their previous academic work has been of distinctly high quality. Their credentials must include a statement of honorable dismissal. Credit for work done at other institutions will be given only after the student has been at the University of Rochester long enough to demonstrate that he can meet its standards and will include only those subjects which can reasonably be accepted as the equivalent of work in the course he is pursuing.

In order to qualify for graduation, all persons admitted must complete not less than one academic year of work at the University.

New students ordinarily enter only at the beginning of the academic year in September. Action on transfer applications is usually taken after May 30 and candidates are notified of the Committee's decision as soon as circumstances permit.

Students with two or more full years of college work elsewhere who seek admission to the College of Business Administration, College of Education, College of Engineering and Applied Science, Department of Nursing, should read carefully the material on admission in the section of this bulletin devoted to that college.

SPECIAL STUDENTS

Students desiring to pursue a special course leading to no degree are admitted only for extraordinary reasons. Ordinarily special students are limited to persons holding a degree from a recognized college. All students so admitted must present the usual sixteen units of preparatory work. Special students are subject to all general regulations and pay a tuition fee amounting to $47.00 per semester hour and all incidental fees attached to any course they take.

INTRODUCTORY WORK FOR TRANSFER STUDENTS

Students admitted as transfers from other colleges and universities are required to report for an abbreviated orientation program during Freshman Week. These students take tests, are given physical examinations, make a tour of the library, and have their photographs taken. While this program is somewhat less extensive than that prescribed for freshmen, its aim is similar—namely, to assist the advanced students in adapting themselves to a new college environment.

FRESHMAN WEEK

Freshman Orientation occurs during the week before regular instruction begins. The objectives of the week are to assist incoming students in adapting to college life and work. The program is planned by the Orientation Committee of the College Cabinet, an advisory committee comprising faculty and students, and the Dean of Students and his 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.

Each freshman has an appointment to discuss his academic program with his faculty adviser. Tests taken by freshmen are used by the advisers in planning academic programs and for future counseling. They are also used for placement in fields of study.

Detailed information on this program is mailed to freshmen in August. Fees for the week, including meals, are about $30.

Expenses and Financial Aid

TUITION AND LABORATORY FEES Tuition for the 1963–64 academic year is $1500, or $750 per term, including laboratory fees. Under the four-course program of studies* this is equivalent to the rate of $47 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 $47 per credit hour in the term in which the course is taken.
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 $47.
6. Students admitted as special, non-degree candidates will be charged tuition at the credit hour rate of $47 per credit hour.

APPLICATION FEE An application fee of $10 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 49.

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 1963–64 the fee is expected to be $29.

An athletic fee of approximately $26 is also paid by all students. This includes admissions to all athletic events.

Women students and male freshmen 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 $1500.

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.

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.

*See page 77 for the definition of a course.

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 rates of $.50 to $1.80 through the U. S. Post Office.

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.

FEES FOR STUDENTS ENROLLED FOR COURSES IN THE EASTMAN SCHOOL OF MUSIC

(1) Students who are concentrating in music shall be charged only the regular tuition fee of the College of Arts and Science. The tuition covers the courses in music required for concentration as outlined on page 129. The cost of any additional music subjects shall be paid by the student.

(2) Other students may elect courses at the Eastman School of Music without payment of an additional fee, except as follows: (a) if the program of the student involves courses in excess of the normal load for a degree, the elective will be regarded as the extra course and full tuition for the course will be charged at the normal rates of the Eastman School of Music; (b) if the elective is in Applied Music, an extra fee may be charged if, upon request, the student is assigned to certain teachers for instruction, but this fee will be less than the usual charge for such instruction. All resident students in Applied Music are charged a practice room fee. The fee varies depending upon the student's program of study.

ESTIMATED STUDENT EXPENSES

Because of possible severe fluctuations in cost of living and the instability of prices, such costs as tuition and fees, as well as estimates for total expenses, are subject to change. In the figures used below, estimates for such items as room and board are based upon the cost prevailing at the time of publication of this bulletin. Under any circumstances, the cost of a year at college is variable, depending largely upon the willingness and need of the student to curtail those expenditures which are not essential to education and reasonable comfort.

Expenses differ only slightly for men and women. The table below gives those items of expense which are fixed or only slightly variable:

ITEMS

Tuition	$1500
(Tuition, by action of the Board of Trustees, will be $1800 beginning Sept., 1964.)	
Student activity, athletic fee[1], and social fee for women and freshmen men	60
Health fees	
Medical Service	35
Insurance Premium—Extended Medical Care	17
Books and supplies	60
Residence hall room (including linen service)	370
Board	525
	$2567

Expenditures for personal necessities, organization dues, recreation, and travel vary from one individual to another. Students who watch their expenditures

[1]The athletic fee will be dropped in Sept., 1964.

closely report amounts ranging from $250 to $400 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 $2800. The average annual expenditure is approximately $2950.

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

Day students who live in their homes in the city report total expenditures of approximately $2250. 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 $100 for lunches and $100 for transportation.

SCHOLARSHIPS AND LOANS

The University has available for student aid the income from endowments given specifically for this purpose, certain annual contributions for the maintenance of special funds, and a large sum appropriated annually from the general income of the University. Although the total amount accruing from these sources is large in proportion to the enrollment, it is impossible to assist all deserving students who apply. An exceedingly careful selection of the 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 29)

PROCEDURE FOR MAKING APPLICATION Applicants for scholarships should file a complete application for admission no later than February 1. 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 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 not required to apply for the renewal of their scholarships. These scholarships, as stated in the letter of award, 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 all scholarships, except those referred to above, must therefore make application at the times announced for such renewal application if they desire to have their scholarships renewed. The renewal of annual scholarships cannot be assured. 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

Veterans eligible for educational benefits under federal or state legislation, members of the NROTC Unit receiving educational benefits under the "regular" plan, and recipients of scholarships granted outside the jurisdiction of the University may be eligible to hold certain of the prize scholarships, awarded primarily as a recognition of achievement rather than as a means of student aid. 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 high school principal and/or guidance counselor.

Information on the above may be obtained by writing: Regents Examination and Scholarship Center, New York State Education Department, Albany 1, New York. Students seeking New York State guaranteed loans should apply to: New York Higher Education Assistance Corporation, 111 Washington Avenue, Albany 24, New York.

ADDITIONAL REGULATIONS

Scholarships are granted only to students who are pursuing one of the regular courses for a degree.[1] 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 below.

[1]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 OR 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 upon the recommendation of principals and headmasters of secondary schools 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. Nominations for these scholarships are made by the principals and headmasters of secondary schools 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 CITY SCHOLARSHIPS are granted by the Trustees to the City of Rochester for the benefit of graduates of the Rochester public high schools who for at least the two years directly preceding graduation have been in attendance at those schools. The scholarships are of two kinds, those awarded by competition and those awarded on nomination. In the first group, those awarded by competition, five scholarships with maximum annual stipends of $1,000 each are granted in each class to the three men and the two women who, fulfilling the conditions of eligibility stated above, obtain the highest averages for the first term of the freshman year among men and women respectively. For the second group, the scholarships awarded on nomination, nominations of eligible students are made by the principals of the Rochester public high schools on the basis of high scholarship, character, personality, and need; and awards are made by the Committee on Student Aid to the nominees regarded as most meritorious. The number of these scholarships in each class and the stipend of each are determined by the Committee on Student Aid. The purpose of these scholarships is to provide

a college education for graduates of the Rochester public high schools who would be unable to obtain such an education without financial aid, but whose circumstances are such that with aid they can meet the financial obligation of a college course.

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 ALLIED CHEMICAL CORPORATION SCHOLARSHIP is provided by the National Aniline Division of the Allied Chemical Corporation and is awarded to an outstanding undergraduate student in Chemical Engineering who is a citizen of the United States or Canada.

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.

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 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 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.

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.

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 REGIONAL ALUMNI CLUB SCHOLARSHIPS are sponsored by the Alumni of the University. The stipends are adjustable, depending upon the financial need of the recipient, with a maximum stipend of full tuition. Candidates for these awards are nominated by regional alumni clubs of:

Baltimore, Maryland
Boston, Massachusetts
Buffalo, New York
Capital District (Albany, Troy area), New York
Chicago, Illinois
Cincinnati, Ohio
Finger Lakes (Geneva, Canandaigua), New York
Genesee Area (Batavia), New York
Greater Detroit, Michigan
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

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 high 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 Regional Alumni Club Scholarships should be forwarded not later than Feb. 1, and the applications of the nominees must be complete and on file in the Admissions Office by Feb. 1. Nominees for Regional Alumni Club 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 and general promise of the candidates. In making selections for award the Committee will give consideration to the candidate's financial need, but merit rather than need will be the factor of primary importance.

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 Phi 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 Scholarship, endowed by the late Ella G. Howe, is awarded every four years without restriction as to the residence of the holder.

The New York Alumni Prize Scholarship is endowed by Alumni of the Greater New York area and awarded to a candidate residing in that area.

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 contributed by Alumnae of the Alpha Sigma Sorority in honor of 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 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 Sigma Kappa Upsilon Scholarship, endowed by the Alumnae of Sigma Kappa Upsilon Sorority, is given to an undergraduate of that sorority. Preference is given to the daughter of an alumnae 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 two. 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 a letter of introduction to an officer of a local bank. Favorable reception of the application by this officer will result in the granting of the loan.

INTEREST AND REPAYMENT All arrangements regarding the payment of interest and repayment of principal must be made at the bank where the loan is secured. Interest payments made before graduation, strictly in accordance with such arrangements, will be credited toward the principal of the loan. Arrangements for repayment after graduation must be made with the bank. After graduation the rate of interest to the University is two per cent on the McGuire Fund and five per cent on all other loan funds, except on the Foley Fund; no interest is charged on loans from this fund. The bank will, however, collect interest at its current rate on all loans; whatever is paid in excess of the percentages of interest stated above will be credited to the principal upon final payment of the loan.

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.

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."

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 per cent per annum.

THE VICTOR J. CHAMBERS LOAN FUND A fund, contributed by the friends and former students of Professor Victor J. Chambers, B.S., '95, who served on the faculty from 1908–1939, is available for loans to students in chemistry and chemical engineering. Loans from this fund may be made to either graduates or undergraduates and may be for studies either at Rochester or other institutions. Applications, submitted to the Director of Student Aid, are acted upon by a special committee of the faculty.

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.

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 to twenty 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.

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 awarded to the two men in the graduating class whose original expository or persuasive speeches exhibit the highest excellence in content, organization, style and delivery.

THE DEWEY PRIZES, founded in 1866, are awarded annually to the two men in the sophomore class whose original expository or persuasive speeches exhibit the highest excellence in content, organization, style and delivery.

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 of $25, first offered in 1955, is awarded annually to the woman of any class whose original expository or persuasive speech exhibits the highest excellence in content, organization, style and delivery.

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.

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, is 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 Chairman of the Departments of Physics, Chemistry, Biology, and Astronomy.

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 $25 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.

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 the Associate and Assistant Deans of Students, Director of Men's Residence Halls, Director of Women's Residence Halls, Director of Student Activities, Director of Testing and Counseling Service, and Placement Officers.

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, member of the Department of Physical Education, Director of Religious Activities, adviser to the University Protestant Fellowship, adviser to Jewish students, adviser to Catholic students, Directors of Student Aid.

EDUCATIONAL PLACEMENT BUREAU

The Educational Placement Bureau of the College of Education assists University of Rochester Teacher Education graduates to find desirable teaching, guidance, student personnel, administrative and other positions in the field of Education. The Bureau will also endeavor to assist candidates holding degrees from other institutions who have completed at least six semester hours of course work within the College of Education for the purpose of completing certification and/or graduate degree requirements.

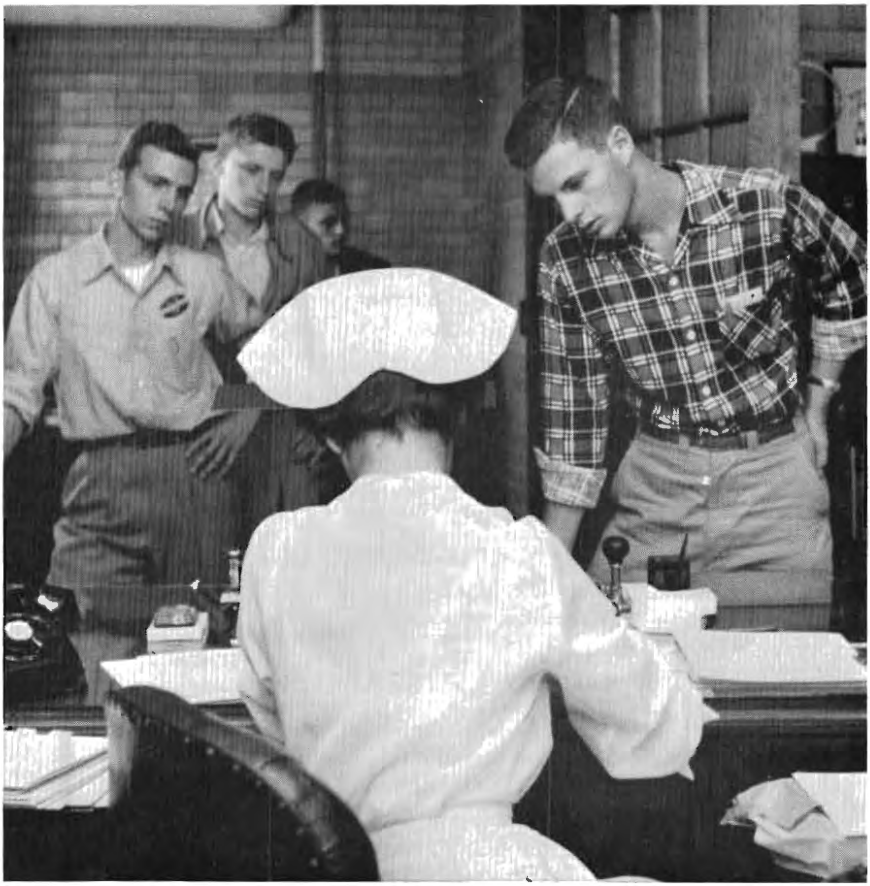
HEALTH SERVICE

The health of the student body is under the care of the physicians of the Student Health Service. The out-patient department for men and women 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. Complicated cases are admitted to the University Medical Center 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 infirmary, dispensary or hospital care as may be thought necessary by the physicians, provided the cost does not exceed $80 in any one academic year. Hospital service is limited. It is expected that students will pay for unusual medications or prolonged hospitalization. Elective surgery, refractions, and dental care are not provided under the program. No care is provided resident students during vacation periods.

If a student prefers to go to a private physician or hospital for treatment, the cost of such treatment and care becomes his or her responsibility.

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 remedial 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 music and religious organizations. Rooms are available for scheduling meetings and social events. Student mail boxes are located in Todd Union, which is also 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 and the Women's Council. The Interfraternity Council and the Intersorority Council handle the special problems of the fraternities and sororities.

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; INTER-PRES, a yearbook edited by the Junior Class; PROLOGUE, a semi-annual literary magazine; RENEGADE, 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; and Co-Kast, a student group which produces a recent Broadway musical show each fall. In the spring the men and women join together to present a student written, student directed musical comedy. The debating program of the Forensic Society is both intercollegiate and intramural.

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.

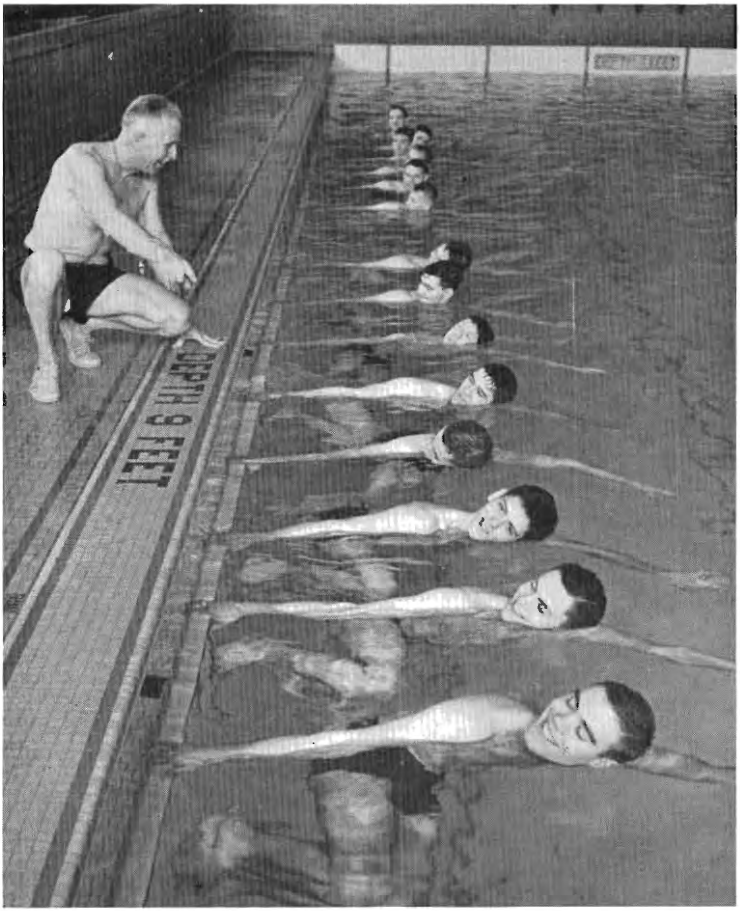
> *The athletic policy of the University of Rochester has been developed to further the best interests of the students who participate in intercollegiate athletics.*

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.

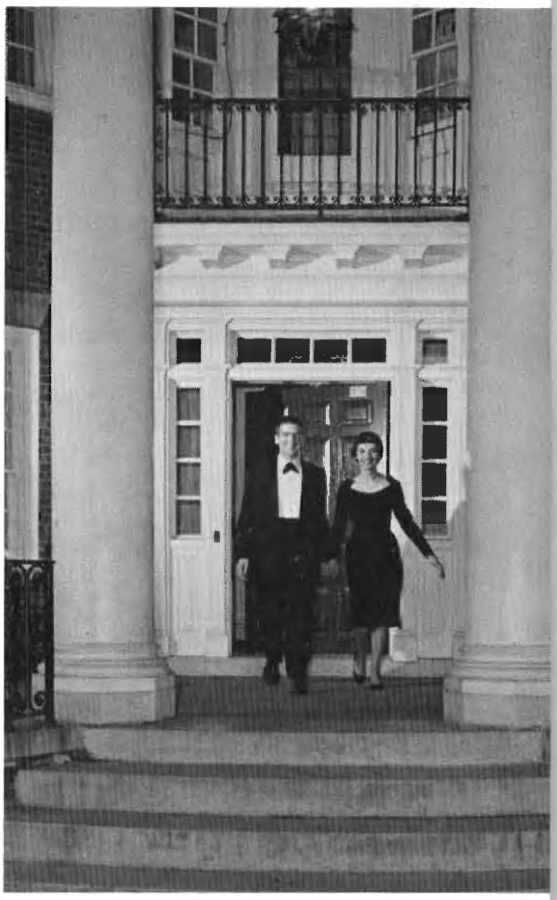
To this end, the University does not subsidize its teams. Members of all athletic squads must meet the same entrance requirements and scholarship standards required of the student body in general, and they enjoy the same privileges as are granted other qualified students.

Women's sports, sponsored by the Women's Athletic 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.

HONORARY SOCIETIES Honorary societies include Phi Beta Kappa, Sigma Xi, Tau Beta Pi, 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.


DEPTH 8 FEET

FRATERNITIES, SORORITIES There are thirteen social fraternities for men and three for women. Ten of the thirteen men's fraternities are national; the other three and all sororities are local groups. The fraternities are Alpha Delta Phi (1851), Delta Upsilon (1852), Delta Kappa Epsilon (1856), Psi Upsilon (1858), Rho Nu (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 Gamma Sigma Phi (1962). The sororities are Theta Eta (1903), Alpha Sigma (1903), and Gamma Phi (1909). The Interfraternity Council and the Intersorority Council deal with the common interests of the respective groups.



RELIGION

The University of Rochester was founded by men of strong religious convictions. Although the school is non-denominational, it recognizes the importance of religion in campus life.

A 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 interdenominational basis, assisted by chaplains or advisers to Protestant denominational groups, and 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 meets bi-weekly for study and discussion and which sponsors many other activities. Working closely with the University Protestant Fellowship and operating as part of its total ministry are the Baptist Student Association, the Canterbury Club, the Lutheran Student Association, The Wesley Foundation, and the United Campus Christian Fellowship. A Christian Science group, a Unitarian-Universalist group, and an Inter-Varsity Fellowship meets during the month. Catholic students are organized through a Newman Club which meets every other week for a talk and discussion, holds retreats, and provides social fellowship. Study groups are held for freshman students, and for upper-classmen. Jewish students are organized through a chapter of the Hillel Foundation which sponsors cultural meetings, breakfasts, religious discussions, and social activities. All of the religious groups on campus are represented on an inter-religious council which coordinates programs and sponsors joint activities, such as brotherhood dinners, coffee hours, and the Campus Conference on Religion. It also takes an active interest in campus life, social service, and international affairs.

CHAPEL 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 11 o'clock in the West Lounge of Todd Union.

Jewish services are held on Friday evening in the upper lounge of Todd Union.

Holy Communion is celebrated at Episcopal Services each Sunday at 9:30 A.M. in the Men's Dining Center Lounge.

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. Opposite the lounge is a room for prayer and meditation.

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 listen-

ing student body. Active choral and instrumental organizations provide opportunity for those with musical interests and talents to develop these abilities under capable direction.

THE CECILIAN CHORALE The Cecilian Chorale is open to all undergraduate women students, admitted by audition. Performances are scheduled for important campus occasions and for local schools and clubs. The Orpheus and Cecilian Chorales combine for one rehearsal each week to learn and perform music selected from the large mixed chorus repertoire. The combined groups also appear in concert with the Concert Band, performing works arranged and written especially for mixed chorus and band.

THE ORPHEUS CHORALE The Orpheus Chorale is open to all men students of the undergraduate River Campus Colleges admitted by audition. The group performs on campus in the Christmas Concert, for Parents' Weekend, and other significant events, and at local schools.

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 Men's and Women's Glee Clubs combine for one rehearsal each week to prepare oratorios and other large choral works which are presented in concert on the River Campus with members of the Rochester Philharmonic Orchestra.

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.

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 on some concerts, all of which are presented in Strong Auditorium. Reading sessions to familiarize members with a large symphonic repertoire are held during the winter months.

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 CONCERT BAND The Concert 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 group also combines in concert with the Orpheus-Cecilian Chorale.

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.

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.

THE TOWERS The Towers, two newly-constructed, nine-story buildings, house 520 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- and four-person suites providing a lounge, individual rooms, and a bath for each unit. Women students live on floors four, six, and eight in each building while the other floors house male students. 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 accommodates five hundred and 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.

HOUSING FOR MEN Undergraduate men from outside the Rochester area are provided with housing in residence halls and fraternity houses on the River Campus. Six residence units provide living quarters for about 1,000 students. About 150 upperclassmen live in eight fraternity houses. Tiernan and Gilbert Halls house freshmen.

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 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 advisers. They are aided by a group of undergraduates who also serve as advisers. A 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 Director of Residence Halls for Men.

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.

Room rental in the residence halls is $370 per academic year. Both single and double rooms are available.

The Men's Dining Hall is located across the street from the residence quadrangle. Students receive their mail at Todd Union, the student activities center.

Special facilities for non-resident 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 should be addressed to the Director of Residence Halls for Men, River Campus.

HOUSING FOR WOMEN Excellent accommodations for women students are provided in the Women's Residence Halls and the new Tower dormitory on the River Campus. 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 libraries, 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, and on each of the living floors there are two lounges, kitchenettes, and small laundry rooms.

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.

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 and a weekly exchange of 1 sheet, 1 pillow case, 2 bath towels is provided.

Both single and double rooms are provided. Room rental is $370 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.

The advisory system of the residence halls is under the administration of the Associate Dean of Students, and includes the Director of Residence Halls for Women, 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 Freshman Counselors 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 Council 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 Council, 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 at Rochester 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 Director of Residence Halls for Women.

ROOM DEPOSITS Both men and women students who live in residence halls are required to deposit with the Accounting Office the sum of $10 against which charges may be made for damage to the halls. For new students, this deposit is taken from the $50 deposit fee paid prior to entrance. During the period of residency, occupancy charges of $2 or less are held against the deposit. Charges amounting to more than $2 are billed through the Accounting Office after advance notification to the resident.

MEN'S DINING HALL The Men's Dining Hall provides dining facilities for residents of the Men's Residence Halls and their guests. In addition to the beautiful and gracious main dining hall, there are several small private dining rooms for special parties. Breakfast and lunch are served cafeteria style; dinner is served by student waiters. A board plan is compulsory for all students. Additional facilities for student recreation, as well as the Faculty Club, are housed in the building.

WOMEN'S DINING HALL 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 are served cafeteria style; dinner is served by student waitresses. A snack bar is open in the residence Sunday evenings for students wishing to buy supper on the campus.

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.

ATTENDANCE All teachers are encouraged to keep a record of attendance and to report absences to the faculty advisers. Responsibility for attendance of juniors and seniors is assumed to rest directly upon the student. This privilege is extended for each term to freshmen and sophomores whose names appear on the Dean's List.

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 Associate Dean of Students 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.

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.

RESIDENCE POLICY See page 59.

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.

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.

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.

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 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 is 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.*

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.

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. However, freshmen whose point-hour ratios are below 1.7 (D plus average) normally are subject to academic action. Sophomores, juniors, and seniors 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 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.

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.

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

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.

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 and Sociology
Astrophysics
Biology
Chemistry
Economics
English
Fine Arts
French
General Science
Geology
Geography
German
History
Mathematics
Music
Philosophy
Physics
Political Science
Psychology
Russian
Spanish

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

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 Administration
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, 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 and a Bachelor of Science with a major in general 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 approximately 1,300 students engaged in 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 and

Sociology, Biology, Chemistry, Economics, English, Geology, History, Languages and 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, and in the following departments of the College: Fine Arts and Foreign and Comparative Literature.

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 Engineering, 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 and Master of 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 is one of 176 such units located at colleges and universities throughout the United States. Its purpose is to prepare male college students to qualify for commissions as second lieutenants in the Air Force Reserve at the same time that they graduate from college. The training program is conducted by personnel assigned from the United States Air Force to the University, where they are organized into the Department of Air Science.

The Air Science program is divided into the basic course (freshman and sophomore years), and the advanced course (junior and senior years). The Air Science courses listed on page 91 must be successfully completed in order to qualify for a commission in the Air Force Reserve upon graduation.

Requirements for enrollment in the basic course (freshman and sophomore years) are that the student: (1) be a citizen of the United States; (2) be over

fourteen years of age upon entering the course and be less than twenty-eight years of age at the time of completing the program; (3) be physically qualified for entrance to the University. Selection for enrollment in the advanced course (junior and senior years) requires that the student: (1) complete the basic course or equivalent thereof; (2) meet the physical requirements for general military service in the scientific or administrative categories or for flight training; (3) have successfully completed such general survey or screening tests prescribed for entering into each of the categories; (4) must possess the overall academic average of "C" (2.0).

Accepted students are eligible for draft deferments after completing the first semester of the freshman year.

Basic students are issued a uniform from the University's stock, while advanced students receive a complete Air Force Officer's uniform which becomes theirs upon graduation. Including summer training session, advanced students are paid about $600 for their two year's training. One summer training period of four weeks' duration is required between the junior and senior years which consists of practical exercises in Survival Training, Air Base Defense, Aircraft and Aircrew Indoctrination and Junior Officer duties. The Summer Training Units are held at several different United States Air Force bases.

Students interested in the program should consult the Air Science section of the "Courses of Instruction" in the College of Arts and Science for pertinent academic regulations.

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 eight terms (four academic years).

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 retainer pay 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; and to serve for four years on active duty after graduation, with the ultimate option of accepting a permanent commission or of transferring to the Naval Reserve for a period of such length as to total six years of commissioned service.
2. *Contract NROTC Students* agree to make one summer practice cruise of three to six weeks; to accept a commission for three years in the Naval Reserve or the Marine Corps Reserve, if offered; to serve for three years on active duty, if called; and not to resign such commission before six years from its original date. Contract students may, if granted permission by the Chief of Naval Personnel, delay their reporting for active duty in order to pursue (at their own expense) graduate study in Engineering,

Chemistry, Physics, or Mathematics. Delay will not be granted for work beyond the master's degree, nor for a period longer than two years. Contract NROTC students are issued a complete uniform and Naval Science textbooks by the government and are paid subsistence allowance during their last two academic years.

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.

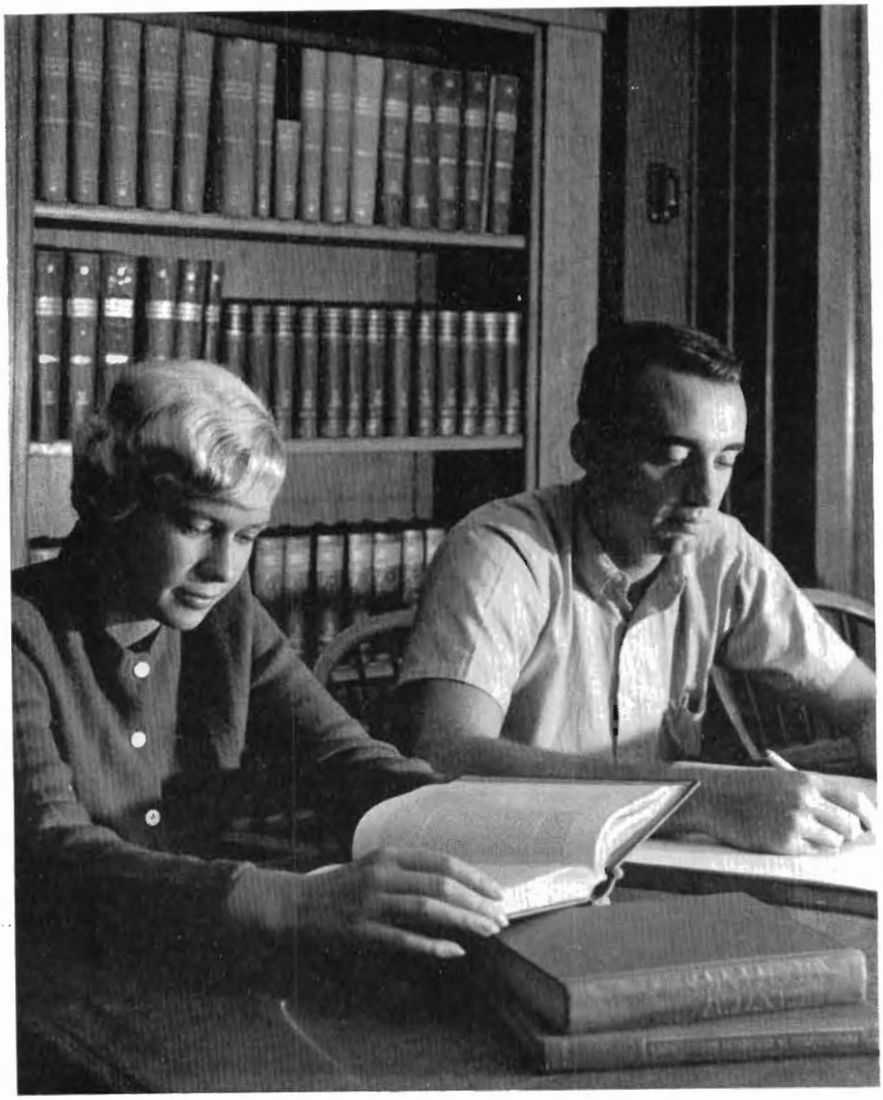
The requirements for enrollment in the ROTC program for both regular and contract students are that they: (1) must be unmarried male citizens of the United States and must agree to remain unmarried until commissioned or disenrolled; (2) must be not less than seventeen years of age nor more than twenty-one 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 for at least four years; (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

Qualified undergraduates may enroll in this course, which consists of two summer training periods of six weeks each. There is no military training during the academic year. Undergraduates who are enrolled in this program are draft deferred. Applications or requests for further information may be submitted to the Marine Officer instructor in the Department of Naval Science.

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

departments offering such courses are Anthropology and Sociology, English, Fine Arts, and Foreign and Comparative Literature.

HONORS SEMINAR The Honors Program is distinguished from the regular program by the seminar system and by a special system of examinations and grades. Each seminar is equivalent in credit to two courses. Enrollment is approximately eight 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 101:* A course of instruction in writing expository and argumentative prose should be taken in the freshman year. A student may be exempt from this requirement if proficiency in English is indicated in an entrance examination or by the high school record.

2. *Foreign Language:*[1] A student must show proficiency in a foreign language. Entering students with three years of a foreign language in high 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

[1]Consult specific programs in Professional Schools for requirements of that college.

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[2]:

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

Social Science (II)—Anthropology and Sociology, Economics, Geography, History, Linguistics, Philosophy[3], Political Science.

Natural Science (III)—Astronomy, Biology, Chemistry, Geology, Mathematics, Physics, and Psychology[4].

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, and Physics and Astronomy) and

[2]The following courses may not be applied toward distribution requirements—English 101, 123; Language courses numbered 101–102; all courses offered by the departments of Air Science, Naval Science and Physical Education.

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

[4]Psychology courses classified under Natural Science include 101, 201, 220, 251–252, 253, 255, 256, 260, 293, 297. All other Psychology courses are classified as Social Science.

at least two literature courses (selected from departments of English and/or Foreign and Comparative Literature). The faculty strongly recommends that students and faculty advisers give special consideration to English 103, History 101–102, and Mathematics 100 when selecting courses to satisfy distribution requirements.

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. 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. 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 in eight fields: Anthropology and Sociology, Economics, English, Fine Arts, Foreign and Comparative Literature, History, Philosophy, and Political Science. The student can concentrate in any one of these fields, except Anthropology and Sociology, Fine Arts and Foreign and Comparative Literature. The honors student is required to complete six to eight seminars for the A.B. degree. Normally students register for two seminars in each of two semesters, and for one or more in each of the remaining two. Four seminars in a single department constitute a concentration. The two to four remaining seminars will normally be in other departments.

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 166). 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 either elect honors seminars in addition to the six required, or take four 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, unless he is enrolled in the B.S. program in Biology, Plan B. A sixth course is not permitted in any term.

A.B. students in honors may take one extra course each term with the permission of the director of the Honors Program and the head of the department of concentration.

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.[1] 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.

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

The comprehensive is taken during the regular examination period at the end of the senior year; students taking comprehensives are excused from final examinations in courses offered by the College of Arts and Science. 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.

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 also take a three-hour written comprehensive examination in their field of concentration, set and graded by the department of concentration. 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.

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.

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:

1. 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. The chairman of this committee is Mr. William B. Muchmore.

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. Mr. Glenn G. Wiltsey, Chairman of the Pre-Legal Advisory Committee, will be glad to consult with students preparing for entrance to law schools. (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 ADMINISTRATIVE OFFICERS

THE COLLEGE OF ARTS & SCIENCE

Kenneth E. Clark, PH.D. (Ohio State).....Dean of the College of Arts and Science
Morton F. Kaplon, PH.D. (Rochester).....Associate Dean of the College of Arts and Science
Marian A. McClintock, ED.M. (Rochester).....Executive Assistant to the Deans of the College

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 SEMINAR

(All Honors Seminars are the equivalent of two courses.)

ANTHROPOLOGY AND SOCIOLOGY

305. ***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.

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.

349. ***Studies in Indian Civilization.*** An examination of the idea of Indian civilization, its content and structure. Particular emphasis is placed on the interrelationships between the ideas Indians and Europeans have had about Indian civilization and the political and social effect these ideas have had since the eighteenth century. Various Indian traditions are critically examined in the light of historical evidence.

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.

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.

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.

325. ***Economic Development.*** Selected problems in the theory and strategy of economic development, with emphasis upon criteria for investment allocation, the concept of balanced growth, theoretical and empirical aspects of underemployment, and agrarian reform and its economic effects.

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.

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

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.

367. ***Economic Fluctuations.*** Economic instability in its long- and short-run manifestations. The role of business, government and the banking system as causes, as well as the stabilization policies which each of these sectors of the economy might follow. Theory and history are emphasized.

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

It is expected that English majors will have taken English 103 and 104 or 105 before beginning seminar work. They are required to take English 304 or 222 or 272 and at least one seminar or course covering material from the periods before 1800.

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.

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

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

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 Thomas Wolfe; 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.

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 courses offered by the Department of Foreign and Comparative Literature, 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.

FOREIGN AND COMPARATIVE LITERATURE

Unless otherwise stated readings will be in the language, but seminars will be conducted in English. However, students enrolling in French or German Seminars should have a reading knowledge of the language involved.

301. ***French Thought.*** The Renaissance: Montaigne. Seventeenth century rationalism: Descartes. Mysticism: Pascal. The Idea of Progress: Montesquieu, Voltaire, Rousseau. Scientific positivism vs. intuition in the nineteenth century: Comte, Taine, Bergson, Sartre. (Knowledge of French useful but not required.)

302. ***French Drama from the Renaissance to the Revolution.*** Masters of classical drama: Corneille, Racine, Moliere. Social and psychological comedy in the eighteenth century: Lesage, Marivaux. Political satire: Beaumarchais. Voltaire and tragedy.

303. ***French Novel to 1900.*** A close analysis of works and importance of novelists such as: LaFayette, Lacios, Stendhal, Balzac, Flaubert, Maupassant, Zola, France.

305. ***French Drama from Revolution to Present Day.*** The Romantic, Realistic, and Naturalistic theatre, the theatre of Ideas, and the 20th century theatre. Playwrights studied will range from V. Hugo to Ionesco.

306. ***Contemporary French Novel.*** A close study of works and importance of Gide, Proust, Duhamel, Mauriac, Malraux, Sartre, Camus, and le nouveau roman.

311. ***The Age of Goethe.*** Goethe and other important representatives of German Classicism.

312. ***Modern German Thought and Literature.*** Representative authors from 1880 to the present; the influence of Schopenhauer and Nietzsche on Mann, Kafka, Hesse, and Musil. Readings in English.

313. ***Studies in Goethe and German Classicism.*** A seminar devoted to the work of Herder, Lessing, Schiller and Goethe and their contemporaries.

314. ***German Romanticism.*** An examination of the German contribution during the Romantic period 1800–1830.

316. ***Studies in German Drama.*** A seminar on representative playwrights from the Sturm und Drang to Brecht and Frisch.

317. ***Studies in German Poetry and Criticism.*** Close study of the major poets from Goethe to Rilke.

320. ***Studies in Indian Civilization.*** An examination of Indian civilization, its content and structure. Particular emphasis will be placed on the interrelationships between the ideas Indians and Europeans, as expressed in literary texts, have had about Indian civilization and the political and social effect these ideas have had since the eighteenth century. Various Indian traditions, as exemplified in religious, philosophical, political literature, will be critically examined in their historical context.

321. ***Studies in Russian Fiction.*** From Pushkin through Gogol, Turgenev, Dostoevsky, Tolstoy and Chekhov to Pasternak. (Russian not required.)

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.

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

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.

352. ***Tragedy.*** A study of tragic themes and tragic behavior in drama and fiction with texts chosen from Aeschylus to Mann, Camus and Brecht.

353. ***The Literature of Aristocracy.*** Study of the artistic, social, and philosophical qualities of the literature of aristocratic life: Lady Murasaki, Racine, Henry James, Marcel Proust.

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.

357. ***The French Enlightenment.*** Critical analysis of works of major authors of the eighteenth century; their origins and influences.

358. ***Studies in the Epic Tradition.*** The origins, development, and nature of the epic; emphasis on the *Iliad* and *Odyssey*, the *Aeneid, Paradise Lost,* and *Faust.*

359. ***16th & 17th Century Lyric and Reflective Poetry.*** Contemporary theories of renaissance and baroque poetry: stylistic analysis of the impact in continental Europe of Petrarchism, Cultisme, Marinismo.

367. ***The Modern European Novel.*** Studies in French, German and English prose fiction. Reading knowledge of French or German required.

370. ***Modern European Drama.*** Leading European dramatists since 1870: Ibsen, Hauptmann, Strindberg, Chekhov, Pirandello, Lorca, Shaw, Sartre, Brecht.

372. ***Contemporary Literature.*** A study of some of the more important European novelists of the twentieth century: Kafka, Gide, Proust, D. H. Lawrence, Thomas Mann, Loestler, Sartre, Malraux, Camus, Joyce.

375. ***Problems in Comparative Literature.*** Confessional literature; the gradual intrusion of the novelist upon his work and of the problem of literary sincerity; representative writers from Rousseau to Kafka.

HISTORY

Students taking seminars in American History must have completed History 231, 232; those taking seminars in European History must have completed History 101, 102.

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.

325. ***French Canada.*** Persistence of the French tradition in North America from colonial times to the present. The effect of political and economic developments upon French-Canadian culture.

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

328. ***Canada-United States Relations.*** Problems in the relations of Canada and the United States from 1763 to the present. Opportunity for students to study the analogies and differences between developments in Canada and the United States or Canada and other members of the British Commonwealth. Previous knowledge of British Commonwealth or American History is expected.

333. ***American Economic History.*** Economic evolution of the United States from the simple agrarian nation of 1789 to the complex industrial society of today. Topical questions: the development of American agriculture; the growth of business organization; and the role of government in economic change.

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.

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.

340. ***American Social History.*** The development of American society and culture from the Civil War to the present.

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.

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

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.

356. ***European Diplomatic History since 1919.*** Diplomatic history of Europe and the wider world from the Paris Peace Conference to the present.

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.

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.

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

366. ***Russia since Waterloo.*** Domestic history, with some attention to diplomacy.

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.

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

See also **Philosophy 340.**

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.

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

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

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

315. ***Language and Philosophy.*** A study of some of the classical problems of philosophy from the standpoint of modern linguistic analysis; evaluation of the adequacy of linguistic philosophy.

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.

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.

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.

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.

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.

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

POLITICAL SCIENCE

All students registering for Honors Seminars in Political Science must have completed Political Science 101 and 102 unless excused by the instructor.

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 appraisal of the problems involved in the interadaptation of traditional political systems and non-African values and institutions.

310. ***Problems of Democratic Policy Formulation.*** A study of the legislative and administrative processes as instruments of policy formulation in a democratic state. Attention will be given to the strengths and weaknesses of each and the relationships between the two. British and American experience will be used as the basis of the study.

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.

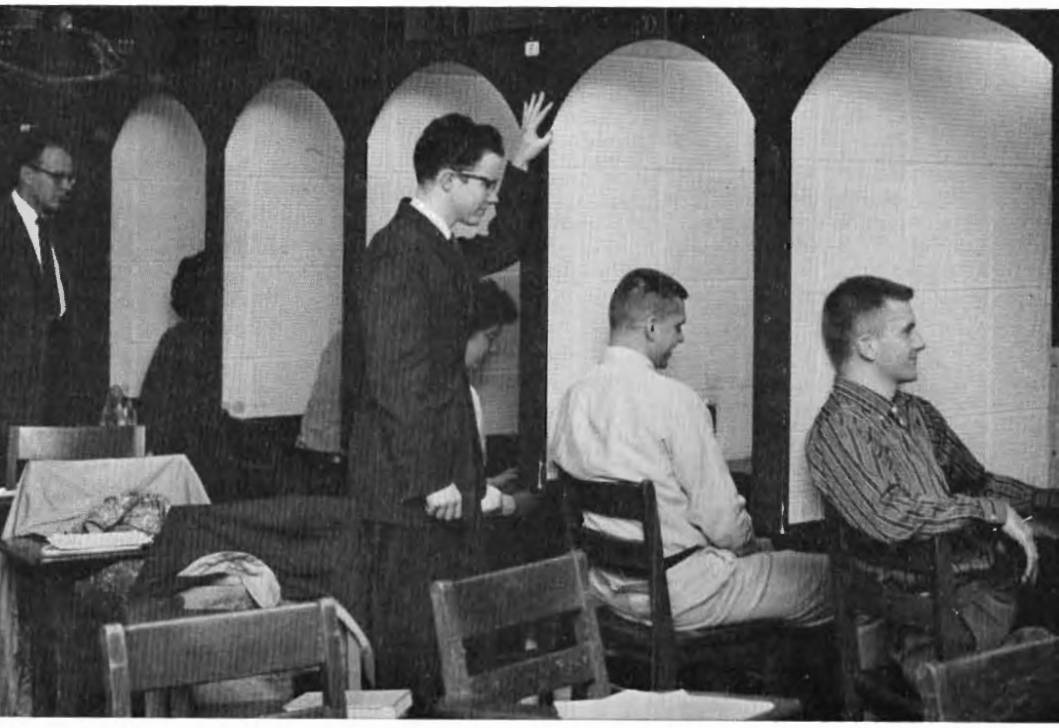
320. ***Constitutional Issues.*** A study in the growth of governmental power as deter-

mined 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.

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.

352. ***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.



Air Science

Richard V. Collins, LT. COL. (USAF) B.C.E. (R.P.I.).....Professor of Air Science and *Chairman of the Department*

W. H. Bell, CAPT. (USAF), B.S. (University of New Mexico).....Assistant Professor of Air Science
K. C. Stahl, CAPT. (USAF), B.S. (University of Kentucky).....Assistant Professor of Air Science

John D. Johanson, S/SGT. (USAF).....Instructor in Air Science
James M. Strout, T/SGT. (USAF).....Instructor in Air Science
Gust T. Tekely, T/SGT. (USAF).....Instructor in Air Science

THE AIR SCIENCE PROGRAM is divided into two parts, the basic course (freshman and sophomore years), and the advance course (junior and senior years). The physical and academic requirements for entering each course are discussed in the section on the Air Force Reserve Officers' Training Corps. All the Air Science courses listed here must be successfully completed in order to qualify for a commission in the Air Force Reserve upon graduation.

Credit is granted towards the A.B. or B.S. degrees for one to three courses in Air Science depending upon the student's academic program. If the student carries the full Air Science course, in most programs, he may in his third, fifth and sixth semesters, reduce his program of civilian courses by one. The difference in load will be made up in credited Air Science courses. A few programs which are the exception to this condition may be identified and program assistance obtained through the Department of Air Science. At specified terms, select courses within the student's program are accepted in lieu of an Air Science course. These terms and courses are:

1) First term, freshman year: a course in the social sciences or the natural sciences, or a foreign language.

2) Second term, sophomore year: a course in social sciences, natural sciences, or foreign language.

3) Senior year: Geography 208, and Political Science 251, or History 238, or History 281.

The student must complete at the proper time any departmental prerequisite requirements for the above courses.

During the first term of the freshman year and the second term of the sophomore year the cadet's work in Air Science includes only the Leadership Laboratory. During both terms of the senior year the cadet attends the Leadership Laboratory and one additional hour of Air Science each week.

81. ***Air Force Leadership Laboratory I.*** Elementary indoctrination in the manual of the airman, customs and courtesies of the service, maintenance of military manner and appearance, and the fundamentals of military drill. A freshman fall course.
One one-hour Leadership Lab a week.

82. ***Foundations of Aerospace Power.*** Introductory examination of the factors of aerospace power, major ideological conflicts, requirements for military forces in being, responsibilities of citizenship, development and traditions of the military profession, role and attributes of the professional officer in American democracy, organization of the armed forces as factors in the preservation of national security, and the United States Air Force as a major factor in free world security. The Leadership Laboratory begun in the first semester is continued. A freshman spring course.
Two lecture-recitations.
One one-hour Leadership Lab a week.

92. *Air Force Leadership Lab II.* Continuation of Air Force Leadership Laboratory I with emphasis on proficiency in instructing and directing the laboratory activities of subordinate cadets. Military organization and functions up to wing level. Military exercises in use of the command voice and conducting personal inspections. A sophomore spring course.

One one-hour Leadership Lab a week.

93. *Air Operations.* Introduction to the meteorological and navigational aspects of the air age to include temperature, pressure and humidity measurements, stability, air mass phenomena, frontal systems, weather hazards and operational problems, various chart projections, use of navigational charts and computers, and dead reckoning navigation. A senior fall course mandatory for cadets in the Flying Indoctrination Program (FIP) and optional for all other senior cadets.

Two lecture recitations.
*One one-hour Leadership Lab a week.

94. *Air Force Officer.* Acquainting the senior cadet with the opportunities available to him upon graduation for duty and training with the Air Force; preparation for active duty and the adjustment to military service; the duty assignment; and personal and professional considerations for the newly commissioned officer during his early period of service. A senior spring course.

One lecture recitation.
One one-hour Leadership Lab a week.

*Senior cadets enrolling for the Fall Leadership Lab only, register for 93 and do not receive academic instructions.

101. *Fundamentals of Aerospace Weapon Systems.* Introductory survey of aerospace missiles and craft, and their propulsion and guidance systems; target intelligence and electronic warfare; nuclear, chemical and biological warhead agents; defensive, strategic and tactical operations; problems, mechanics and military implications of space operations; and a survey of contemporary military thought. A sophomore fall course.

Two lecture-recitations.
One one-hour Leadership Lab a week.

201. *Air Force Officer Development I.* Knowledge and skills required of a junior officer in the Air Force. Includes staff organization and functions, communicating, instructing, and techniques of problem solving. A junior fall course.

Four lecture-recitations.
One one-hour Leadership Lab a week.

202. *Air Force Officer Development II.* Principles and practices of leadership. Includes basic psychology of leadership, the military justice system, and application of problem-solving techniques and leadership theory to simulated and real Air Force problems. A junior spring course.

Four lecture-recitations.
One one-hour Leadership Lab a week.

Anthropology and Sociology

Frederick G. Bailey, PH.D. (Manchester).....Visiting Professor of Anthropology[1]

Bernard S. Cohn, PH.D. (Cornell).....Associate Professor of Anthropology and *Chairman of the Department*

Robert S. Merrill, PH.D. (Chicago).....Associate Professor of Anthropology

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

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

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

James Downs, PH.D. (California).....Assistant Professor of Anthropology and East Asian Studies

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

Dean Harper, PH.D. (Columbia).....Assistant Professor of Sociology

Alfred Harris, PH.D. (Cambridge).....Assistant Professor of Anthropology

Vera P. John, PH.D. (Chicago).....Assistant Professor of Sociology

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

[1]Term I.

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

Concentrators entering the Department may (a) concentrate wholly in Anthropology or (b) if they are especially interested in Sociology, take a split concentration.

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

102. ***Introduction to Sociology.*** Elements of social organization; the nature of society; study of the social group and bureaucracy.

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.

203. ***Methods of Social Research.*** Approaches to the understanding of society and culture; community study techniques; surveys; small group research; review of methodology employed in selected research studies; formulation of research design.

205. ***The Social Organization of Industrial Society.*** Social class and social stratification; differential class behavior; sub-group organization of modern society; institutional patterns of behavior and the effect of the class structure on these institutional patterns.

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.

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.

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

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

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

216. ***Anthropological Linguistics I.*** Training in linguistic analysis as applied to the description of the sound systems of language,

with particular emphasis on the uses of such analysis in anthropological fieldwork.

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

239. ***Peoples of the Far East I.*** Survey of the tribal and peasant peoples of China, Japan, Korea, Tibet, Manchuria, Mongolia, and Sinkiang. Outline of the prehistoric and ethnohistoric background of the area. Discussion of the various traditional ways of life presented in the ethnographic present.

240. ***Peoples of the Far East II.*** Rise and spread of civilization in the Far East. Comparison of the cultural, social, and political institutions of China, Japan, Korea, and Tibet prior to the impact of the west. Discussion of the relationship between civilized and non-civilized peoples and the conflict between nomad and farmer.

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.

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.

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 legitimatization of authority.

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.

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.

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

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

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.

280. ***Problems of Bureaucracy in Modern Industrial Society.*** Social organization of large groups such as schools, factories, hospitals, governmental agencies, etc.; development and growth of bureaucracy; the impact of the bureaucratic organization on the individual; the emergence of small informal groups in large organizations; the recruitment of personnel to the organization; the socialization of personnel.

281. ***Mathematical Models in Anthropology and Sociology.*** The application of mathematics to the study of social organization, communication, decision-making, and kinship systems. An examination of measurement models, game theory, information theory and of their utility for sociology and anthropology.

283. ***Socialization and Education.*** Processes of socialization and education; socialization and education in modern industrial society will be emphasized, although some comparative studies will be examined; social class differences in socialization and educational behavior; social organization of schools.

284. ***The Impact of the Mass Media.*** Various effects of the mass media upon the individual. Theoretical models of the communica-

tion process. First-hand experience in the application of the techniques of mass media analysis. Prerequisites: Anthropology and Sociology 102 or Psychology 212.

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

Biology

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

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

Jerome Sidney Kaye, PH.D. (Columbia).....Assistant Professor of Biology
Uzi Nur, PH.D. (California).....Assistant Professor of Biology
Thomas R. Punnett, Jr., PH.D. (Illinois).....Assistant Professor of Biology

Jakov Krivshenko, D.SC. (Ukraine).....Senior Research Associate in Biology
Brian Colman, PH.D. (Aberystwyth, Wales).....Research Associate in Biology
Herman S. Forest, PH.D. (Michigan State).....Research Associate in Biology
Peter Hull, PH.D. (Edinburgh).....Research Associate in Biology
Saburo Nawa, PH.D. (Nagoya, Japan).....Research Associate in Biology
Minna B. Rotheim, PH.D. (Rochester).....Research Associate in Biology
Lotte Schwinck, PH.D. (Tübingen).....Research Associate in Biology
Charles R. Weston, PH.D. (Princeton).....Research Associate in Space Biology
Sydney Sze Yih Young, PH.D. (Sydney, Australia).....Research Associate in Biology
**Alice del Capillo Campbell,* PH.D. (Michigan).....Research Associate in Biology
**Rachel McMaster Kaye,* PH.D. (Columbia).....Research Associate in Biology

*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 and not more than eight must 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 295–296. 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. An Elective course in Third Year, Semester I, would be Biology 291, *Readings in Biology*. In Semester II of the Third Year, an Elective course would be Biology 291 or Biology 293, *Problems in Biology*. The main purpose of these courses would be to prepare the student for his research project conducted in the fourth year. He will participate in the Senior Seminar in his Fourth Year.

b. An Elective course in each semester of the Fourth Year would be Biology 293, in which the student would carry out a piece of research under the supervision of the faculty member advising him.

c. At the end of Fourth Year, the student would prepare a research paper and defend it in an oral examination before outside examiners.

d. Also at the end of the Fourth Year, the student would take a written examination, which would be read by the outside examiner.

PLAN A

FIRST YEAR

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

1. Math. 162 Analysis II
2. Biol. 122 Invertebrate Zoology
3. Chem. 124 General Inorganic
4. Foreign Language (Group I)‡
   Physical Education

‡Most students can complete their requirement 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.

SECOND YEAR

1. Phys. 101 General Physics
2. Biol. 125 Comparative Chordate Anat.
3. Biol. 131 The Plant Kingdom
4. Group I
5. Group II
   Physical Education

1. Phys. 102 General Physics
2. Chem. 142 Quantitative Analysis
3. Elective
4. Group I
5. Group II
   Physical Education

THIRD YEAR

1. Chem. 161 Organic Chemistry
2. Biol. 241 Embryology
3. Group I
4. Group II
5. Elective

1. Chem. 162 Organic Chemistry
2. Biol. 221 Genetics
3. Group I
4. Group II
5. Elective

FOURTH YEAR

1. Biol. 265 Cellular Phys. and Metabolism
2. Biol. (elective)
3. Elective
4. Elective
   Biol. 295 Senior Seminar

1. Biol. 272 Comparative Microbiology
2. Biol. (elective)
3. Elective
4. Elective
   Biol. 296 Senior Seminar

PLAN B

FIRST YEAR

1. Math. 161 Analysis I
2. Chem. 123 General Inorganic
3. Engl. 101 English Composition
4. Biol. 101 General Biology I
5. Group II
   Physical Education

1. Math. 162 Analysis II
2. Chem. 124 General Inorganic
3. Foreign Language (Group I)‡
4. Biol. 122 Invertebrate Zoology
5. Group II
   Physical Education

SECOND YEAR

1. Math. 163 Analysis III
2. Biol. 131 The Plant Kingdom
3. Group I
4. Group II
5. Chem. 142 Elem. Quant. Analysis **OR**
   Physical Education

1. Math. 164 Analysis IV
2. Biol. 221 Genetics
3. Group I
4. Group II
5. Chem. 213 Quantitative Analysis I
   Physical Education

THIRD YEAR

1. Biol. 241 Embryology
2. Chem. 161 Organic Chemistry
3. Phys. 115 Physics A
   or
   Phys. 117 Physics I
4. Elective

1. Group I
2. Chem. 162 Organic Chemistry
3. Phys. 116 Physics A
   or
   Phys. 118 Physics I
4. Elective

FOURTH YEAR

1. Biol. 265 Cellular Phys. and Metabolism
2. Phys. 125 Physics B
   or
   Phys. 127 Physics II
3. Elective in science other than biology
4. Biology Elective
   Biol. 295 Senior Seminar

1. Biology Elective
2. Phys. 126 Physics B
   or
   Phys. 128 Physics II
3. Elective in science other than biology
4. Elective
   Biol. 296 Senior Seminar

‡Most students can complete their requirement 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.

101. ***General Biology I.*** Principles unifying modern biological knowledge. Introduction to the structure and physiology of cells. Discussion of the generalized structure of animals and plants. 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.

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.

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.

Two lectures and two three-hour labs 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, as is Biology 131, or permission of the instructor.

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

213. ***Statistical Analysis in Biology.*** Elements of probability and combinatorial analysis. Principles of statistical inference and the testing of hypotheses as applied to biological problems. The design of experiments. Some acquaintance with principles of the calculus prerequisite.

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 physiological, morphogenetic and evolutionary implications. Biology 101 prerequisite.

Three lectures, one lab a week.

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 Biology 125 prerequisite.

Two lectures or conferences, 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.

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 experi-

*The lab sections of Biology 265 and Biology 272 are identical. Students taking both courses will take only one semester of lab work, either in spring or in fall.

ments 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 per 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.

272*. ***Comparative Microbiology.*** 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.

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.*

295–296. ***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.

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.

116. ***Survey of Mammalian Embryology.*** Normal embryonic development of mammals and mechanisms of development. Illustrations are drawn largely from the normal and abnormal development of man, although other species are used to illustrate the evolutionary and experimental aspects of embryology. 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.

Center for Brain Research

Erwin Roy John, PH.D. (Chicago).....Professor in the Center for Brain Research
Karl Lowy, M.D. (Vienna).....Professor in the Center for Brain Research
Robert Doty, PH.D. (Chicago).....Professor in the Center for Brain Research
Ray S. Snider, PH.D. (Washington University)....Professor in the Center for Brain Research

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

C. Andrew Hilgartner, M.D. (Johns Hopkins).....Research Associate and *Assistant Professor in the Center for Brain Research

William Hayes, PH.D. (Princeton).....Postdoctoral Fellow in Brain Research
Donald A. Overton, PH.D. (McGill).....Postdoctoral Fellow in Brain Research
Jorge Pecci-Saavedra, M.D. (Buenos Aires, Argentina)....Postdoctoral Fellow in Brain Research

Edward T. Greenstein, D.V.M.....Staff Veterinarian in the Center for Brain Research

*Part-time.

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
Dean Stanley Tarbell, PH.D. (Harvard).....Charles Frederick Houghton Professor of Chemistry
Winston Danae Walters, PH.D. (Johns Hopkins).....Professor of Chemistry
Edwin Odde Wiig, PH.D. (Wisconsin)..Professor of Chemistry and *Chairman of the Department*

William Hundley Saunders, Jr., PH.D. (Northwestern).....Associate Professor of Chemistry
David Wilson, PH.D. (California Institute of Technology).....Associate Professor of Chemistry

Robert Luis Autrey, PH.D. (Harvard).....Assistant Professor of Chemistry
Bernard Baker, PH.D. (Northwestern).....Assistant Professor of Chemistry
Marshall Blann, PH.D. (California).....Assistant Professor of Chemistry
Lawrence David Colebrook, PH.D. (Aukland).....Assistant Professor of Chemistry
Jack Kampmeier, PH.D. (Illinois).....Assistant Professor of Chemistry

Madeline Brickman, PH.D. (University College, London).....Postdoctoral Fellow in Chemistry
Edward Caress, PH.D. (Rochester).....Postdoctoral Fellow in Chemistry

Mavelil Chaco Chaco, PH.D. (Bombay).....Postdoctoral Fellow in Chemistry
Michel Jeunehomme, PH.D. (Brussels).....Postdoctoral Fellow in Chemistry
John A. Poole, PH.D. (Alberta).....Postdoctoral Fellow in Chemistry
William Rebel, PH.D. (Albany State).....Postdoctoral Fellow in Chemistry
Paul Sigal, PH.D. (California Institute of Technology).....Postdoctoral Fellow in Chemistry
**Clarence Heininger,* PH.D. (Rochester).....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

*Part-time.

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 high 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 high 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.

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, 142 and 214 or Chemistry 213, 214
C. Chemistry 161–162
D. Chemistry 251 and 252
E. Chemistry 295, 296

Chemistry 251 and 252 require as prerequisites one year of Physics, and Mathematics through differential and integral calculus with some differential equations. At least one year of Chemistry in addition to the senior seminar must be taken in the senior year. If a 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 295, 296, 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. A reading knowledge of technical German is required (German 105). 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. Engl. 101 English Composition	2. Group I
3. Math. 161 Analysis I	3. Math. 162 Analysis II
4. Phys. 115 Physics A	4. Phys. 116 Physics A
or	
Phys. 117 Physics I	Phys. 118 Physics I
Physical Education	Physical Education

SECOND YEAR

1. Chem. 161 Organic Chemistry	1. Chem. 162 Organic Chemistry
2. Foreign Language (Group I)*	2. Germ. 105 Special Technical Readings**
3. Math. 163 Analysis III	3. Math. 164 Analysis IV
4. Phys. 125 Physics B	4. Phys. 126 Physics B
or	
Phys. 127 Physics II	Phys. 128 Physics II
Physical Education	Physical Education

THIRD YEAR[1]

1. Chem. 213 Quantitative Analysis I	1. Chem. 214 Quantitative Analysis II
2. Chem. 251 Physical Chemistry	2. Chem. 252 Physical Chemistry
3. Group I	3. Elective
4. Group II	4. Group II

FOURTH YEAR[2]

1. Chem. 291 Thesis research	1. Chem. 292 Thesis research
2. Chem. 415 or 435	2. Chem. (412)[3,4]
3. Chem. (431, 451)[3,4]	3. Group II
4. Elective[5]	4. Elective[5]
5. Elective	5. Elective
Chem. 295 Senior Seminar	Chem. 296 Senior Seminar

*Most students can complete their requirement 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.

**Prerequisite: German 101 and 102 or equivalent.

[1]In the second term of the junior year, each student should select a thesis adviser and possibly the general area in which he will plan to do his thesis research. His adviser should be consulted with regard to registration for the senior year.

[2]The choice of courses required in the senior year will be determined by the department counsellor.

[3]Courses in Biology, Mathematics or Physics approved by the Department of Chemistry may be substituted.

[4]Two of these courses must be elected.

[5]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, de-

signed 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.

141. ***Qualitative Analysis.*** A study of the physico-chemical principles of aqueous solutions of electrolytes which are of importance in qualitative analysis. Semi-micro methods are used in the laboratory. Chemistry 121 or 123 and Chemistry 122 prerequisite.

Two hours, two labs a week.

142. ***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.

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.

161–162. ***Organic Chemistry.*** 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.

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. Electro-chemical, colorimetric, and other photo-metric 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 (125–126 or 127–128); Mathematics (163, 164). Students who have had only Physics 101–102 must consult the instructor.

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.

291–292. ***Laboratory Problems in Chemistry.*** Each student selects a thesis topic, the investigation of which will teach him how to attack a problem involving laboratory and library work. Chemistry 415 or 435 prerequisite for Chemistry 292.

*293–294. ***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.

295–296. ***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.

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.

*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.

*431. ***Advanced Organic Chemistry.*** An advanced study of the reactions of carbon compounds and the theories of organic chemistry.

Credit—three hours.

*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.

Credit—four hours.

*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 and radiation effects; (4) surface phenomena.

Credit—two hours.
Two hours a week.

For Industrial Chemistry and other courses in Chemical Engineering see pages 184, 185, 186.

*Taken with the consent of the instructor.

East Asian Studies Program

COMMITTEE ON EAST ASIAN STUDIES

Diran Dohanian, A.M. (Harvard).....Assistant Professor of Fine Arts
James F. Downs, PH.D. (California).....Assistant Professor of Anthropology and East Asian Studies
Robert B. Hall, Jr., PH.D. (Michigan).....Associate Professor of Geography
Harry Harootunian, PH.D. (Michigan).....Assistant Professor of History
George Kent, PH.D. (California).....Assistant Professor of Chinese
Daniel Pfiefer, M.A. (Michigan).....Assistant Professor of Japanese

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. Downs or Mr. Kent.

101. ***Introduction to East Asian Civilizations I.*** Historical introduction to the civilizations of China and Japan through a study of the rise and development of traditional, social, political, and intellectual forms to about 1600.

102. ***Introduction to East Asian Civilizations II.*** Structural analysis of the fundamental institutions of East Asian civilizations and societies. Although the course will be concerned with the social structures of China and Japan, special emphasis will be placed upon the relationship between the major cultures and surrounding areas such as Tibet, the Inner Asian frontier zone, and Korea.

110. ***Traditional Civilizations of China and Japan.*** The origins and development of the major elements in the intellectual and institutional traditions of China and Japan from the earliest times to about 1800. Special emphasis will be placed upon those cultural forces which continue to shape modern China and Japan.

203. ***Oriental Humanities.*** A selective survey of the arts, literature, and philosophies of India, China, and Japan. Intended to acquaint the student with the artistic and cultural traditions of those great oriental societies which have a rich ancient heritage and which still play a vital role in the role today.

Departmental offerings acceptable in the Program are: Anthropology 239, 291; 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
Norman Kaplan, M.A. (Chicago).....Xerox Professor of International Economics
Lionel Wilfred McKenzie, PH.D. (Princeton).....Professor of Economics and *Chairman of the Department*
Sho-Chieh Tsiang, PH.D. (London).....Professor of Economics
W. Allen Wallis, A.B. (Minnesota).....Professor of Economics and Statistics

Michio Hatanaka, PH.D. (Vanderbilt).....Associate Professor of Economics
Ronald Winthrop Jones, PH.D. (Massachusetts Institute of Technology).....Associate Professor of Economics

Richard N. Rosett, PH.D. (Yale).....Associate Professor of Economics
Edward Zabel, PH.D. (Princeton).....Associate Professor of Economics

Stanley Engerman, PH.D. (Johns Hopkins).....Visiting Assistant Professor of Economics
Robert Fogel, A.M. (Columbia).....Assistant Professor of Economics
Harry Grubert, B.A. (Manitoba).....Assistant Professor of Economics
Rudolph Penner, B.COMM. (Toronto).....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 is prerequisite 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, which normally will 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 and Sociology, Business Administration, Geography, History, Mathematics, Philosophy, Political Science, and Psychology.

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.

225. ***Economic Development.*** Part I: problems of underdeveloped areas and the strategy of development. This involves an examination of the stimulants to economic change and growth, and the conditions and prerequisites for industrialization. Part II: contemporary development theories surveyed and appraised against the background of factors discussed in Part I. Prerequisite: Economics 207 or the permission of the instructor.

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. Considerable use is made of price theory and modern growth theory.

231. ***Economic Statistics.*** Basic ideas and methods of descriptive statistics and statistical inference. Sampling distributions, statistical tests, estimation of parameters, regression, and time series.

245. ***Government and Business.*** Examines the role of government in the American economy. Particular attention is given to recent legislation and judicial decisions.

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.

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.

293. ***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.
Credit—three hours.

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.
Credit—three hours.

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.
Credit—three hours.

English

Wilbur Dwight Dunkel, PH.D. (Chicago).....Rosewell S. Burrows Professor of English
George H. Ford, PH.D. (Yale).....Professor of English and *Chairman of the Department*
Joseph Frank, PH.D. (Harvard).....Professor of English
George S. Fraser, M.A. (St. Andrews).....Visiting Professor of English
William Henry Gilman, PH.D. (Yale).....Professor of English

Cyrus Hoy, PH.D. (Virginia).....Professor of English[1]
Alun Jones, B.LITT. (Oxford).....Visiting Professor of English[2]
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

McCrea Hazlett, PH.D. (Chicago).....Associate Professor of English
Robert Benedict Hinman, PH.D. (Johns Hopkins).....Associate Professor of English
Howard Horsford, PH.D. (Princeton).....Associate Professor of English and *Acting Chairman of the Department*
James William Johnson, PH.D. (Vanderbilt).....Associate Professor of English
Ralph James Kaufmann, PH.D. (Princeton).....Associate Professor of English

Harvey D. Goldstein, PH.D. (Northwestern).....Assistant Professor of English
Richard M. Gollin, PH.D. (Minnesota).....Assistant Professor of English
David Hadas, PH.D. (Columbia).....Assistant Professor of English
Bruce Johnson, PH.D. (Northwestern).....Assistant Professor of English
John Nabholz, PH.D. (Chicago).....Assistant Professor of English
Lisa Rauschenbusch, A.M. (Cornell).....Assistant Professor of English and Adviser for Student Play Productions

Kenneth Cameron, M.F.A. (Carnegie Tech).....Instructor in English and Adviser for Student Play Productions
Stanley J. Kahrl, PH.D. (Harvard).....Instructor in English
William Kinsley, B.A. (Toronto).....Instructor in English
Russell A. Peck, PH.D. (Indiana).....Instructor in English
Richard C. Vitzthum, M.A.T. (Harvard).....Instructor in English
**Marcia D. Landy,* PH.D. (Rochester).....Instructor in English

George Chester Curtiss, A.M. (Harvard)....Professor Emeritus of Rhetoric and English Literature
John Rothwell Slater, PH.D. (Chicago).....Professor Emeritus of English

[1]Arriving September 1964.
[2]Term I, 1963–64.
*Part-time.

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.

English 101 or its equivalent is required of all students seeking a bachelor's degree on the River Campus. Since it is primarily a course in composition it does not alone fulfill the prerequisites for advanced work in English literature. Students who wish to take advanced courses in English, but who do not plan to concentrate in it, are required to complete any two of English 103, 104, 105 before registering for higher level courses. Students who expect to concentrate in English are urged to select English 103 and 105 to satisfy these requirements. They are also strongly advised to take The History of England and Greater Britain (History 221, 222), preferably in the sophomore year.

Courses numbered from 201–249 are customarily open to juniors and seniors, and to qualified sophomores. Courses numbered from 250–299 are customarily open to seniors, and to qualified juniors; in some instances the approval of the instructor may be required. The following courses do not count towards a concentration in English: 115, 116, 117, 123, 132, 133. The following count as allied fields: 103, 217, 230, 231, 232, 236, 237, 264.

A program of concentration will include six to eight courses in English and American literature at the advanced level, and two to four courses in allied fields. This program of courses must include English 222 (Shakespeare) and one course in each of the following groups: medieval or renaissance literature (English 219, 220, 223, 270, or 273), seventeenth or eighteenth century literature (English 224, 225, 274, or 275), nineteenth

century literature (English 226, 227, or 276). In addition to this core of required courses concentrators have an opportunity to take courses in earlier or later periods of English literature as well as in the drama, the novel, or American literature in accord with their individual interests. English 105 (in the form offered from September, 1963) may be substituted for *one* of the required courses in literature before 1800. Students who elect this option are still required to take at least six 200-level courses in English and American literature.

The two to four courses in the allied fields are to 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, or the courses offered by the English Department in areas outside English and American literature.

Students majoring in the Honors Program are required to take English 304 or 222 or 272 and at least one honors seminar in literature before 1800 or one of the following: 219, 220, 223, 224, 225, 270, 273, 274, 275.

101. ***English Composition.*** Introduction to expository and argumentative writing through critical analysis, and evaluation of various types of literature. The student will write approximately ten essays during the semester, including one two thousand word research paper. Required of all freshmen except those exempted by the department on the basis of previous school record and exceptionally high standing in placement tests.

103. ***Continental Masterpieces.*** English 103, 104 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.

104. ***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. Prerequisite: English 103.

105. ***Survey of English Literature.*** An historical survey of English literature from the beginnings to the Restoration. Open to all students. Especially recommended for students planning to concentrate in English or to enter the Honors Program in English.

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 juniors and seniors with grades of B or better in English 101, 102 or 103 or 104 or 105. Sophomores by special arrangement with the instructor. For admission to this course, written permission of the instructor is needed. English 115 is required for all students who are preparing to teach English in secondary schools.

116. ***Creative Writing.*** Short story and poetry 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 cannot be substituted for English 115 in order to satisfy requirements for teaching English in secondary schools.

117. ***Playwriting.*** A workshop in the techniques of dramatic composition. Students will write plays and analyze the dramaturgy of established playwrights. Prerequisite: English 116 or permission of instructor.

123. ***Speech.*** A "fundamentals course," designed especially to clarify the principles underlying sound and effectual speaking of all sorts, in all circumstances. Supervised practice in, for example, group discussion, individual speeches, and especially the oral interpretation of literature. Each section is limited to 15 students.

132. ***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.

133. ***History of the Theatre.*** A survey of the conditions and techniques of dramatic presentation from ancient times to the present.

195. ***Preceptorial: The Poetic Response.*** Readings of some important English and American poets of the past 150 years to illustrate their responses to changes which

have occurred in traditional concepts of religion, politics, and philosophy.

201. ***A Survey of American Literature from Colonial Times to 1865.*** Does not carry graduate credit.

202. ***A Survey of American Literature from 1865 to the Present.*** Does not carry graduate credit.

208. ***The Nineteenth Century American Novel.***

209. ***The American Novel Since 1890.***

210. ***The Modern English Novel.*** The novel from the late nineteenth century to the present, emphasizing such novelists as Conrad, Joyce, and Lawrence.

211. ***Modern British and American Poetry.*** An introduction to representative twentieth-century poetry.

214. ***English Drama.*** History and development of English drama from its medieval beginnings to Oscar Wilde.

215. ***Modern Drama.*** Great modern dramas from Ibsen to Eliot as reflectors of the main currents in modern thought and feeling.

216. ***The English Novel.*** The novel from the beginnings to the late 19th century, emphasizing such major novelists as Defoe, Fielding, Austen, and Dickens.

217. ***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.

218. ***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.

219. ***The Old English Epic.*** The structure of Old English heroic poetry, with emphasis on *Beowulf*. Prerequisite: English 218.

220. ***Medieval Literature.*** Major medieval writers: Langland, the Pearl poet, and—especially—Chaucer.

221. ***Middle English Language and Literature.*** A comprehensive survey of the language and literature in various English dialects from the twelfth through the fifteenth centuries.

222. ***Shakespeare.*** An introductory study of Shakespeare's major plays. Required of all students concentrating in English.

223. ***Renaissance Literature.*** 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.

224. ***Seventeenth-Century Literature.*** Leading poets and prose writers from Donne and Bacon through Milton.

225. ***Restoration and Eighteenth-Century Literature.*** Poetry and prose between 1660 and 1798.

226. ***Romantic Literature.*** Major writers, other than novelists, of the early part of the nineteenth century, with particular emphasis on poets from Blake through Keats.

227. ***Victorian Literature.*** Major Victorian poets from Browning through Hardy and prose writers, other than novelists, from Carlyle through Pater.

230. ***The Concept of the Comic Spirit.*** The concepts of the comic spirit in great literature from the classics to the present.

231. ***The Concept of the Tragic Spirit.*** The concepts of the tragic spirit in great literature from the classics to the present.

232. ***The Greek and Roman Classics in Translation.*** With special emphasis on their humanistic influence on later literature.

236. ***Literary Criticism.*** A survey of the major critics from Aristotle to Coleridge.

237. ***Literary Criticism in a Changing Culture.*** Interaction between literary criticism and society from the Romantic era to the present. Enrollment limited.

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. ***Studies in Nineteenth-Century American Literature.***

251. ***Studies in Twentieth-Century American Literature.***

260. ***Studies in Modern Literature.***

261. ***Studies in the Novel.***

262. ***Studies in Literary Criticism.***

263. *Special Studies in Literature.*

264. *Studies in the History of the English Language.* The interrelations of English structure, lexicon, and style. A close study of selected literary texts.

270. *Studies in Medieval Literature.*

272. *Studies in Shakespeare.*

273. *Studies in Renaissance Literature.*

274. *Studies in Seventeenth-Century Literature.*

275. *Studies in Restoration and Eighteenth-Century Literature.*

276. *Studies in Nineteenth-Century Literature.*

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 Suhr, PH.D. (Johns Hopkins).....Professor of Classical Art and Archeology

Diran K. Dohanian, A.M. (Harvard).....Assistant Professor of Fine Arts
Robert Janson-La Palme, M.F.A. (Princeton).....Assistant Professor of Fine Arts
Archibald Miller, M.F.A. (Cranbrook).....Assistant Professor of Fine Arts
**Kurt K. Feuerherm,* M.F.A. (Cranbrook).....Assistant Professor of Fine Arts
**John Conway Menihan,* B.S. (Pennsylvania).....Assistant Professor of Fine Arts

*Part-time.

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. The aesthetic and expressionistic aspects of the visual arts are stressed, as well as their historical development. 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 se-

quence and interpreted with regard to form and content.

109. ***Representation and Design with Studio Practice.*** Lectures on the theory of design and on the modes of drawing and painting, supplemented by actual practice in drawing and painting, including a systematic study of color relations. Analysis of different methods of artistic expression. Designed primarily for freshmen. No previous art training necessary.

Two labs of two hours and one lecture a week.

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 free choice of projects in wood, stone, ceramics, and plaster. Some lectures and papers. No previous experience required. The class is 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. Development of natural ability, often present but not recognized, is encouraged. 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 in art is not prerequisite. Registration is limited to sixteen 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 master-works of painting and sculpture. Selected works of art are analyzed in detail and interpreted with reference to the aesthetic ideals of the civilization which produced them. This course is intended as an introduction to the great tradition 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. Slides and photographs are used in the classroom for illustration. No graduate credit.

Two hours a week.

201. ***The Art of Early Civilizations.*** Review of 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 illustrated lectures are designed to throw light on the religion, traditions, society, and cultural values of ancient peoples as expressed in their art forms.

Three hours a week.

202. ***Greek and Roman Art.*** Review of the painting, sculpture, and architecture of ancient Greece and Rome. The illustrated 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.

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.*** Aims to develop a knowledge of the theory and problems of Renaissance architectural design and to trace the development of architecture in Europe from the beginning of the Renaissance to the end of the eighteenth century.

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.

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 manifesta-

tions in Japan and Indonesia. Factors of art style as well as those of iconographical and iconological character are considered.

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 end of the 15th. Fine Arts 102 normally prerequisite.

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. Fine Arts 102 normally prerequisite.

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. Fine Arts 102 or 231 normally prerequisite.

239. ***Northern European Painting.*** A survey of the development of painting in Europe, excluding Italy, from about 1400 to 1800. The work of Bruegel, Rubens, Rembrandt, Velasquez, and Poussin receives special emphasis. Fine Arts 102 normally prerequisite.

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. Emphasis is placed on outstanding artistic personalities such as David, Delacroix, Goya, Daumier, Manet, Renoir, Degas, Monet, and Seurat. 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. Cezanne, Gauguin, Vincent van Gogh, Munch, Matisse, and Picasso receive special emphasis. Fine Arts 102 prerequisite.

245. ***American Architecture.*** Colonial, Early Republican, eclectic, and modern styles of American architecture from the seventeenth century to the present, with reference to the historical and cultural background which explains their character. Special attention is given to the English colonial tradition, to the spirit of nationalism underlying the architecture of the Early Republic, and to the 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.*** A continuation of Fine Arts 113–114 with further development of the principles of drawing and painting. The course includes a study of the fundamentals of color and composition and experiments with such materials as tempera, casein, watercolor, and oil paint; attention is given to supports, grounds, and pigments, including the new plastic paints and mediums. The course is based on a progressive series of advanced studies which stress independent research and individual development. Demonstrations, special assignments, and field trips to museums are an integral part of the course. Prerequisite: Fine Arts 113–114 or previous creative work.

Two supervised periods of three hours and one period of independent work.

290. ***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.

Oriental Humanities. See East Asian Studies 203.

Foreign and Comparative Literature

Jules Brody, PH.D. (Columbia) ..... Professor of French and *Chairman of the Department*
Norman O. Brown, PH.D. (Wisconsin) ..... Professor of Classics and Comparative Literature
Howard Graham Harvey, PH.D. (Harvard) ..... Professor of French
Bernard N. Schilling, PH.D. (Yale) ..... Trevor Professor of English and Comparative Literature
Virgil W. Topazio, PH.D. (Columbia) ..... Professor of French
Kurt Weinberg, PH.D. (Yale) ..... Professor of Foreign Literature

Eduardo Betoret-Paris, PH.D. (Kansas) ..... Associate Professor of Spanish
Wilhelm Braun, PH.D. (Toronto) ..... Associate Professor of German
William H. Clark, Jr., PH.D. (Columbia) ..... Associate Professor of German
Nathan Rosen, PH.D. (Columbia) ..... Associate Professor of Russian

George W. Kent, PH.D. (California) ..... Assistant Professor of Chinese
Maurice Z. Shroder, PH.D. (Harvard) ..... Assistant Professor of French

John K. Donaldson, Jr., M.A. (Middlebury) ..... Instructor in French
Alfred Geier, PH.D. (Johns Hopkins) ..... Instructor in Classics
Neil M. Larkin, PH.D. (Johns Hopkins) ..... Instructor in French

L. Alfreda Hill, PH.D. (Johns Hopkins) ..... Professor Emeritus of French
Robert Alexander MacLean, PH.D. (Chicago) ..... Professor Emeritus of Classics
Virginia Moscrip, PH.D. (Chicago) ..... Professor Emeritus of Classics

THE DEPARTMENT OF FOREIGN AND COMPARATIVE LITERATURE offers work in Classics, French, German, Spanish, and Russian leading to the A.B. and A.M degrees.

For a concentration in any of the modern literatures, the 121, 131, and 132 courses are normally required. A concentration usually consists of ten courses: six to eight in the foreign literature, and the rest in allied fields (e.g., Fine Arts, Languages and Linguistics, English and the other literatures, History, and Philosophy). Concentrators in French must take the Senior Seminar.

Concentrators in all foreign literatures must show proficiency in a second foreign language through the 103 level, or its equivalent.

In the belief that the exchange of students with other countries contributes to international understanding as well as to the enrichment of the individual, the Department advocates the Junior Year Abroad for qualified students in the foreign literatures.

THEMES OF CRITICISM

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.

191. ***Preceptorial: Introduction to the Study of Literary Traditions.*** A major Indian text will be examined in relation to the entire civilization; emphasis on sources, structure, literary context, and subsequent influence.

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.

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.*** Reading and analysis of selected essays in the *ku wen* style by such writers as Han Yu, Liu Tsung-yuan, and Ouyang Hsiu. Prerequisite: Chinese 251.

262. ***Poetry of the T'ang and Sung.*** Reading and appreciation of 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.

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.

GREEK AND LATIN

NOTE: It is recommended that students preparing to teach Latin in secondary schools study two years of Greek.

Advanced courses other than those listed below may occasionally be offered by members of the Department to suit individual needs.

GREEK

103. *Introduction to Greek Literature I.* Plato's *Meno* and Sophocles' *Oedipus Rex.*

104. *Introduction to Greek Literature II.* Euripides' *Bacchae* and Aristophanes' *Clouds.*

251. *Classical Civilization I.* A survey of the civilizations of Greece and Rome in the fields of literature, philosophy, history, science, politics, and art. A knowledge of Greek and Latin is not requisite: translations are used. Designed for all students who are interested either in the study of origins or in the Greek and Roman elements in our own civilization. Greece is studied.

252. *Classical Civilization II.* A continuation of 251 with emphasis on Rome.

LATIN

103. *Introduction to Latin Literature.* Selections from Virgil and Horace.

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.

CLASSICS IN TRANSLATION

251. *Classics of the Graeco-Roman Tradition.* Readings in epic, dramatic, historical, and philosophical writing. *See also* Honors Seminar 358: *Studies in the Epic Tradition.*

EUROPEAN LITERATURE IN TRANSLATION

141. *Survey of Russian Literature I.* From the beginnings to Pushkin and Lermontov.

142. *Survey of Russian Literature II.* Emphasis is placed on Gogal, Turgenev, Dostoevsky, Tolstoy, Chekhov.

230. *The Concept of the Comic Spirit.* The concepts of the comic spirit in great literature from the classics to the present.

231. *The Concept of the Tragic Spirit.* The concepts of the tragic spirit in great literature from the classics to the present.

233. *Dostoevsky.* Representative early works and all the major novels. (Russian concentrators will be assigned selections in the original language.)

285. *Modern European Novel and Drama from 1850–1900.* Flaubert, Zola, Tolstoy, Dostoevsky, Ibsen, Strindberg, Hauptmann.

286. *Modern European Novel and Drama since 1900.* Chekhov, Gide, Mauriac, Satre, Camus, Pirandello, Silone, Garcia Lorca, Mann.

See also Russian Literature 131 and 132.

FRENCH

131. *Introduction to Modern Literature.* Critical reading of representative 19th and 20th century poetry and fiction; practice in the *explication de texte* method.

132. *Masterpieces of Literature to 1800.* Survey of chief literary movements and forms from the late Middle Ages through the Enlightenment.

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.*

228. *French Poetry from Romanticism to Symbolism. Explication de texte* of lyric poetry and the short epic: Lamartine, Hugo, Vigny, Nerval, Baudelaire, Rimbaud, Mallarmé.

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.

250. *French Classical Tragedy.* Detailed analysis of the chief plays of Corneille and Racine; frequent reference to Greek theory and practice.

281. *Giraudoux and Sartre.* Close study of two representatives of the theater of ideas.

291. *French Reading Course.* Study of special literary problems under the direction of a member of the departmental staff.

295. ***Senior Seminar.*** Colloquim on literary masterpieces from the Middle Ages to the present. Required of French concentrators; open to others by permission of instructor.

GERMAN

131. ***Introduction to Modern German Literature.*** Close reading and analysis of representative works of poetry and fiction of the 19th and 20th centuries.

132. ***Masterpieces of German Literature to 1832.*** An introduction to selected works of German literature as seen in their historical and stylistic context.

265. ***Eighteenth Century Literature I.*** Development of German literature from 1720 to 1785, with emphasis on Lessing and the young Goethe.

266. ***Eighteenth Century Literature II.*** Works of Goethe and Schiller from 1785 to 1805, in the "Classical" period of German literature.

269. ***Goethe.*** *Faust* and other late prose and verse.

275. ***Nineteenth Century Drama and Poetry.*** Major dramatists of the period: Kleist, Grillparzer, Hebbel. Introduction to representative poets.

276. ***Nineteenth Century Prose.*** Selected works by Keller, Stifter, Raabe, and Fontane.

285. ***Modern German Drama and Poetry.*** Readings in Hauptmann, Hofmannsthal, Brecht, and Rilke.

286. ***Modern German Prose.*** The major prose writers since 1880: Mann, Kafka, Hesse.

291. ***Senior Reading Course.*** For concentrators. The character and scope of these courses are determined by needs and interests of individual students. By permission only.
Credit to be arranged.

INDIAN

201. ***Philosophy and Religion of Classical India.*** An introduction to the various systems of thought and ethics.

285. ***Literature of Classical India.*** Emphasis on the secular philosophies of logic, aesthetics, grammar; social and political theory; belles lettres; interrelation of these topics in the light of the various systems of Indian thought. Readings in English. Prerequisite: Sanskirt 201, or consent of instructor.

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.

RUSSIAN

NOTE: Other courses in Russian literature are given under the heading EUROPEAN LITERATURE IN TRANSLATION.

131. ***Introduction to Russian Literature.*** To develop fluency and accuracy in translating fairly difficult prose of the modern period. Texts will be chosen from Russian history and literature. Prerequisite: two years of Russian or consent of instructor.

132. ***Introduction to Russian Literature: Textual Analysis.*** Analysis of the language and style of the major Russian writers. Prerequisite: two years of Russian or consent of instructor.

SPANISH

131. ***Survey of Hispanic Literature I.*** Representative poetry, novels, and plays from the beginnings to the present day.

132. ***Survey of Spanish-American Literature.*** Development of the literature of the Spanish-speaking countries of America.

255. ***Spanish Golden Age Prose.*** A critical study of the picaresque novel, the *Quijote* and other works of Cervantes, Quevedo, etc.

256. ***Spanish Golden Age Drama and Poetry.*** A critical study of the theater of the Spanish Golden Age, from Lope de Vega to Calderon, and the poetry of the same period.

275. ***Nineteenth Century Prose.*** Romanticism, Realism and Naturalism in Spain, with special reference to the *costumbrismo* movement and its significance.

276. ***Nineteenth Century Spanish Drama and Poetry.*** A critical study of the Spanish theater and poetry of the 19th century, from Moratin to Benavente.

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.

285. *Twentieth Century Spanish Novel and Essay.* The Generation of '98, the introspective essay, and the Spanish 20th century novel to the present.

286. *Twentieth Century Spanish Drama and Poetry.* A critical study of the Spanish drama and poetry, from Benavente to the present.

291. *Senior Reading Course.* Studies in special literary problems under the direction of a member of the staff.

General Science

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. This 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 (Psychology 101, 201, 220, 251–252, 253, 255, 256, 260, 293, 297). 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.

The student should consult with his adviser concerning the requirement of a comprehensive examination or substitute therefor.

Geology and Geography

John Edward Hoffmeister, PH.D. (Johns Hopkins).....Professor of Geology

Robert Burnett Hall, Jr., PH.D. (Michigan).....Associate Professor of Geography

Lawrence William Lundgren, Jr., PH.D. (Yale).....Associate Professor of Geology and *Acting Chairman of the Department*

Robert George Sutton, PH.D. (Johns Hopkins).....Associate Professor of Geology

William Akers Bassett, PH.D. (Columbia).....Assistant Professor of Geology

Zeddie Paul Bowen, PH.D. (Harvard).....Assistant Professor of Geology

Alan Gibson Macpherson, M.A. (Edinburgh).....Assistant Professor of Geography

Taro Takahashi, PH.D. (Columbia).....Assistant Professor of Geology

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

A.B. Program

Students concentrating in geology are expected to become well grounded in the fundamentals of chemistry, physics, and mathematics.

A program of concentration for the A.B will consist of from six to eight courses in geology beyond Geology 101 and 102. In this group four courses are required: Geology 121, 124, 235, and 246.

The remaining courses to make up the number of ten required for the concentration should be in one of the following related fields: mathematics, chemistry, physics, and biology. All such courses must be beyond the introductory level.

B.S. Program

A synopsis of the courses required in the B.S. program, term by term, follows:

FIRST YEAR

1. Geol. 101 Introductory Geology	1. Geol. 102 Introductory Geology
2. Engl. 101 English Composition	2. Foreign Language (Group I)*
3. Chem. 121 General Chemistry	3. Chem. 122 General Chemistry
or	
Chem. 123 Inorganic Chemistry	Chem. 124 Qualitative Analysis
4. Math. 161 Analysis I	4. Math. 162 Analysis II
Physical Education	Physical Education

SECOND YEAR

1. Geol. 121 Introductory Paleontology	1. Geol. 124 Introductory Mineralogy
2. Biol. 101 General Biology I	2. Group I
3. Math. 163 Analysis III	3. Group II
4. Group I	4. Elective
Physical Education	Physical Education

THIRD YEAR

1. Geol. 227 Intermediate Mineralogy	1. Chem. 142 Elementary Quant. Analysis
2. Geol. 235 Stratigraphy	2. Geol. 246 Structural Geology
3. Elective	3. Elective
4. Phys. 115 Physics A	4. Phys. 116 Physics A
or	
Phys. 117 Physics I	Phys. 118 Physics I

FOURTH YEAR

1. Geol. 252 Regional Geology	1. Geol. 274 Advanced Paleontology
2. Geol. 241 Introductory Petrology	2. Geol. 248 Geochemistry
	or
3. Adv. Elective (Chem., Biol., Phys., Math.)	3. Adv. Elec. (Chem., Biol., Phys., Math.)
4. Group II	4. Group II
5. Elective	5. Elective

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

NOTE: Equivalent of two courses in field camp the summer after the junior year.

101. ***Introductory Physical Geology.*** The earth; its origin, topography, composition, and structure. The common rocks and rock-making minerals are examined in the laboratory and field. The geologic agents and processes which have produced the present land forms and structural features are stressed.
Two lectures, one recitation, 1 lab a week.

102. ***Introductory Historical Geology.*** Major developments in the history of the earth from its origin to the present as interpreted from the geologic records. In addition to the physical changes which have occurred, the development of life as revealed by the fossils preserved in the rocks receives attention.
Two lectures, one recitation, 1 lab a week.

121. ***Introductory 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.
Two lectures, one lab a week.

124. ***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. ***Intermediate Mineralogy.*** The optical properties, crystallography, and atomic structure of minerals. The laboratory is devoted to solving crystallographic problems and to the measurement of optical properties of minerals with the polarizing microscope. Analytic geometry, Chemistry 121, 124 and Physics 115–116 or 117–118 prerequisite.
Two lectures, one lab a week.

231. ***Economic Geology I.*** The geology of petroleum and natural gas.

232. ***Economic Geology II.*** The geology of metalliferous ore deposits: fundamental principles of ore deposition combined with a study of specific mining districts. Geology 227 prerequisite.
Two lectures, one lab a week.

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.

241. ***Introductory Petrology.*** Discussions of the occurrence and classification of igneous and metamorphic rocks and an introduction to the study of these rocks as chemical systems. Laboratory work consists of a study of rocks in thin section. Geology 227 prerequisite.
Two lectures, one lab a week.

246. ***Structural Geology.*** The attitude of rocks in the earth's crust. The classification and origin of folds, faults, joints, and related features are discussed and shown in laboratory experiments. The geometric solution of structure problems is carried on in the winter months and the recognition and interpretation of structures are emphasized in the field.
Two lectures, one lab a week.

248. ***Geochemistry.*** Introductory survey designed to present a review of the contributions of chemistry, physics, and the other sciences to our understanding of the evolution of the earth. Topics include: the internal constitution of the earth, the relationship between the chemistry of the earth and the planets, measurement of geologic time and temperature, and isotope geology. The latter half of the course includes discussions of the principles of the geochemical separation of the elements and the processes by which the separation is effected. Chemistry 121, 122 or 123, 124 and Physics 115–116 or 117–118 prerequisite.

249. ***Introductory Physical Geochemistry.*** An introductory survey of applications of physical chemistry to earth science. Elementary thermodynamics, theories of solutions, chemistry of surfaces, and chemical kinetics will be discussed.

252. ***Regional Geology.*** Study of geologically strategic regions in the United States. In addition, the course emphasizes the interrelationships of the geological sciences as applied to regional studies. Geology 235 and 246 prerequisite.
Two lectures, one lab a week.

274. ***Advanced Paleontology.*** A detailed study of the several invertebrate groups most important to the geologist. Stress will be placed on origin, evolution, and comparison with recent organisms. Field trips.
Two lectures, one lab a week.

295. ***Senior Reading Course.***
Credit to be arranged.

GEOGRAPHY

A program of concentration in geography consists of six to eight courses beyond Geography 101 and 102. 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 geography should consult the departmental adviser concerning the selection of courses.

101. ***World Regional and Political Geography.*** A broad survey of the major areas and nations of the world with emphasis on man's adaptation to his environment.

102. ***World Physical Geography.*** A survey of the major world areas in terms of the distribution of land forms, climate, vegetation, and other physical features. Elements of maps and map making will be discussed.

203. ***Geomorphology.*** The characteristics and evolution of landforms, including such topics as the cycle of erosion, classification of landforms and type-terrain, slope evolution, denudation chronology under different climatic regimes, and problems of regional geomorphology.

Three lectures, one lab a week.

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.

220. ***Cartography.*** A course in the basic principles of map-making and map-interpretation, including work with aerial photographs and elementary field mapping.

250. ***Geography of the U.S.S.R.*** A geographical study of the Soviet Union with emphasis on the development of agriculture and industry in relation to the physical environment and natural resources.

252. ***Geography of South America.*** An introduction to the most recent developments in South America with emphasis on economic features and population problems as they occur in their natural environment.

253. ***Geography of Europe.*** Physical and cultural geography of the continent of Europe.

258. ***Geography of North America.*** Physical, cultural, and economic aspects of the geography of the United States and Mexico.

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.

295. ***Senior Reading Course.***

Credit to be arranged.

History

Marvin B. Becker, PH.D. (Pennsylvania) ..... Professor of History[1]
Willson Havelock Coates, PH.D. (Cornell) ..... Professor of History
Arthur James May, PH.D. (Pennsylvania) ..... Professor of History
A. William Salomone, PH.D. (Pennsylvania) ..... Professor of History
Mason Wade, M.A. (McGill) LL.D. (New Brunswick) ..... Professor of History and Director of Canadian Studies
Bernard A. Weisberger, PH.D. (Chicago) ..... Professor of History

Loren Baritz, PH.D. (Wisconsin) ..... Associate Professor of History
Milton Berman, PH.D. (Harvard) ..... Associate Professor of History
John Barrett Christopher, PH.D. (Harvard) ..... Associate Professor of History
Sidney Monas, PH.D. (Harvard) ..... Associate Professor of History
Hayden V. White, PH.D. (Michigan) ..... Associate Professor of History and *Chairman of the Department*

Harry Harootunian, PH.D. (Michigan) ..... Assistant Professor of History
Dean A. Miller, PH.D. (Rutgers) ..... Assistant Professor of History
Edward L. Towle, M.A. (George Washington) ..... Assistant Professor of History

Christopher Lindley, A.B. (Cornell) ..... Instructor in History

Dexter Perkins, PH.D. (Harvard) ..... Professor Emeritus of History
Glyndon Garlock Van Deusen, PH.D. (Columbia) ..... Professor Emeritus of History

[1]Beginning September, 1964.

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.

History 101–102 is prerequisite to all other courses in history. Exceptions to this regulation may be made by the departmental counselor.

A program of concentration for the A.B. degree will normally consist of six to eight courses in History beyond History 101–102. 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.

For Honors Seminars in History see page 88.

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.

211. ***Hellenic Civilization.*** A study of the main lines of Greek development from Minoan times to the end of the Peloponnesian Wars.

212. ***Hellenistic Civilization.*** A study of the ancient world from the early fourth to the first century B.C.

213. ***Roman Civilization.*** A study of Roman culture and society from the foundation of

the city of Rome to the foundation of Constantinople.

214. ***Byzantine Empire.*** History of Byzantium from 330 to 1453, including a consideration of the Islamic world and the early medieval Slavonic states.

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.

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.

219. ***The Northern Renaissance and the Reformation.*** A study of the cultural history of Northern Europe from the fourteenth to the late sixteenth century.

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.

222. ***The History of England and Greater Britain II.*** A historical survey of the development of British civilization since 1685, including the development of the Empire and Commonwealth, with the emphasis on England.

223. ***The History of Canada, 1000–1867.*** A general course in Canadian history from the age of discovery until Confederation. Canadian developments are related to those in the United States, Great Britain, and France. Emphasis is given to the French regime and the evolution of responsible government under British rule.

224. ***The History of Canada, 1867–1963.*** A general course in Canadian history from the beginnings of the Dominion until the present. Canadian developments are related to those in the United States, Great Britain and France. Emphasis is given to the rise of national feeling and to relations with the United States.

226. ***Economic History of the St. Lawrence and Great Lakes Region.*** An historical approach to the study of the economic relations between Canada and the United States.

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.

231. ***The History of the United States I.*** A general history of the United States from colonial times to the Civil War.

232. ***The History of the United States II.*** A general history of the United States from the Civil War to the present.

233. ***Exploration and Settlement of North America.*** **(1400–1800)** An examination of European expansion into the New World with special emphasis on the imperial struggle for the continent, upon the influence of geography and sea power, and upon the emergence of American institutions and cultures.

234. ***The Colonial Mind.*** An analysis of the dominant patterns of thought in colonial America, with emphasis on theology, philosophy, and social theory.

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.

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.

240. ***The History of the American West.*** A survey of the expansion of the American West from the Revolution to the early 20th Century.

241. ***American Economic History I.*** An advanced course covering the principal events

in the economic life of the United States from the Colonial period to the Civil War.

242. *American Economic History II.* An advanced course covering the principal events in the economic life of the United States from the Civil War to the present.

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.

246. *American Intellectual History II.* The American mind from the Civil War to the present.

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.

248. *The American Historiographical Tradition.* A study of the development of American historiography from the early 19th Century to the present.

249. *Nineteenth Century American Diplomatic History.* A survey of the foreign policy of the United States to 1890.

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.

252. *The Age of Revolution, 1789–1870.* Special attention is given to the era of the French Revolution and Napolean 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.

255. *Europe 1871–1914.* The development of Europe from the Franco-German War to the First World War.

256. *Europe 1914 to Present.* An intensive study of Europe since 1914.

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.

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.

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

261. *History of China and Southeast Asia Since 1800.* Economic, political, social, diplomatic, and intellectual developments from about the beginning of the nineteenth century to the present. Special emphasis will be devoted to China's response to the West and the resulting tensions.

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.

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.

265. *A History of Russia I.* History of Russia from the earliest times to 1861. 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 1861 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.

281. *Totalitarianism.* The background and development of totalitarian movements in the twentieth century, with special emphasis on Soviet Russia and Nazi Germany.

292. *Intellectual History of Modern Europe.* A reading course in the history of western thought from ca. 1300 to the present. The course meets in small discussion sections once a week. Students not concentrating in history will be admitted to this course only by special permission of the instructors.

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

Antanas Klimas, PH.D. (Pennsylvania) ..... Associate Professor of German

William A. Coates, PH.D. (Harvard) ..... Assistant Professor of Linguistics
Edwin Gerow, PH.D. (Chicago) ..... Assistant Professor of Sanskrit
Dean H. Obrecht, PH.D. (Pennsylvania) ..... Assistant Professor of Linguistics
Daniel Pfeiffer, M.A. (Michigan) ..... Assistant Professor of Japanese
Donald G. Reiff, PH.D. (Michigan) ..... Assistant Professor of Linguistics

Vladimir Butkoff, M.A. (Syracuse) ..... Instructor in Russian
Robert Maples, M.A. (Yale) ..... Instructor in French
****Demitrius Moutsos,*** M.A. (Chicago) ..... Instructor in German
****Caroline Wood,*** B.A. (Tsing Hua) ..... Instructor in Chinese

*Part-time.

THE DEPARTMENT OF LANGUAGES AND LINGUISTICS offers courses in Chinese, French, German, Greek, Japanese, Latin, Russian, Sanskrit and Spanish at the undergraduate level, with concentration for the A.B. in French, German, Russian and Spanish, and for the M.A. in French, German, General Linguistics, and Spanish, and for the Ph.D. in General Linguistics. Work for the A.B. is offered in cooperation with the Department of Foreign and Comparative Literature.

The Department of Languages and Linguistics also offers several undergraduate courses in linguistics, both descriptive and historical, as a basis for more intensive work at the graduate level.

For the A.B. in French, German, Russian or Spanish, a student's program of concentration will consist of six to eight courses beyond the 103 level. After consulting the departmental adviser for the language in question, the student will plan a program with emphasis on language or on literature but including in any case the Survey of Literature course and at least one course in composition or in historical linguistics. Additional related courses bring the total to ten.

The Department of Languages and Linguistics encourages the Junior Year Abroad for qualified students of French, German and Spanish and the sponsored summer tours to Soviet Russia.

Language laboratories, conducted both electronically and *viva voce* by native assistants, offer special opportunities for oral-aural training at several levels, and laboratory exercises constitute an integral part of the language and linguistics courses.

CHINESE

201. ***Elementary Chinese I.*** Introduction to the study of modern Chinese and its basic vocabulary. Exercises in pronunciation and the use of logographic script. No graduate credit.

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. 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 201, 202 and 203, or equivalent. No graduate credit.

FRENCH

101. ***Elementary French I.*** An introductory study of the structure of the French Language and its basic vocabulary. Reading of selected graded texts.
Three hours and one lab a week.

102. *Elementary French II.* A continuation of French 101.

103. *Intermediate French.* Important trends in the development of the civilization of France as reflected in representative works of French literature. Prerequisite: French 101 and 102 or equivalent.
Three hours and one lab a week.

121. *Composition and Conversation.* A practical course in both oral and written composition. Analysis and application of acceptable usage.

122. *Advanced French Composition and Conversation.* Practical application of a command of accepted usage in modern French. Analysis and discussion of areas of special difficulty for those whose native language is English. Open to juniors and seniors acceptable to the instructor, whose written permission is necessary for admission to the course. Prerequisite: French 121.

211. *The Linguistic Structure of French.* Objective analysis of the phonemic, syntactical and semantic features of present-day French. Dialectal variations.

235. *History of the French Language.* Formation, development and present state of French as one of the Romance Languages. Examination of Old French texts.

237. *Romance Philology.* Comparative study of the development of the principal Romance Languages from their Latin origins. A study of writings in Old French, Provençal, Italian, Spanish, and Portuguese.

241. *Practicum in French.* Investigation of special linguistic problems.

GERMAN

101. *Elementary German I.* Introductory study of the structure of the German language and its basic vocabulary. Reading of selected graded texts.
Three hours, one lab a week.

102. *Elementary German II.* Continuation of German 101.

103. *Intermediate German.* Important trends in the development of German civilization as reflected in representative works of German literature. Prerequisite: German 101 and 102 or equivalent.
Three hours, one lab a week.

105. *Readings in Scholarly and Technical German Prose.* Controlled readings in technical prose as a preparation for specialized use of the language. Prerequisite: German 101 and 102 or equivalent.

121. *German Composition and Conversation.* A practical course in both oral and written composition. Analysis and application of acceptable usage.

122. *Advanced German Composition and Conversation.* Practical application of a command of accepted usage in modern German. Analysis and discussion of areas of special difficulty for those whose native language is English. Open to juniors and seniors acceptable to the instructor, whose written permission is necessary for admission to the course. Prerequisite: German 121.

211. *Syntactic Structure of German.* Objective analysis of the phonemic, syntactical and semantic features of present-day German. Dialectal variations in German language areas of Europe.

235. *History of the German Language to 1500.* Formation, development and present state of German as one of the Germanic Languages. Examination of old German texts.

236. *History of the German Language from 1500.* A continuation of German 235.

241. *Practicum in German.* Investigation of special linguistic problems.

GREEK

101. *Elementary Greek I.* Easy selections from Greek authors will be read in class.

102. *Elementary Greek II.* A continuation of Greek 101.

JAPANESE

201. *Elementary Japanese I.* Introductory study of the grammar of modern Japanese with reading of simple texts and practice with tapes. No graduate credit.

202. *Elementary Japanese II.* A 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.* An introductory study of the structure of the Latin language and its basic vocabulary. Reading of selected graded texts.

102. *Elementary Latin II.* A continuation of Latin 101.

SANSKRIT

201. *Introduction to Sanskrit I.* Introduction to the classical language, its basic

grammatical structure, syllabic writing, relation to other Indo-European languages. Simple texts will be read in transliterated form and the acquisition of vocabulary stressed. No graduate credit.

202. ***Introduction to Sanskrit II.*** A continuation of Sanskrit 201. No graduate credit.

SPANISH

101. ***Elementary Spanish I.*** Introductory study of the structure of the Spanish language and its basic vocabulary. Reading of selected graded texts.
Three hours, one lab a week.

102. ***Elementary Spanish II.*** Continuation of Spanish 101.

103. ***Intermediate Spanish.*** Important trends in the development of the civilization of Spain and Hispanic America as reflected in representative works of Hispanic literature. Prerequisite: Spanish 101 and 102 or equivalent.
Three hours, one lab a week.

121. ***Spanish Composition and Conversation I.*** A practical course in both oral and written composition. Analysis and application of acceptable usage.

122. ***Advanced Spanish Composition and Conversation.*** Practical application of a command of accepted usage in modern Spanish. Analysis and discussion of areas of special difficulty for those whose native language is English. Open to juniors and seniors acceptable to the instructor, whose written permission is necessary for admission to the course. Prerequisite: Spanish 121.

211. ***The Linguistic Structure of Spanish.*** Objective analysis of the phonemic, syntactical and semantic features of present-day Spanish. Dialectal variations of Spain and Hispanic America.

235. ***History of the Spanish Language.*** Formation, development and present state of Spanish as one of the Romance Languages.

237. ***Romance Philology.*** Comparative study of the development of the principal Romance Languages from their Latin origins. A study of writings in Old French, Provençal, Italian, Spanish, and Portuguese.

241. ***Practicum in Spanish.*** Investigation of special linguistic problems.

RUSSIAN

101. ***Elementary Russian.*** Introductory study of the structure of Russian and its basic vocabulary. Exercises in pronunciation and intonation. Reading of graded texts.
Three hours, one lab a week.

102. ***Elementary Russian II.*** A continuation of Russian 101.

103. ***Intermediate Russian.*** Important trends in the development of the civilization of Russia as reflected in representative works of Russian literature. Prerequisite: Russian 101 and 102 or equivalent.

121. ***Russian Composition and Conversation.*** A practical course in both oral and written composition. Analysis and application of acceptable usage.

122. ***Advanced Russian Composition and Conversation.*** Practical applications of a command of accepted usage in modern Russian. Analysis and discussion of areas of special difficulty for those whose native language is English. Open to juniors and seniors acceptable to the instructor, whose written permission is necessary for admission to the course. Prerequisite: Russian 121.

211. ***The Linguistic Structure of Russian.*** Objective analysis of the phonemic, syntactical and semantic features of present-day Russian. Dialectal variations.

235. ***History of the Russian Language.*** Formation, development and present state of Russian as one of the Slavic languages. Examination of old Russian texts.

241. ***Practicum in Russian.*** Investigation of special linguistic problems.

LINGUISTICS

204. ***Applied Linguistics for Language Teachers.*** Introduction to principles of linguistic analysis which may be effectively applied in second-language teaching. Prerequisite: fulfillment of the foreign language requirement.

205. ***Introduction to Linguistics.*** Principles of structural analysis of speech phenomena, both synchronic and diachronic. Examination of material from English, French, German, Italian, Spanish and less familiar languages. Prerequisite: fulfillment of the foreign language requirement.

206. ***Articulatory Phonetics.*** An introduction to the science of phonetics. Historical perspectives of descriptive, developmental and comparative phonetics. Physiological bases of speech production and perception. Analysis and classification of speech sounds in isolation and in context.

207. ***Experimental and 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 205 or permission of instructor.

209. ***Informant Work.*** Intensive practice in the transcription and analysis of an unknown language from speech. A native informant will be provided. Elements of phonological, morphological and syntactical analysis and presentation. Prerequisite: Linguistics 205.

210. ***Introduction to Historical Linguistics.*** A diachronic study of the phases and processes of linguistic change: phonological, grammatical and semantic.

236. ***Transpyrenean Dialects.*** Language and dialect changes in the area of the Pyrenees.

241. ***Practicum in Linguistics.*** Investigation of special linguistics problems.

Mathematics

William Frederick Eberlein, PH.D. (Harvard).....Professor of Mathematics
Leonard Gillman, PH.D. (Columbia).....Professor of Mathematics and *Chairman of the Department*
Richard Edward Johnson, PH.D. (Wisconsin).....Professor of Mathematics
Johannes Henricus Bernardus Kemperman, PH.D. (Amsterdam).....Professor of Mathematics
Leopoldo Nachbin, PH.D. (Brazil).....Visiting 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 Gustav Gunderson, PH.D. (Cornell)....Associate Professor of Mathematics and Education
Ralph Alexis Raimi, PH.D. (Michigan).....Associate Professor of Mathematics

William Wistar Comfort, PH.D. (Washington).....Assistant Professor of Mathematics
John Arthur Ernest, PH.D. (Illinois).....Assistant Professor of Mathematics
Govind Shrikrishna Mudholkar, PH.D. (North Carolina).....Assistant Professor of Statistics
Kenneth Allen Ross, PH.D. (Washington).....Assistant Professor of Mathematics
Charles Edward Watts, PH.D. (California).....Assistant Professor of Mathematics
James Juei-Chin Yeh, PH.D. (Minnesota).....Assistant Professor of Mathematics

Sanford Leonard Segal, PH.D. (Colorado).....Instructor in Mathematics

Arthur S. Gale, PH.D. (Yale).....Professor Emeritus of Mathematics
Charles William Watkeys, A.M. (Harvard).....Professor Emeritus of Mathematics

THE DEPARTMENT OF MATHEMATICS offers the A.B., A.B. with Special Merit, 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 required in mathematics numbered 200 or higher; the rest are nonintroductory electives in biology, chemistry, economics, philosophy, physics, or psychology.

The A.B. requires Mathematics 237 and 265. The A.B. with Special Merit requires at least two mathematics courses numbered 400 or higher.

There is considerable flexibility in mathematics electives. All students planning graduate work are urged to take Mathematics 266 and 275 and at least one mathematics course numbered 400 or higher; these students should also study two of the languages: French, German, Russian. Students planning a career in industry are advised to take Mathematics 200, 210, 266, 280, and 467. Those planning to teach in the secondary schools should consider Mathematics 200, 210, 230, and 250.

For non-majors, a recommended one-semester elective is Mathematics 100. A second, independent elective is Mathematics 150 or, for those planning further work, Mathematics 161.

100. ***Finite Mathematics.*** Logic and the algebra of sets; partitions; combinatorial probability; vectors and matrices; linear programming and the theory of games.

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; 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 numbers; central limit theorem; Markov chains. Prerequisite: Math. 163.

210. ***Statistical Inference.*** Sample space; estimation; testing of hypotheses. Prerequisite: Math. 163.

220. ***Mathematical Logic.*** Propositional calculus, functional calculus of first and higher order, the decision problem, consistency, completeness.

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.

237. ***Introduction to Abstract Algebra.*** Fundamental algebraic structure; rings, fields, polynomial domains, groups, vector spaces, modules.

250. ***Higher Geometry.*** Foundations of geometry; isometry, similarity, inversions; introduction to affine, projective, and various non-Euclidean geometries.

265. ***Functions of a Real Variable.*** Real number system; uniform continuity; mean value theorems; bounded variation; Riemann-Stieltjes integral; sequences of functions. Prerequisite: Math. 163.

266. ***Advanced Analysis.*** Differentials; implicit functions, functional dependence; transformations of multiple integrals; arc length, surface area; differential forms, vector analysis. Prerequisite: Math. 265 or 174.

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 or 174.

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.

290. ***Reading.*** Special work, arranged individually. Consent of the department required.

297. ***Seminar.*** Topics to be selected. Consent of the department required.

299. ***Senior Thesis.*** A paper based upon independent study.

440. ***General Topology.*** Continuity. Compactness, connectedness, metrizability. Product spaces. Prerequisite: Math. 265.

467. ***Functions of a Complex Variable.*** Cauchy theorems, Taylor and Laurent series, residues, conformal mapping, entire and meromorphic functions. Prerequisite: Math. 265 or 174.

Music

COLLEGE OF ARTS AND SCIENCE

**Ward Woodbury*, PH.D. (Rochester) ..... Associate Professor of Music

EASTMAN SCHOOL OF MUSIC

Charles W. Fox, PH.D. (Cornell) ..... Professor of Musicology
Verne Thompson, PH.D. (Rochester) ..... Professor of Music Literature

Elvera Wonderlich, M.M. (Rochester) ..... Associate Professor of Theory

Thomas Canning, M.M. (Rochester) ..... Assistant Professor of Theory
William Cerny, M.M. (Yale) ..... Assistant Professor of the Humanities
Louis Mennini, PH.D. (Rochester) ..... Assistant Professor of Composition
Robert V. Sutton, PH.D. (Rochester) ..... Assistant Professor of Theory

*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 Appreciation 101, 103, 104, 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. 101 English	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. Special emphasis is given to the study of the characteristics of the orchestral instruments and to the orchestra as a medium of musical performance during the past 200 years.

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, 102. ***First-Year Theory.*** Melodic, harmonic, and rhythmic elements of music. First semester: four types of triads; intervals, keys, scales, cadences, notation, rhythmic reading, sight-singing, melodic dictation, and harmonic dictation. New material in the second semester: dominant and supertonic seventh chords, modal scales, key relationships, modulations, transposition, four-part writing, and two-part counterpoint.

Four hours a week.

Theory 111, 112. ***Second-Year Theory.*** 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 choral harmonizations, chorale preludes, a two-part invention, recitatives, piano accompaniments for folk songs, and three-part and four-part vocal arrangements. Prerequisite: Theory 101, 102. Required of music majors; open to other majors with the permission of the instructor.

Four hours a week.

Theory 131, 132. ***Contemporary Styles.*** First semester: a technical analysis of the late eighteenth and nineteenth century composers with written assignments in the styles under consideration. Second semester: styles of twentieth century American and European composers.

Counterpoint 101, 102. ***Modal Counterpoint.*** Modal counterpoint of the sixteenth century; the motet and the Mass. Writing in three, four, and five voices. Prerequisite: Theory 112.

Orchestration 201, 202. ***Fundamentals.*** Instruments of the orchestra; practical scoring for individual choirs, chamber and full orchestra. Prerequisite: Theory 112.

Two hours a week.

History 101, 102. ***Historical Survey.*** A general consideration of Western civilization from antiquity to the present with special emphasis upon the development of Western musical forms and styles.

Music Literature 211, 212. ***Piano Literature.*** Analysis and performance of keyboard music from the pre-piano period to the present; special attention to the piano sonata and other characteristic forms. Primarily for students majoring in piano, composition, or the history of music.

Two hours a week.

Ensemble 101. ***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.

Naval Science

William H. Game, CAPT. (USN), M.S. (Massachusetts Institute of Technology)....
....Professor of Naval Science and *Chairman of the Department*

Joseph T. Hock, LTJG. (USNR), A.G. (St. John's College).....Assistant Professor of Naval Science
William J. Marker, LTJG. (USN), A.B. (Cornell).....Assistant Professor of Naval Science
Victor Ohanesian, MAJ., (USMC), M.A. (George Washington)..Assistant Professor of Naval Science
Raymond A. Pettigrew, LT. COMDR. (USN), B.S. (Holy Cross)..Assistant Professor of Naval Science

Kenneth M. Browning, FTC (USN).....Instructor in Naval Science
William L. Estes, QMC, (USN).....Instructor in Naval Science
Richard J. Gallagher, GYSGT. (USMC).....Instructor in Naval Science
John J. Gribbin, Jr., GMGl (USN).....Instructor in Naval Science
Robert W. Leftwich, SKC (USN).....Instructor in Naval Science
Ralph E. Smith, YNC (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 English 101, or its equivalent.

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 naviga-

tion, polar operations and operational meteorology.

Three lecture-recitations.
One two-hour practical instruction period a week.

231. ***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.

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.

235. ***Naval Auxiliary Machinery, Nuclear Power and Ship Stability.*** Open only to juniors majoring in engineering. Designed to apply the principles of engineering to the main propulsion plants of naval vessels. Nuclear power. Ship stability and buoyancy as they apply to damage control.

One lecture-recitation.
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. ***Naval Justice and Leadership.*** The principles and techniques of leadership. The administration of naval justice.

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*

Murray Jerome Stolnitz, PH.D. (Harvard).....Professor of Philosophy

Colin Murray Turbayne, PH.D. (Pennsylvania).....Professor of Philosophy

James Welton Cornman, PH.D. (Brown).....Assistant Professor of Philosophy

Robert Lawrence Holmes, PH.D. (Michigan).....Assistant Professor of Philosophy

Keith Lehrer, PH.D. (Brown).....Assistant Professor of Philosophy

John Powers Stewart, M.S. (Pennsylvania).....Assistant Professor of Philosophy

Alfred Harrison Jones, PH.D. (Cornell).....Professor Emeritus of Philosophy

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, 211, 242, and 244. 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 and two to four seminars in other fields.

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.*** An investigation of arguments and common fallacies with the purpose of establishing a criterion for distinguishing between valid and invalid arguments. Classical logic will be covered as a special case of modern logic. Special attention will be paid to the handling of material in ordinary language.

108. ***Philosophy of Mind.*** A critical examination of the metaphysical problem of the nature of mind, including such topics as: the relation of mind and body, the will and human freedom, the problem of perception, the problem of other minds, and problems connected with the nature and existence of God and with the belief in immortality.

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.

216. ***Formal Logic.*** A formal presentation of logic and a discussion of axiomatic systems. Applications of logic to philosophy and mathematics. Prerequisite: Philosophy 107 or a background in mathematics.

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.

237. ***Social and Political Philosophy.*** An enquiry into the nature of human society and its institutions with special stress on the role of the state. What is political allegiance and how is it related to moral and legal obligation and to economic interests? Distinction between fact and value in social and political discussion and the idea of a philosophical justification of particular forms of government.

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.

244. ***The Philosophy of Criticism.*** Examination of the meaning of value judgments in the arts; whether and by what means such judgments can be confirmed; the problems of "good taste". Analysis of the validity and scope of the principles employed in criticism of the arts, including literature. Readings in critical texts and application to specific works of art.

252. ***Philosophy of Science.*** An examination of scientific definitions and postulates, the functions and structure of theories, the nature of causal and statistical explanation, and the role of mathematics in science. Special emphasis placed on actual scientific systems in both the physical sciences and the social sciences.

Mathematical Logic. (See Mathematics 220)

282. ***The Organization of Knowledge.*** An historical and philosophical study of the basic presuppositions underlying the natural and social sciences, the humanities, and religion; their bearing upon each other, and their implications for man's conception of himself and of his place in the world.

Chinese Philosophy. (See Chinese 285. The Growth of Chinese Thought)

Indian Philosophy. (See Indian Literature 285. Literature of Classical India.)

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

Louis A. Alexander, A.M. (Columbia).....Professor of Physical Education and *Chairman of the Department*
Paul E. Bitgood, M.ED. (Springfield).....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

Clarence Aikey, M.S. (Ithaca).....Assistant Professor of Physical Education
David Ocorr, M.A. (Columbia).....Assistant Professor of Physical Education
Everett J. Phillips, B.S. (Springfield).....Assistant Professor of Physical Education

William Boomer, M.ED (Rochester).....Instructor in 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 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.

11. ***Physical Education I.*** Required of all freshmen. Instruction is provided in swimming, tennis, handball, basketball, softball, track, volleyball, soccer, tumbling, apparatus, squash 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 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).....Assistant Professor of Physical Education

Joan Bates, M.A. (Sarah Lawrence).....Instructor in Physical Education
Sylvia Kerns, A.B. (DePauw).....Instructor in Physical Education
Jessie Disston Mason, (Bouve Boston School).....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. Each girl buys a regulation costume and provides her own tennis racquet. Other equipment is furnished. The activities are taught for a period of eight weeks during four seasons: Fall, Winter, Winter II, and Spring. Activities are offered from the following: American Red Cross Life Saving, archery, badminton, basketball, body conditioning, diving, 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.*** Each girl is expected to enroll for one season of instruction in a sport if it was not elected during her freshman year.

No credit.

24. ***Physical Education II.*** A continuation of 22.

No credit.

Physics and Astronomy

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).....Professor of Physics
Harry W. Fulbright, PH.D. (Washington).....Professor of Physics
Harry E. Gove, PH.D. (Massachusetts Institute of Technology).....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 *Associate Dean of the College of Arts and Science*
Robert E. Marshak, PH.D. (Cornell).....Professor of Physics
and *Chairman of the Department*
John H. Tinlot, PH.D. (Massachusetts Institute of Technology).....Professor of Physics
Emil Wolf, PH.D. (Edinburgh).....Professor of Physics

W. Parker Alford, PH.D. (Princeton).....Associate Professor of Physics
Theodore G. Castner, PH.D. (Illinois).....Associate Professor of Physics
Everett M. Hafner, PH.D. (Rochester).....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
Malcolm P. Savedoff, PH.D. (Princeton).....Associate Professor of Astronomy
E. C. G. Sudarshan, PH.D. (Rochester).....Associate Professor of Physics

Susumu Okubo, PH.D. (Rochester).....Senior Research Associate

Olexa-Myron Bilaniuk, PH.D. (Michigan).....Assistant Professor of Physics
J. G. M. Duthie, PH.D. (Bristol).....Assistant Professor of Physics
M. Emery Nordberg, (PH.D.) (California Institute of Technology)..Assistant Professor of Physics
Ronald D. Parks, PH.D. (Stanford).....Assistant Professor of Physics
Donald C. Schmalberger, PH.D. (Indiana).....Assistant Professor of Astronomy
Edward H. Thorndike, PH.D. (Harvard).....Assistant Professor of Physics
Alan J. Macfarlane, PH.D. (London).....Visiting Assistant Professor of Physics

Neville W. Reay, PH.D. (Minnesota).....Instructor in Physics
James W. Ryan, PH.D. (California).....Instructor in Physics

Hadi H. Aly, PH.D. (Bristol).....Research Associate in Physics
Douglas Cline, PH.D. (Manchester).....Research Associate in Physics
Peter G. Dawber, PH.D. (Oxford).....Research Associate in Physics
Vijay K. Deshpande, PH.D. (Rochester).....Research Associate in Physics
Kazuo Gotow, PH.D. (Rochester).....Research Associate in Physics
Carl Richard Hagan, PH.D. (Massachusetts Institute of Technology).....Research Associate in Physics
Kenneth Kinsey, PH.D. (Rochester).....Research Associate in Physics and *Assistant Professor
Daniel Koltun, PH.D. (Princeton).....Research Associate in Physics and *Assistant Professor
Frederick Lobkowicz, PH.D. (Edg. Tech. Hochschule Zurich)....
....Research Associate in Physics and *Assistant Professor
David Lurie, PH.D. (Brussels).....Research Associate in Physics and *Assistant Professor
Richard M. Spector, PH.D. (Oxford).....Research Associate in Physics
Taiji Yamanouchi, PH.D. (Rochester).....Research Associate in Physics
A. H. Zimerman, LIC (Sao Paulo, Brazil).....Research Associate in Physics

*Part-time.

Arthur K. Hamann, E.E. (Munich).....Technical Associate in Physics
Roman A. Hawrylak, DIPLOM-INGENIEUR (Munich).....Technical Associate in Physics
William Stinson, DIPLOMA (Oswego).....Technical Associate in Physics

Richard W. Mortenson, B. OF. M.E. (Clarkson).....Assistant Chairman

James E. Eden, B.S. (Muhlenberg).....Assistant to the Chairmen

Herbert R. Childs, A.B. (Rochester).....Associate Professor Emeritus of Physics

THE DEPARTMENT OF PHYSICS AND ASTRONOMY offers programs leading to the A.B, B.S., A.M., M.S., and Ph.D. degrees in the fields of physics and astrophysics. The following description refers particularly to the A.B. and B.S. programs in physics; the corresponding astrophysics programs are described on page 139. The A.B. and B.S. degrees provide adequate preparation for most graduate schools but a student holding the A.B. degree may, in some cases, require further preparation.

A student entering a physics program must have high standing in secondary school courses in science and mathematics. In particular he should have begun a study of calculus or be prepared to begin it in his first college term. Enrollment in a physics program is contingent upon the approval of the Chairman of the Department or his representative.

The introductory work in physics normally taken by a degree candidate consists of the two-year sequence Physics 117–118, 127–128. In exceptional cases, a student who is unprepared for this sequence may be permitted to replace it entirely or in part with Physics 115–116, 125–126. He can then expect to encounter more than average difficulty in the advanced courses. Upon entering the College, students are screened by the Department in order to assign each one to the appropriate course sequence. An effort is made to scrutinize the progress of all students in these courses, and to facilitate early transfers from one to the other when such a move is evidently in the interest of the student concerned.

The following courses taught by the Department are normally not counted toward a physics concentration: Physics 101–102 and Physics 203.

A.B. Program

Aside from the introductory sequence (Physics 117–118, 127–128), 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. Students normally elect mathematics for most of this requirement, but certain courses in chemistry, astronomy, and engineering can also be approved.

All candidates for the A.B. in physics must take a comprehensive examination in the senior year.

B.S. Program

A typical synopsis of courses leading to the degree B.S. in Physics is given below. The program is not entirely inflexible, and the Department permits certain substitutions to be made. The distribution among the several groups of study cannot, however, be very different from that of the typical program. The Department does not operate an honors program but it encourages B.S. students to take advantage of research opportunities by enrolling in Physics 293, 294 during the senior year. Under the direction of a staff member, a student can use this course to replace all or part of the requirement normally fulfilled in the Senior Laboratory.

FIRST YEAR

1. Physics 117 Physics I
2. Math. 161 Analysis I
3. Engl. 101 English Comp.
4. Group III*
   Physical Education

1. Physics 118 Physics I
2. Math. 162 Analysis II
3. Group I
4. Group III*
   Physical Education

SECOND YEAR

1. Physics 127 Physics II
2. Math. 163 Analysis II
3. Foreign Language (Group I)**
4. Group II
   Physical Education

1. Physics 128 Physics II
2. Math. 164 Analysis IV
3. Group I
4. Group II
   Physical Education

THIRD YEAR

1. Physics 235 Theor. Phys. IA
2. Physics 237 Mod. Phys. IA
3. Math. (Adv. Calculus)
4. EE 221
5. Elective

1. Physics 236 Theor. Physics IB
2. Physics 238 Mod. Physics IB
3. Math. (Adv. Calculus)
4. Group II
5. Elective

FOURTH YEAR

1. Physics 245 Theor. Phys. IIA
2. Physics 247 Mod. Phys. IIA
3. Physics 243 Senior Lab. I
4. Elective
5. Elective

1. Physics 246 Theor. Phys. IIB
2. Physics 248 Mod. Phys. IIB
3. Physics 244 Senior Lab. II
4. Elective
5. Elective

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*To be chosen from elementary Astronomy, Biology, Chemistry or Geology.

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 also available.

**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.

ASTROPHYSICS

The description of programs in physics on page 138 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. Physics 203 is allowed as a course within the concentration. 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 295 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 117 Physics I	1. Physics 118 Physics I
2. Math. 161 Analysis I	2. Math. 162 Analysis II
3. Astronomy 111*	3. Astronomy 112*
4. English 101 English Comp.	4. Group I
Physical Education	Physical Education

SECOND YEAR

1. Physics 127 Physics II	1. Physics 128 Physics II
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. (Adv. Calculus)	3. Math. (Adv. Calculus)
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

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*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.

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 A.*** The first year of a two year sequence. A rigorous introductory course covering topics in mechanics, wave motion, kinetic theory, and thermodynamics. Mathematics 161, 162 to be taken concurrently.
Three lectures, one recitation a week.
Laboratory in alternate weeks.

117–118. ***Physics I.*** The first year of a two year sequence intended primarily for Physics concentrators, covering more intensively the same content as 115–116. Mathematics 161, 162 to be taken concurrently.
Three lectures, one recitation a week.
Laboratory in alternate weeks.

125–126. ***Physics B.*** 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.
Three lectures, one recitation a week.
Laboratory in alternate weeks.

127–128. ***Physics II.*** A continuation of Physics 117–118 covering more intensively the same content as 125–126. Mathematics 163, 164 to be taken concurrently. Satisfactory performance in Physics 115–116 or 117–118 prerequisite.
Three lectures, one recitation a week.
Laboratory in alternate weeks.

162. ***Physical Optics I.*** (See Optics 162)

203. ***Introduction to Modern Physics.*** A first course in quantum theory, intended to serve as an introduction to the theory and a brief treatment of some of its applica-

tions to the phenomena of atomic and nuclear physics. Prerequisites: a course in elementary physics, and courses in calculus and differential equations.

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. Prerequisite: 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 electricity 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 and the development of the Maxwell stress tensor. The interactions of currents and the study of magnetic materials and boundary value problems is followed by a discussion of Maxwell's equations, the concepts of energy, force and momentum in the electromagnetic field, the development of the field equations and their consequences. Physics 235, 236, Advanced Calculus prerequisite.

246. ***Theoretical Physics IIB. Electromagnetic Fields and Waves.*** A continuation of Physics 245. A discussion of electromagnetic fields in conducting media, the generation of electromagnetic waves and a thorough discussion of optical phenomena both from the point of view of field theory and from the geometrical optical point of view developed as a limiting case of the field theory. 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 II.*** (See Optics 261)

262. ***Physical Optics III.*** (See Optics 262)

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

111–112. ***Elementary Astronomy.*** Primarily a descriptive 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.

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. Prerequisites: 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

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

Richard Francis Fenno, PH.D. (Harvard) ..... Associate Professor of Political Science

William Theodore Bluhm, PH.D. (Chicago) ..... Assistant Professor of Political Science

S. Peter Regenstreif, PH.D. (Cornell) ..... Assistant Professor of Political Science and Canadian Studies

Arthur Goldberg, A.B. (Connecticut) ..... Instructor in Political Science

Gerald H. Kramer, B.S. (Massachusetts Institute of Technology) ... Instructor in Political Science

Dale Allen Neuman, A.B. (Kenyon College) ..... Instructor in 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 prerequisites to all other courses in Political Science; however, exceptions to this rule may be made by the department.

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, C, and D. Honors students concentrating in Political Science are required to enroll in course 298.

The remaining three courses to make up ten in the concentration will be chosen from among advanced course offerings in one of the following related fields: Anthro-

pology, Economics, Geography, History, Philosophy, and Psychology. A student interested in a related field not here listed should consult the departmental 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.

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 characteristics of international politics. Prerequisite: Political Science 251.

258. ***Federalism.*** A comparative study of the constitutional form and administrative devices of the main examples of federal government.

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. Prerequisite: 259.

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.

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.

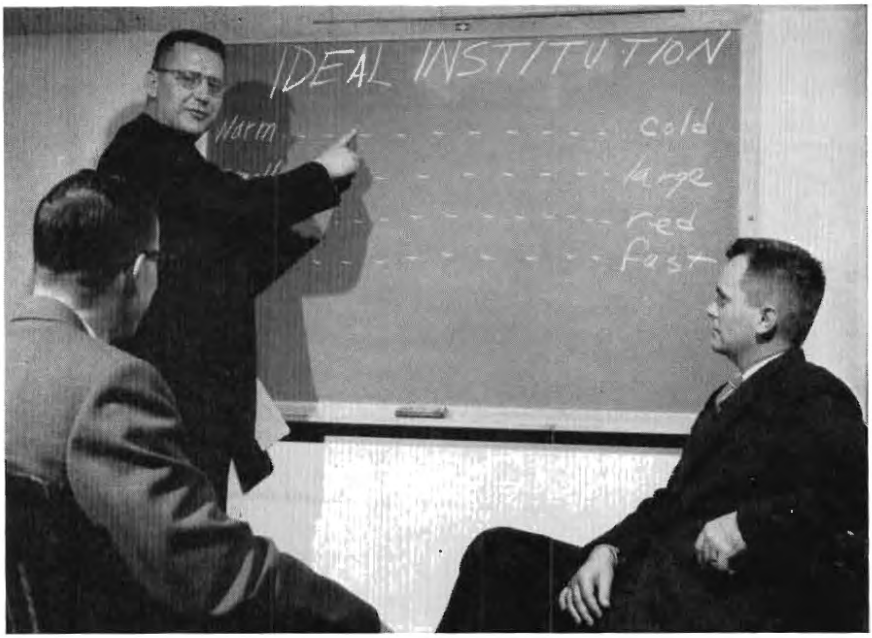
286. ***Modern Political Ideologies.*** A comparative study of important ideological currents in the age of nation-state, and their relationship to political events; constitutionalism, liberalism, conservatism, anarchism, socialism, communism, traditional authoritarianism, fascism, nationalism, corporatism.

289. ***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.

Group D. Methodology

295. ***Senior Reading Course.*** By arrangement with the department to permit work beyond regular course offerings.

298. ***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 and open only to Political Science concentrators and graduate students in Political Science.



Psychology

Robert Merrill Boynton, PH.D. (Brown) ..... Professor of Psychology
Kenneth Edwin Clark, PH.D. (Ohio State) ..... Professor of Psychology
Emory Leland Cowen, PH.D. (Syracuse) ..... Professor of Psychology
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

Burton G. Andreas, PH.D. (Iowa) ..... Associate Professor of Psychology
John Hurley Flavell, PH.D. (Clark) ..... Associate Professor of Psychology
Russel Frank Green, PH.D. (Southern California) ..... Associate Professor of Psychology
Erwin Roy John, PH.D. (Chicago) ..... *Associate Professor of Psychology and Professor in the Center for Brain Research
Melvin Zax, PH.D. (Tennessee) ..... Associate Professor of Psychology

Jay Steven Efran, M.S. (City College of New York) ..... Assistant Professor of Psychology
Marvin R. Goldfried, PH.D. (Buffalo) ..... Assistant Professor of Psychology
James Ison, PH.D. (Michigan) ..... Assistant Professor of Psychology
Joel F. Lubar, B.S. (Chicago) ..... Assistant Professor of Psychology
Robert C. Radtke, M.A. (Iowa) ..... Assistant Professor of Psychology
Edward E. Ware, PH.D. (Illinois) ..... Assistant Professor of Psychology

*Part-time.

*Alex Braiman, M.D. (New York State) ..... Clinical Associate in Psychology
*Daniel Cecil Broida, PH.D. (Syracuse) ..... Clinical Associate in Psychology
*Willard G. Conrad, PH.D. (Pennsylvania) ..... 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
*Wilson Hess, 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
*Francis H. Parsons, PH.D. (Pennsylvania) ..... Senior 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

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, B.A. (Rochester) ..... Research Associate in Psychology
Donald W. DeMott, PH.D. (Rochester) ..... Research Associate and *Assistant Professor of Psychology
*Howard P. Iker, PH.D. (Rochester) ..... Research Associate in Psychology
*Judith Onley, PH.D. (Rochester) ..... Research Associate and *Assistant Professor of Psychology
*Alvin L. Ureles, M.D. (Rochester) ..... Research Associate in Psychology

Priscilla Specht, B.A. (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 for all other courses in Psychology. Psychology 201 and 251–252 are required of all students concentrating in Psychology. A program of concentration in Psychology includes completion of ten courses beyond Psychology 101. Of these, six to eight are taken in the Psychology Department. Students contemplating concentration in Psychology should, if possible, take Psychology 101 in the freshman year, Psychology 201 in the sophomore year, and Experimental Psychology (251–252) in the junior year. Psychology 210, 212, 213, 217, and 220 are appropriate for upper classmen who have had Psychology 101. Psychology 255 and 256 require previous completion of introductory courses in both Psychology and Biology, while Psychology 251–252, 253 and 254 have various Psychology courses as prerequisites.

The remainder of the ten courses required for a concentration in Psychology should consist of a carefully planned set of allied courses. Depending upon the student's interests and plans, certain courses in Biology, Chemistry, Mathematics, Optics, Physics, Anthropology and Sociology, Economics, History, Philosophy, Political Science, Religion, English, Fine Arts, Education, Business Administration, or Engineering may be approved. Students planning to pursue graduate studies in Psychology should seek a broad foundation in related disciplines and should, for example, include courses in Biology, Mathematics, and Philosophy to the extent possible. Such students should consult with a departmental adviser at the earliest possible date.

101. ***Introduction to Psychology.*** A systematic study of the principles of human behavior and experience. Lectures and class discussions supplemented by experiments and demonstrations. Prerequisite for all other courses in the department.

201. ***Statistics in Psychology.*** An introduction to the application of statistical methods. Although illustrations of applications are taken primarily from the field of Psychology, the course will also be suitable for students interested in the application of statistical methods to sociology, education, and biology. Requires completion of, or concurrent enrollment in, Psychology 101.

210. ***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. Class lectures supplemented by demonstration films. Psychology 101 prerequisite.

212. ***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. Psychology 101 prerequisite.

213. ***Personality Dynamics.*** A survey of the basic methods in studying personality. Analysis of factors determining the course of behavior and personality development. Emphasis on the study of modern personality theories as they bear on areas such as conflict, frustration, the defense mechanisms and allied phenomena. Consideration given to current research in the field. Psychology 101 prerequisite.

217. ***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 transportation accidents); market, product, advertising, and selling research; a brief consideration of applications of psychology to the professions. Psychology 101 prerequisite.

220. ***Psychology of Learning.*** An intensive study of psychological theory and findings which bear upon problems in conditioning and learning. Principles of transfer of training will be discussed in relation to their applicability to education and to other training situations.

251–252. ***Experimental Psychology.*** Techniques and methods in the experimental study of human behavior. The laboratory experiments are selected on the basis of their factual content and their illustration of basic experimental design and procedures. Psychology 101 and 201 prerequisite.

253. ***Mental Measurement.*** A survey of the major findings in the field of psychological measurement. Individual differences in intelligence and personality traits are studied and an analysis made of the contribution of heredity, race, sex, and various environmental factors to these differences. Class demonstration of the principal tests. Psychology 101, 201 prerequisite.

254. ***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 101, 213 prerequisite.

255. ***Physiological Psychology.*** Physiological basis of co-ordination, learning, perception, thought, emotion, and motivation of behavior. Some material on sensory processes. Psychology 101, Biology 101, 102 prerequisite.

256. ***Comparative Psychology.*** The concepts of the science of behavior and the application of scientific method to the study of animal conduct. Evolution of behavior and intelligence, the receptor control of activity, periodicity in behavior, and higher mental processes in animals. Psychology 101, and Biology 101, 102 prerequisite.

258. ***The Psychology of Motivation.*** The study of theories of motivation, motivational antecedents, and the consequence of such antecedents on instrumental behavior, learning, and perception. Open to advanced undergraduates and to graduate students by permission of the instructor.

260. ***Junior Seminar.*** Opportunity for familiarization with the problems of research in Psychology. During each section of the course, ongoing research is discussed by the sponsoring department member. Papers pertaining to that research area are prepared by each student for further discussion. In one semester a majority of the areas of research interest within the department will be covered. Open to Junior Psychology concentrators by permission only.

280. ***Senior Seminar in Current Psychological Literature.*** The seminar will consider recent

experimental and theoretical contributions in several selected areas of psychology. Students will prepare written reports for presentation and intensive discussion. Open to Senior Psychology concentrators by permission only.

293. ***Reading Course.*** Supervised reading on topics not covered by existing courses or on specialized topics. Open only by special permission of the instructor.

297. ***Special Problems Course.*** The investigation, under guidance, of a special problem in experimental psychology and the presentation of the result of the research in a paper. Open only by special permission of the instructor.

NOTE: For graduate courses in Psychology consult the Graduate Studies Bulletin.

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.

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.

College of Business Administration

Henry C. Mills, ED.D. (Harvard).....Acting Dean of the College

Richard W. Fortner, M.B.A. (Indiana).....Assistant Dean

Richard R. Schulz, M.B.A. (Syracuse).....Director of Academic Office
Kenneth F. Gordon, S.M. (M.I.T.).....Administrative Assistant

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Donald E. Ackerman, SC.D. (M.I.T.).....Professor of Business Administration
John M. Brophy, PH.D. (Cornell).....Professor of Business Administration
Myron J. Gordon, PH.D. (Harvard).....Professor of Business Administration
Melvin R. Marks, PH.D. (Tulane).....Professor of Business Administration
Murray E. Polakoff, PH.D. (Columbia).....Professor of Business Administration
Eric C. Vance, M.A. (Columbia).....Professor of Business Administration

Marcus Alexis, PH.D. (Minnesota) .....Associate Professor of Business Administration
****Marshall Freimar,*** PH.D. (Harvard).....Associate Professor of Business Administration
Joseph W. Gavett, PH.D. (Cornell).....Associate Professor of Business Administration
Vernon G. Lippitt, PH.D. (Harvard).....Associate Professor of Business Administration
Jack H. Matthews, D.B.A. (Indiana), C.P.A. New York.....Associate Professor of Business Administration
Philip T. Meyers, M.S. (Oklahoma State), C.P.A. Oklahoma....
Visiting Associate Professor of Business Administration
John D. Stanley, D.B.A. (Indiana).....Associate Professor of Business Administration

George H. Dunteman, PH.D. (Louisiana).....Assistant Professor of Business Administration
Richard W. Fortner, M.B.A. (Indiana), C.P.A. Indiana.....Assistant Professor of Business Administration
Bertrand N. Horwitz, PH.D. (Minnesota).....Assistant Professor of Business Administration
Richard R. Schulz, M.B.A. (Syracuse).....Assistant Professor of Business Administration
Leonard S. Simon, PH.D. (Columbia).....Assistant Professor of Business Administration
George Schwartz, PH.D. (Pennsylvania).....Assistant Professor of Business Administration
Allan Wolk, LL.B. (Syracuse).....Assistant Professor of Business Administration

*Appointment effective Sept., 1963.

PART-TIME FACULTY

Jack H. Benard, B.S. (Illinois).....Lecturer
N. Joseph Houghton, M.B.A. (Harvard).....Lecturer
Leslie J. Knox, M.B.A. (Syracuse).....Lecturer
Richard K. Schalk, B.S. (Iowa State).....Lecturer
Charles H. Schwartz, B.A. (Niagara).....Lecturer

Donald J. Bardell, LL.B. (Georgetown) ..... Associate Lecturer
Wiles E. Converse, M.B.A. (Pennsylvania) ..... Associate Lecturer
James C. Duffus, B.A. (Yale) C.P.C.U. ..... Associate Lecturer
Kenneth F. Gordon, S.M. (MIT) ..... Associate Lecturer
Frank P. Hart, M.B.A. (Detroit), C.P.A. Illinois ..... Associate Lecturer
James T. Henderson, A.B. (Rochester) ..... Associate Lecturer
Curtis W. Howard, B.A. (Kentucky) ..... Associate Lecturer
Albert Kasdin, M.B.A. (Pennsylvania) C.P.A. New York ..... Associate Lecturer
Laurance G. Locke, B.A. (George Washington) ..... Associate Lecturer
Frank R. Monfredo, LL.B. (Cornell) ..... Associate Lecturer
Randall N. Saflund, B.S. (Rutgers), C.P.A. New Jersey ..... Associate Lecturer
John E. Swett, LL.B. (Harvard) ..... Associate Lecturer

Robert S. Hager, M.B.A. (Syracuse) ..... Assistant Lecturer
Walter E. Loebmann, B.S. (Wesleyan) ..... Assistant Lecturer
James R. Mills, M.S. (Columbia) ..... Assistant Lecturer
T. Richard Olney, B.A. (Hobart) ..... Assistant Lecturer
Martin L. Suter, B.S. (Rochester) ..... Assistant Lecturer
Robert J. Walsh ..... Assistant Lecturer

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 and Business Administration

I. Preprofessional Study in Business Administration		**2 courses**
ACC 153, Principles of Accounting	1 course	
GBA 157, Fundamentals of Bus. Admin.	1 course	
II. Minimum Study in Liberal Arts and Science		**12 courses**
ENG 101, English Composition	1 course	
ENG 103, Continental Masterpieces	1 course	
ENG 104, Eng. & Amer. Masterpieces	1 course	
ECO 101, Principles of Economics	1 course	
Laboratory Science	2 courses	
Mathematics (Two of following, Math. 100, 161, 162)	2 courses	
History and Political Science Electives	3 courses	
Humanities Elective	1 course	
III. Additional Liberal Arts and Science Electives		**2 courses**
(Business Administration majors should elect one course from the Humanities.)		
TOTAL		**16 courses**

Distribution Requirements for Majors in Industrial Management

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		**15 courses**
ENG 101, English Composition	1 course	
ENG 103, Continental Masterpieces	1 course	
ENG 104, Eng. & Amer. Masterpieces	1 course	
ECO 101, Principles of Economics	1 course	
MATH 161, Intro. to Calculus	1 course	
MATH 162, Analytic Geom. & Inter. Calculus	1 course	
MATH 100, Finite Mathematics	1 course	
PHY 101, 102, General Physics	2 courses	
CHM 121, 122, General Chemistry	2 courses	
Hist. & Pol. Sci. Electives	2 courses	
Humanities & Social Sci. Electives	2 courses	
TOTAL		**17 courses**

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 his 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.*

*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.

DEGREE PROGRAMS OFFERED

The College administers programs of study leading to the degree Bachelor of Science, with majors either in Accounting, Business Administration, or Industrial Management; and to the degree Master of Science with a major in Business Administration or the professional degree, Master of 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.

BACHELOR OF SCIENCE WITH A MAJOR IN BUSINESS ADMINISTRATION

The degree program in Business Administration consists of a well-balanced and coordinated group of liberal and professional studies designed to prepare the student for successful progress toward a rewarding and socially useful business career. Required courses in the humanities, mathematics, natural sciences, and social studies, including economics, comprise more than half of the four-year program and may include approximately two-thirds of all study completed, depending on the choice of electives. Professional education in business administration, exclusive of economics, includes approximately a third of the total program. Flexibility in the choice of electives enables each student to adapt his program to his own needs and interests.

The professional studies consist principally of a core of business administration and allied courses which reflect both the breadth of preparation required for managerial responsibility and the high degree of interdependence of major business functions. This core includes (1) introductory courses in business fundamentals, basic accounting, and basic economics; (2) more intensive course work in business law, financial management, marketing, production management and statistics; and (3) two advanced courses which are designed to integrate the previous studies, and which are taught primarily by the case method. One of these latter courses stresses human factors in administrative management and the other, the analysis and decision-making involved in comprehensive business problems.

Throughout the core curriculum, analysis of concrete business situations is stressed. In addition, field trips to industrial establishments, direct contact with visiting executives and, for some, participation in internship programs facilitate the adaptation of formal course study to business requirements.

A synopsis of the general distribution of requirements for the *degree Bachelor of Science with a major in Business Administration* follows:

A. Minimum study in Business Administration:* 12 courses, including two professional courses, nine required core courses, and one Business Administration elective.
B. Minimum study in Economics: 3 courses.
C. Minimum study in Liberal Arts and Science: 15 courses.
D. General Electives: 4 courses.**
E. Physical Education.

Total minimum requirement is 34 courses. Specific courses required for the *degree Bachelor of Science with a major in Business Administration* are listed on the typical program which follows.

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*See Admissions Requirements, page 149.

**At least two courses must be in fields other than Business Administration. Work in Air Science or Naval Science courses may be credited toward the fulfillment of the requirements of the B.S. degree to the maximum of *three* academic courses.

TYPICAL PROGRAM*

B.S. in Business Administration

FIRST YEAR

1. English 101	1. English 103
2. Mathematics 100	2. Mathematics 161
3. Laboratory Science	3. Laboratory Science
4. History 101	4. History 102
or	
Political Science 101	Political Science 102

SECOND YEAR

1. English 104	1. Economics 101
2. GBA 157	2. Accounting 153
3. Liberal Arts & Science Elective	3. Liberal Arts and Science Elective
4. History & Pol. Sci. Elective	4. Humanities Elective

THIRD YEAR

1. Accounting 209	1. IHR 205
2. Law 203 (½ course)	2. Law 204 (½ course)
3. QNT 205	3. Production 208
4. Finance 205	4. Economics Elective
5. Marketing 203	5. Humanities Elective

FOURTH YEAR

1. IHR 251	1. GBA 282
2. Business Administration Elective	2. History or Political Science Elective
3. Economics Elective	3. General Elective
4. General Elective	4. General Elective
5. General Elective	

*Students participating in Officer Candidate programs should consult with the appropriate ROTC unit for program planning.

In choosing his electives a student majoring in business administration may emphasize either breadth of preparation for administration or a limited specialization in one functional area of business. A specialization ordinarily consists of at least three courses in one of the following areas:

ACCOUNTING: Within the Business Administration major, specialization in accounting is designed to develop an awareness of standards and values required for significant managerial responsibility in areas where accounting concepts and practices are controlling.

FINANCE: Specialization in this area broadens and deepens the student's understanding of the finance function in business, of financial instruments and institutions, and of the economic forces and relationships which affect financial and investment management. It also develops further the student's powers of analysis and decision-making with respect to financial problems and financial reports.

INDUSTRIAL & HUMAN RELATIONS: Work in this area is oriented toward the concept of the manager as a problem solver and involves the application of concepts, skills and methods from the behavioral sciences to the problems of people at work.

MARKETING: Those specializing in marketing will find emphasis on the use of resources to match demands and means of keeping our system of distribution adapted to expanded productive capacity and the over-all economy. Due in part to increasing production, the problems of distributing the goods and services being made available are increasing and are also becoming more complex. This has been evidenced by an increase in the number of people in distribution activities. The area of marketing provides opportunities for managers responsible for devising, improving and developing new techniques and policies for distribution.

PRODUCTION MANAGEMENT: Specialization in this area encourages an appreciation of a production executive's responsibilities and an understanding of the issues, concepts and practices within this field.

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.

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 for 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. Minimum study in Business Administration:* 15 courses, including two preprofessional courses and 13 required core courses.
B. Minimum study in Economics: 4 courses.
C. Minimum study in Liberal Arts and Science: 13 courses.
D. General Electives: 2 courses**.
E. Physical Education.

Total minimum requirement is 34 courses. Specific courses required for the *degree Bachelor of Science with a major in Accounting* are listed on the typical program which follows.

*See Admissions Requirements, page 149.

**Work in Air Science 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.

TYPICAL PROGRAM*
B.S. in Accounting

FIRST YEAR

1. English 101	1. English 103
2. Mathematics 100	2. Mathematics 161
3. Laboratory Science	3. Laboratory Science
4. History 101	4. History 102
or	
Political Science 101	Political Science 102

SECOND YEAR

1. English 104	1. Economics 101
2. General Business Administration 157	2. Accounting 153
3. History & Pol. Sci. Elective	3. Humanities Elective
4. Liberal Arts & Science Elective	4. Liberal Arts & Science Elective

*Students participating in Officer Candidate programs should consult with the appropriate ROTC unit for program planning.

THIRD YEAR

1. Accounting 233	1. Accounting 221
2. IHR 205	2. Accounting 236
3. Law 203 (½ course)	3. Law 204 (½ course)
4. QNT 205	4. Finance 205
5. Economics 211 or Economics 236	5. Marketing 203

FOURTH YEAR

1. Production 208	1. Accounting 261
2. Accounting 275	2. GBA 282
3. Law 223 (½ course)	3. Law 226 (½ course)
4. Economics Elective	4. Economics Elective
5. General Elective	5. General Elective

BACHELOR OF SCIENCE WITH A MAJOR IN INDUSTRIAL MANAGEMENT

The major in Industrial Management meets the growing need for managers with an interest in science and technology and with ability to use the quantitative methods of mathematics, statistics, accounting, and operations research to identify, analyze and interpret variables involved in management decisions. Approximately one-half of the required courses are in liberal arts and science.

The curriculum for a B.S. degree with a major in Industrial Management is broadly based; half of the required courses are in arts, science, humanities, economics, and basic mathematics. In addition to strong emphasis on industrial management and applied mathematics (including statistics and operations research methods), the remaining half of the required courses include marketing, accounting, finance, and human relations. Finally, four unrestricted electives assure the student of further development in either professional or liberal arts subjects.

A synopsis of the general distribution of requirements for the *degree Bachelor of Science with a major in Industrial Management* follows:

A. Minimum study in Business Administration:* 13 courses, including 2 pre-professional courses and 11 required core courses.
B. Minimum study in Economics: 3 courses.
C. Minimum study in Liberal Arts and Science: 14 courses.
D. General Electives: 4 courses.**†
E. Physical Education.

Total minimum requirement is 34 courses. Specific courses required for the *degree Bachelor of Science with a major in Industrial Management* are listed on the typical program which follows.

*See Admissions Requirements, page 149.
**See footnote, page 151.
†GBA 282, *Business Policy* and either QNT 234, *Data Processing Systems*, or Optics 209, *Computer Science*, are strongly recommended.

TYPICAL PROGRAM*
B.S. in Industrial Management

FIRST YEAR

1. English 101	1. English 103
2. Mathematics 161	2. Mathematics 162
3. Physics 101	3. Physics 102
4. History 101	4. History 102
or	
Political Science 101	Political Science 102

*Students participating in Officer Candidate programs should consult with the appropriate ROTC unit for program planning.

SECOND YEAR

1. English 104
2. Mathematics 100
3. Humanities or Social Sci. Elective
4. Chemistry 121
5. Accounting 153

1. Economics 101
2. Chemistry 122
3. Humanities or Social Sci. Elective
4. QNT 205

THIRD YEAR

1. Accounting 209
2. Production 208
3. IHR 205
4. General Elective

1. Finance 205
2. QNT 224
3. Production 220
4. Economic Elective
5. General Elective

FOURTH YEAR

1. IHR 251
2. Production 225
3. QNT 241
4. General Elective

1. QNT 242
2. Marketing 203
3. Economics Elective
4. General Elective

Completion of this program provides a solid background in the rapidly developing field of industrial management including the theory and application of conventional and mathematical methods to the analysis of business problems. In addition, it affords an ample basis for further specialization in this area through graduate study if the student so desires. Most important, however, is the fact that the inclusion of arts, science and related courses preclude the development of narrow specialists at the undergraduate level.

(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 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.
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

ACC63. ***Public Accounting Internship.*** Internship program of three to six weeks with a local or national public accounting firm. Opportunity to perform the general tasks of a junior under the supervision of a senior accountant. Students must be recommended by the instructor and duly accepted by the public accounting firm before any final arrangements can be made for their participation in the program. During senior year only.

Three to six weeks a semester.
No credit.

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.

ACC209. ***Managerial Cost Accounting.*** *(Fall and Spring)* A study of the accounting problems involved in determining, analyzing and controlling production and distribution costs. Budgetary control, standard costs and other topics will be discussed from the viewpoint of their use by management in planning and control. Prerequisite: ACC153.

ACC221. ***Cost Accounting I.*** *(Fall)* Practices and procedures of recording and analyzing production and distribution costs for inventory valuation and income determination for financial statements. This treatment is more detailed and technical than that in ACC209. The managerial uses of cost information are explored. Prerequisite: ACC153.

ACC222. ***Cost Accounting II.*** *(Spring)* The use of cost information for managerial decision-making. Standard costs, budgeting and special cost studies are examined in depth. Prerequisite: 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 businesses in financial difficulty, trusts and estates, consolidated statements, foreign exchange and governmental accounting. Prerequisite: ACC-233.

ACC241. ***Budgetary Control.*** *(Fall)* Principles and procedures of preparing and implementing business budgets for planning and control. Extensive use of problems and cases. Prerequisite: ACC221 or equivalent.

ACC261. ***Auditing I.*** *(Fall and 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.

ACC262. ***Auditing II.*** *(Spring)* A continuation of ACC261.

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.

ACC281. ***Accounting Systems.*** *(Fall)* An advanced course in the design and installation of accounting systems. Procedures used in systems work are illustrated including surveys of accounting procedures, account classifications, internal controls, and use of mechanical equipment. Prerequisites: ACC221, ACC-261, or the consent of the instructor.

ACC283. ***C.P.A. Problems.*** *(Spring)* Advanced accounting problems are used as a basis for the review and application of accounting concepts and procedures. The materials for the course are drawn to a great extent from actual C.P.A. Examination questions and include analysis and revision of financial statements, partnerships, receiver's statements, consolidated statements, cost accounting, and other accounting problems. Prerequisites: ACC221, ACC236, and ACC261.

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. Prerequisite to all other business law courses.

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.

LAW235. ***Fundamentals of Patents.*** *(Spring)* Tests for invention, mechanics of protecting inventions, rights of inventors and employers, patent licensing, infringement, validity, patentability and inventorship discussed from the standpoint of business and technical personnel.

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. Prerequisites: GBA157 and ACC153.

FIN246. ***Investment Management.*** *(Fall)* 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 the developing criteria for the selection of individual security issues. Prerequisites: ECO101 and GBA157.

FIN256. ***Financial Analysis.*** *(Spring)* Analysis of corporation and other financial reports, from the standpoints of investors, short-term creditors, and management. Primary emphasis is on the interpretation of balance sheets, income statements and other company and industry data for the purpose of analyzing investment bonds, investment and speculative stocks, and short-term credit risks. Prerequisites: FIN205 and ACC233 or consent of instructor.

ECO236. ***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: ACC 153 and ECO 101.

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 QNT 205.

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.

INDUSTRIAL & HUMAN RELATIONS

IHR205. ***Behavioral Science in Management.*** *(Fall and 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.

IHR231. ***Business and Corporate Public Relations.*** Principles and history of public relations as a key function of business management. Requirements for an executive and/or practitioner. Fundamentals of planning and programming, with analysis of typical blueprints for action. Demonstration and practice in publicity techniques for effectively communicating a company's story, through setting up a hypothetical corporation, emphasis on class participation in solving major public relation problems of business and industry.

IHR241. ***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: IHR205.

IHR251. ***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: IHR 205.

IHR262. ***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 IHR205 or consent of instructor.

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.

MKT221. ***Advertising.*** *(Fall)* Understanding of and ability to appraise advertising as a

part of the selling program. Survey of the social and economic aspects of advertising. Critical examination of the principles and techniques involved in developing good copy, making layouts and reproducing the advertisement. Topics include: stimulating primary and selective demand, determining basic promotional strategy, formulating and executing promotional programs, selecting advertising media, determining the appropriation, testing the advertising and maximizing the results. Prerequisite: MKT203.

MKT234. ***Principles of Retailing.*** *(Spring)* Principles of management as applied to retail stores. The techniques of retail merchandising are examined and cases are used to provide the student with training in making decisions. Topics include: store location, layout and organization, analysis of consumer demand, buying, pricing, merchandise control, budgetary control, retail salesmanship, retail advertising and display, sales promotion planning, credits and collections, store personnel work, and general retail management. Prerequisite: MKT203.

MKT241. ***Marketing Research and Analysis.*** *(Spring)* 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.

MKT244. ***Sales Management.*** *(Spring)* Comprehensive cases and problems are utilized to develop the management principles involved in product merchandising, selecting wholesale and retail outlets, determining prices and terms of sale, utilizing marketing research in the solution of sales problems, planning sales programs and sales promotion, building a sales organization, managing the sales force, and controlling sales costs. Prerequisite: MKT203.

MKT271. ***Industrial Procurement.*** *(Fall)* The development of a fundamental purchasing policy, with emphasis upon methods of determining the proper sources of supply, the proper quantity to buy, and the proper price to pay. Modern inventory control methods, departmental organization, and the preparation of reports to management. Selected case problems will deal with specific situations requiring decisions and recommended courses of action.

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. ***Production Facilities and Standards.*** *(Spring)* Analysis of characteristics and requirements of process, product and operations into a total production system. Work simplification, standardization, measurement and compensation. Prerequisite: PRD208 or permission of the instructor.

PRD225. ***Manufacturing Control.*** *(Fall)* Organization and techniques required, and the concepts involved in the control of production volume, rate, quality and cost. Emphasis is given to the integration of production, quality and cost control in manufacturing operations. Cases and visits to industrial plants may be used. Prerequisites: PRD208, 220 or permission of the instructor.

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 math. (excluding Math. 100)

QNT222. ***Advanced Business Statistics.*** *(Spring)* Development and application of the more advanced techniques of statistical analysis common to business research. Typical topics: multiple regression and correlation, analysis of variance, non-parametric methods, sequential analysis, and stochastic processes. Prerequisite: One course in basic statistics or the permission of the instructor.

QNT224. ***Decision Theory.*** *(Fall)* Foundations and theory of decision making under uncertainty. Basic principles of probability and distribution theory including the various

probability distributions applicable to decision problems in business. Development of theories of classical statistical methods; comparison with Bayesian approach. Presentation of various decision criteria. Introduction to sequential decision theory. Emphasis is divided between theory and application to problems in business administration and economics. Prerequisite: One year of calculus and a beginning course in business statistics.

QNT231. ***Electronic Data Processing.*** *(Fall)* Preparation of data and use of electronic machines to provide information needed for executive decision. Includes an introduction to the nature, programming and use of equipment with emphasis on that available at the University of Rochester Computing Center. Typical case studies concerned with current uses in business and government will be investigated with the equipment at the Computing Center.

QNT234. ***Data Processing Systems.*** *(Spring)* Analysis of the overall design of business systems for electronic data processing. Study of how a complete system relates to the equipment to be used. The last part of the course is devoted to the analysis, charting and solution of a realistic business system and individual assignments in the field of electronic data processing for business. Prerequisite: QNT231.

QNT241. ***Operations Research I.*** *(Fall)* Application of knowledge of mathematics and business administration to the quantitative analysis of business situations. Topics include: various methods of quantitative analysis, their application to problems of industrial management, and the application of such methods to problems in other management areas. Prerequisites: Math. 162, 100, QNT205, QNT224, or the permission of the instructor.

QNT242. ***Operations Research II.*** *(Spring)* Continuation of the above. Prerequisite: QNT241.

SPECIAL PROGRAMS

Courses Prerequisite to Certification or Licensing

The courses listed below may be taken by degree candidates only upon recommendation of a faculty adviser and with the approval of the Dean of the College. Prior approval is necessary for degree candidates both to assure adequate guidance regarding requirements and to minimize the possibility of selecting courses which in content largely duplicate others required by the degree programs.

With the exception of a certificate in public accounting, it is not necessary to graduate from a four-year degree program to qualify fully for licensing or certification in the fields listed. Accordingly, the courses shown are intended primarily to assist those who desire additional education in qualifying themselves for or advancing themselves in their chosen careers. In each instance, the courses have been developed in cooperation with appropriate business and professional associations and have received approval from New York State authority where such approval was necessary.

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 156 and 157 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.

INSURANCE

These courses in the field of insurance will be of particular interest to anyone in the insurance profession as well as those concerned with insurance in the course of their employment. These two courses have been approved by the Insurance Department of the State of New York. Upon their successful completion, the student becomes eligible to take the examination for both the agent's and broker's licenses under Section 115 and 119 of the Insurance Law of New York State. In addition, these two courses prepare the student for the A, B, and C examinations given by the Insurance Institute of America, which issues an Insurance Institute Certificate to those who pass the examinations. These courses were developed in cooperation with the Insurance Institute of America and the Monroe County Association of Insurance Agents.

FIN131. ***General Insurance I.*** *(Fall)* The historical development and economic significance of the industry as well as the types and organization of insurance carriers and the principles of rate-making. Thorough discussion of the workings and basic revisions of the general insurance contract with extended study of fire, automobile, and public liability. Useful to the general business or economic student and prerequisite to FIN134.

FIN134. ***General Insurance II.*** *(Spring)* A continuation of FIN131 studying all of the common casualty insurance contracts, with extended study of marine workmen's compensation, bonds, accident and health, aviation and "package" policies. Thorough discussion of the contract, rates, loss adjustment, insurance law and regulation of the industry. Designed for the general business or economic student as well as for those interested in insurance as a career. Prerequisite: FIN131.

CREDITS AND FINANCIAL MANAGEMENT

The College of Business Administration offers three courses in the area of credits and financial management. These form part of the required program of study for either the Associate Award Program or the Fellow Award Program granted by the National Institute of Credit. Completion of either of these programs requires study of certain approved elective and required subjects. In addition the Fellow Award Program requires the passing of a comprehensive examination administered by the National Institute of Credit. For further information consult the Director of the Academic Office, College of Business Administration. The National Institute of Credit and the Rochester Credit and Financial Management Association assisted in the planning and presentation of these courses.

FIN118. ***Credit and Collection Principles.*** *(Spring)* Includes a study of the nature and function of credit; types and classifications of credit; retail and mercantile credit contrasted; credit department organization; functions and personnel; credit risk factors; sources of credit information and analysis of credit risks; credit interchange services and uses; interpretation of credit reports; uses of financial statements; and collection procedures.

Half course.

FIN119. ***Advanced Credits.*** *(Fall)* A continuation of FIN118 with emphasis upon analysis of financial statements as a source of credit information; legal remedies used in collection of delinquent accounts; handling insolvent accounts and bankruptcies; adjustment problems and the use of adjustment bureaus; credit insurance; activities and services of credit associations; measures of credit department efficiency, and other important phases of credit work. Prerequisite: FIN118.

Half course.

FIN128. ***Credit Management Problems.*** *(Spring)* Cases and problems are used in the course related to the analysis of an account with special consideration given to the nature of the business; current economics; industrial and governmental trends and conditions; credit limits; assignments; adjustments; bankruptcies. Prerequisite: FIN-119.

Half course.

REAL ESTATE

The Certificate in Real Estate is awarded by the University School upon successful completion of the four-course professional sequence described below. R–E 121 and R–E 123 are approved by the New York State Division of Licenses for fulfilling the education requirements for the New York State Real Estate Brokers License Examination. This sequence of courses was developed in conjunction with the Rochester Real Estate Board.

R-E121. ***Fundamentals of Real Estate.*** Introductory study of technical, legal and economic phases of real estate business. Topics include: ownership, contracts, deeds, bonds and mortgages, leases, title insurance and title closing, appraisal, depreciation, financing, investment, management, planning, rent control, housing, and the growing role of government.

R-E123. ***Real Estate Brokerage Law and Practice.*** A study of real property law, including real estate contracts, liens and easements, leases, bonds and mortgages, deeds, agency, and forms of voluntary and involuntary alienation.

R-E125. ***Property Management and Financing.*** Property analysis, location, space layout, equipment service, rental policies, vacancy and rental surveys, lease provisions, budgets, accounting, inspection, purchasing, maintenance, building codes, tenant relations, and operating policies. Attention also given to equities and mortgages, leases, junior liens, mortgage origination, servicing, defaults, and the impact of legislation on financing of real estate investments.

R-E127. ***Real Estate Appraisal and Valuation.*** Relationship between the urban economy, land values, and land utilization, including the economic characteristics of realty, the market for realty, real estate cycles, and the changing pattern of urban land use. Residential, business, and industrial uses, with special reference to population and land value studies, architecture and construction, condemnation and eminent domain, growth and re-development. Emphasis on developing ability to select value evidences and to calculate and apply legal principles as well as administrative standards.

TRAFFIC AND TRANSPORTATION

The Certificate in Traffic and Transportation Management is awarded by the University School upon successful completion of a sequence of liberal arts and business administration courses. Three specialized courses in traffic and transportation management are included in the Certificate Program and are described below. Additional information concerning the Program requirements can be obtained from the Director of the Academic Office, College of Business Administration. This sequence of courses can be used to prepare for the professional examination given by the American Society of Traffic and Transportation. This program was developed in cooperation with Delta Nu Alpha and the Transportation Club of the Rochester Chamber of Commerce.

TRP127. ***Principles of Transportation Management.*** Economic aspects of the transportations system in the United States from the era of railroad building to the present day. Overall look at the transportation system, indicating the relative importance of the various modes of transport, stressing their similarities and their significant differences. The rate structure, special aspects of administration and organization, and selected carrier problems are examined from the standpoint of theory and practice. Special consideration is given to national transportation policy.

TRP132. ***ICC Law and Regulations.*** A course designed to provide students with an understanding of the Interstate Commerce Act, particularly the features which provide for the regulation of the several modes of transportation. The case method of study is employed, requiring the student to read decisions of the courts and the commission. Issues arising under the Act include cases affecting common, contract and private carriers and distinctions between the nature of interstate and intrastate transportation. Prerequisite: TRP127.

TRP157. ***Transportation Management.*** Problems of transportation, forming an extension of materials introduced in TRP127 and TRP132. This course is designed to be an integrating course in the field of transportation. Important factual material is covered but emphasis is on the decision-making and management skills developed by use of the case method. Prerequisite: TRP132.

College of Education

William A. Fullagar, ED.D. (Columbia) ..... Dean

Robert B. Howsam, ED.D. (California) ..... Associate Dean for Graduate Studies

Edward E. Kennedy, B.S. ..... Counselor of Students

Sylvia Grossman ..... Administrative Assistant to the Dean

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
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
Gerald A. Gladstein, PH.D. (Chicago) ..... Associate Professor of Education
Norman G. Gunderson, PH.D. (Cornell) ..... Associate Professor of Education and Mathematics
Glenn N. Hontz, ED.D. (Columbia) ..... Associate Professor of Education
Elizabeth Z. Howard, PH.D. (Chicago) ..... Associate Professor of Education
Clarence J. Karier, PH.D. (Wisconsin) ..... Associate Professor of Education
Thomas R. Knapp, ED.D. (Harvard) ..... 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

Charles H. Adair, ED.D. (Florida State).....Assistant Professor of Education
Dean Corrigan, ED.D. (Columbia).....Assistant Professor of Education
Kenneth N. Fishell, ED.M. (Rochester).....Assistant Professor of Education
Gene W. Moser, M.A. (Cornell).....Assistant Professor of Education
Robert L. Osborn, PH.D. (Indiana).....Assistant Professor of Education
John A. Schmitt, ED.D. (Cornell).....Assistant Professor of Education
Francis M. Trusty, ED.D. (Stanford).....Assistant Professor of Education

****Herman R. Goldberg,*** A.M. (Columbia).....Lecturer in Education
****Vivian T. Harway,*** PH.D. (Rochester).....Lecturer in Education
****Katherine C. Neill,*** M.S. (Rochester).....Lecturer in Education and Public Health
****Ruth Vann,*** D.D.S. (Toronto).....Lecturer in Education and Dental Hygiene

****Alfred Stiller,*** ED.D. (Buffalo).....Associate Lecturer in Education
****H. Hunter Fraser,*** ED.M. (Rochester).....Associate Lecturer in Education
****Bernard Greenberger,*** M.A. (Rochester).....Assistant Lecturer in Education

*Part-time.

THE COLLEGE OF EDUCATION offers study designed to prepare students for careers in education at all levels. The offerings extend through the doctoral level and provide comprehensive programs of preparation for classroom teachers and for specialists in education. A realistic balance among experience, academic work and professional courses is maintained in all programs. Student programs are planned to include a broad liberal background, sound professional preparation, and specialization or concentration in academic fields.

All full-time undergraduate students on the River Campus enroll in the College of Arts and Science for the first two years of study. During the freshman and sophomore years a prospective teacher should complete as many distribution requirements[1] as possible and should include Psychology 101 in his program. Students planning careers in teaching or wishing to explore the prospect of a career in education are invited to make an appointment with the Counselor of Students in the College of Education as early as possible during the freshman year.

General Admission Procedures for Undergraduate Programs

1) Students report to the College Counselor's Office for instruction and forms at the appropriate time.
2) When records are complete, the College Counselor will direct the student to the appropriate faculty member for an interview.
3) Students who have been admitted by the Undergraduate Committee will then be assigned an adviser for program planning. It is expected that students will take the initiative to contact their advisers once the assignments have been made.
4) Students who have not been admitted will be notified immediately.

Transfer students from other institutions who are applying for junior or senior standing may be admitted into the College of Education through the Office of Admissions of the University of Rochester River Campus.

The College of Education does accept a limited number of well qualified part-time students who may wish to pursue a degree in Education. Part-time students are accepted on the condition that the program selected will be pursued without interruption.

[1]See Distribution Requirements of College of Arts and Science.

Program in Elementary Education

After the completion of the first two years, qualified students may follow a program of study which leads to the degree of Bachelor of Science in Education with a concentration in Elementary Education and New York State certification for teaching in the elementary school. This program prepares students to teach in grades 1 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.

The requirements for admission to the elementary program are:

a. Completion of a minimum of 64 semester hours of selected course work.
b. A 2.0 honor point average based upon all course work taken prior to admission.
c. A satisfactory health record.
d. A satisfactory interview with the appropriate faculty member.
e. Satisfaction of any other admission standards and requirements established by the College of Education, and acceptance by the Undergraduate Committee of the College.

Following admission the student and his adviser plan a program in terms of the requirements outlined below which meet New York State certification requirements. 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 101 (unless excused)	0–1
B. Foreign Language	0–3
C. Physical Education (4 semesters—non-credit)	0
II. Distribution Requirements:	
A. Humanities	3
1. English (103 recommended)	
2. Fine Arts	
3. Music	
4. Religion	
B. Social Sciences	5
1. A minimum of three courses in an approved combination of American History and Geography	
2. A minimum of two courses selected from Anthropology, Sociology, Economics, History, Philosophy, Political Science, Non-Western Civilization	
C. Natural Sciences	3
1. Psychology 101 required	
2. Two laboratory science courses	
III. Group Concentration:	4
A. A minimum of four courses in one group or related courses from more than one group beyond distribution requirements and including at least 2 courses at the upper division level	
B. In either event, courses taken should be approved by an adviser in the College of Education	
IV. Education Requirements:	
A. Education 200 (These courses are taken during the junior year)	1
B. Education 210 (These courses are taken during the junior year)	1
C. Education 220–221 (These courses are taken during the junior year)	3
D. Education 229*	4
V. Electives:	4–8
	Total 32 courses

*Education 229, Student Teaching in the Elementary School, is offered both Fall and Spring semesters of the senior year. Students are assigned to one semester or the other by the Coordinator of Student Teaching.

Program in Secondary Education

Undergraduate students preparing to teach an academic subject in the secondary schools, grades 7 through 12, have the choice of two separate 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 (Education 200, Ed. 210, Ed. 231–2, 4, 5 or 6 and Ed. 239) in the College of Education. Education 200 is usually completed during the junior year.

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 included in the degree program. 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 find it inadvisable to pursue the A.B. degree. Typical programs leading to this degree for each academic subject taught in the secondary school are available in the Counselor's Office. The admission requirements for the student desiring to enter 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 no later than the end of the first semester 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.
b. An accumulative point ratio of 2.5 or higher in the subject field selected for student teaching.
c. Completion of provisional certification requirements in the subject field selected by the end of the academic year in which the sequence is undertaken.
d. A satisfactory health record.
e. A satisfactory interview with the appropriate faculty member.
f. Acceptance by the Undergraduate Committee of the College.

Inter-University Experimental Internship Program in Secondary Education

The experimental teacher education program at the University of Rochester is part of a five-year project supported by the Ford Foundation in four universities for the preparation of superior students for secondary school teaching.

Juniors with an interest in and potential for secondary school teaching will be selected to commence the program in their senior year. A fifth-year internship at half-teacher load and half-salary and a summer session preceding and following the internship year, will also be included in the program. At the completion of the senior year, upon fulfilling course requirements, participants will graduate from the College of Arts and Science with a bachelor's degree in their subject field. Teacher Certification and a master's degree from the College of Education will be awarded upon satisfactory completion of the graduate phase of the program. In addition to the salary paid by the teaching center during the fifth-year internship, financial awards will be provided for part of each student's program.

[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 level—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.

Education 180. ***Health Service in Schools (two hours).***[1] A consideration of the place and function of health services in public education; the coordination of the health service program with regional and other community programs; regulations relating to the health service in New York State.

Education 181. ***Methods and Materials in Dental Hygiene Education (two hours).***[1] Study and analysis of the objectives of dental hygiene education and methods to be employed in reaching those objectives. Study of visual aid materials and their adaptability to various phases of dental hygiene; education at different age groups, and necessary records, reports and follow-up procedures. Opportunity for field work in observing health education in the schools.

Education 182. ***Principles of School Organization (two hours).***[1] A survey of the school program including personnel, curriculum, and finance; the functions, duties, and interrelations of administrative, supervisory, instructional, and school service staffs.

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. Prerequisite: Psychology 101.

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. Prerequisite: Psychology 101.

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.

[1]Open only to students enrolled in the School Dental Hygiene Teacher Program or with special permission of the College of Education.

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 (four 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. *Applications for student teaching must be received by the May 1st preceding the academic year during which assignment to student teaching will be made.*

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.

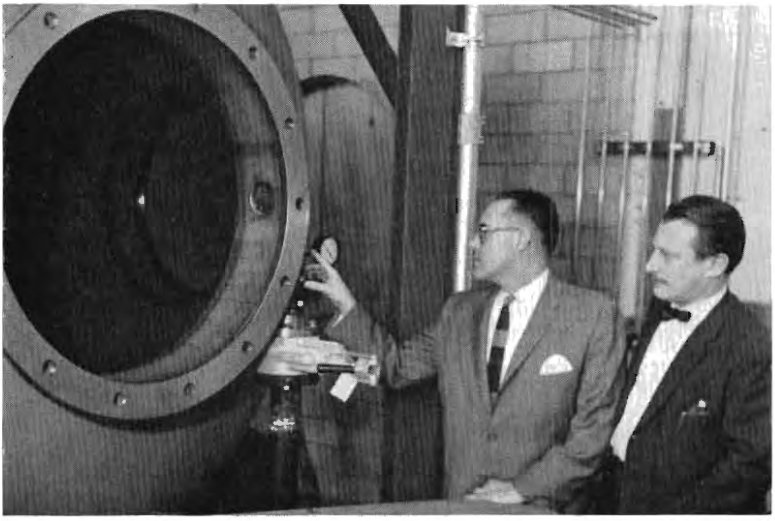
Education 236. ***The Teaching of Mathematics in the Secondary School.*** Survey of desirable methods in the teaching of mathematics. The objectives, content, and methods of presenting the basic topics in arithmetic, algebra, geometry, and trigonometry. Some discussion of typical curriculum procedures 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. *Applications for student teaching must be received by the May 1st preceding the academic year during which the assignment to student teaching will be made.*

General Courses

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.

Education 249. ***Audio-Visual Materials and Methods.*** Designed to develop understanding of values of audio-visual materials and their effective use. Consideration of field trips, museum materials, projected still pictures, motion pictures, recordings, transcriptions, and radio and television programs. Discussion of bases for selection, evaluation, and use of audio-visual materials. Opportunities given students to develop skill in the operation of audio-visual equipment.

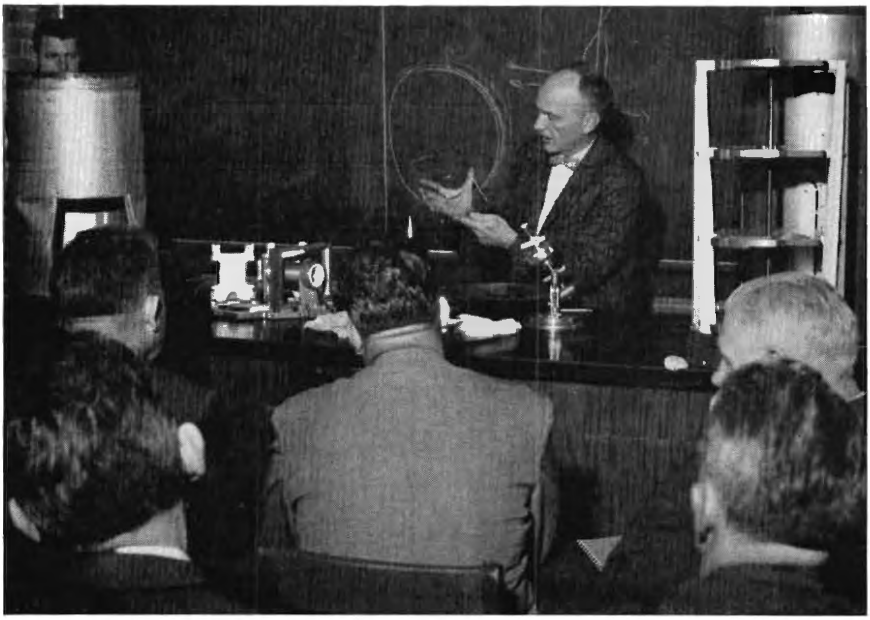


College of Engineering and Applied Science

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 objectives in undergraduate and graduate education, research, or service.

It is the aim of the College to prepare undergraduate students with the skills 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.



...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.

...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.

...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

Lewis Dalcin Conta, PH.D. (Cornell).....Associate Dean for Graduate Studies

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 Engineering

Robert Earl Hopkins, PH.D. (Rochester).....Director of the Institute of Optics

James Arthur Eyer, PH.D. (Rochester).....Assistant Director, Institute of Optics

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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 courses are offered in Chemical Engineering, Electrical Engineering, Mechanical Engineering, and in Optics. These curricula, all of which lead to the Bachelor of Science degree, devote over one-fifth of the curriculum time to work in the humanities, social sciences, and subjects elected without restriction (free electives), and the remainder to the basic and applied sciences and to specialized studies in engineering and optics. 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 PROGRAMS Although these 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. Approval is required from the Faculty Adviser and the cognizant Department Chairman, and the proposed program must meet, during each of five years, the normal minimum load requirements. (See also the next paragraph concerning five-year, two-degree courses.)

COMBINED PROGRAMS Two-degree courses in engineering and liberal arts are being elected by an increasing number of students at Rochester. These courses, which lead to both the B.S. and A.B. degrees, include the requirements for a B.S. degree in the College of Engineering and Applied Science and those of an A.B. program in a chosen field of concentration. By choosing his electives properly, a student can usually complete the requirements for both degrees in five years. These combined curricula provide a much broader and more liberal education than is possible in the regular four-year engineering course. The purpose is to give the engineer or applied scientist a fuller appreciation of the social and economic responsibilities of his profession and to enable him to combine his technical and nontechnical training in a wider field of effort. The choice between the four- and five-year courses should be made toward the end of the freshman year, and must have the approval of the Faculty Adviser as well as the cognizant Engineering and Liberal Arts Department Chairmen.

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 physical metallurgy, in physical optics, 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 101:* A course of instruction in writing expository and argumentative prose. A student may be exempt from this requirement if proficiency in English is indicated in an entrance examination or by the high school record.

2. *Foreign Language:* Students pursuing the optics curriculum are expected to satisfy the language requirement as stated for the College of Arts and Science, in German, French, or Russian. There is no language requirement for the undergraduate program in the Electrical, Chemical, or Mechanical Engineering Departments.

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 Requirements:* Students following the mechanical, electrical, or optics program 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 79 of this catalog; however, there are certain exceptions for engineering students as stated below.

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; Economics 101 and at least one other course must be in the social sciences.

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.

WORK-STUDY PROGRAM Understanding the nature of engineering and the distinction between engineering and science has important implications for the motivation and education of the student of engineering. Science is concerned with the ordering and extension of knowledge; engineering is concerned with the application of knowledge to the solution of technical and professional problems. With the above thoughts in mind, and recognizing that engineers and applied scientists in the fields emphasized at Rochester make their contributions, for the most part, in industrial situations, the Faculty of the College of Engineering and Applied Science has established a work-study program for students of the College. This plan, which has been worked up in consultation with leading industries, gives the engineering student an opportunity to earn while he learns. The engineering student spends two semesters (the normal academic year) in residence as a full time student at the University and his summer period of three months working as an engineer-in-training in industry. If a student will spend his college years in this way, he will have an "ideal" preparation to begin to learn as a practicing embryo engineer. The Assistant Dean of the College, working with the University Placement Officer, is responsible for coordinating the activities of students engaged in the work-study program.

ADMISSION POLICY After two years in the College of Arts and Science, or a satisfactory equivalent preparation, an application for transfer to the College of Engineering and Applied Science is made by those students wishing to pursue such a program. To be admitted to the College a student must:

a) have completed the freshman and sophomore courses of the appropriate Departmental 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 each semester.

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. ROTC students majoring in engineering or optics must take the appropriate Air Science or Naval Science courses of the freshman year in addition to the regular courses listed below.

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*

Gouq-Jen Su, SC.D. (M.I.T.).....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
Rubens Sette Ramalho, PH.D. (Vanderbilt).....Associate Professor of Chemical Engineering

John Wesley Bartlett, PH.D. (Rensselaer).....Assistant Professor of Chemical Engineering
Stanley Middleman, DR. ENG. (Johns Hopkins).....Assistant Professor of Chemical Engineering
William David Smith, Jr., D.ENG. (Yale).....Assistant Professor of Chemical Engineering

Rinoud Kamel Hanna, PH.D. (Bristol).....Research Associate in Chemical Engineering

****Gordon Dale Hiatt,*** PH.D. (Illinois).....Lecturer in Chemical Engineering

****Burton Cosden Gibbons,*** B.S. CH.E. (Carnegie Institute of Technology).... ....Assistant Lecturer in Chemical Engineering

*Part-time.

DEGREE PROGRAM

Freshman Year

1st Term		*Hours*
Math. 161[1]	Analysis I	4
Phys. 115[2]	Physics A	4
Chem. 123	General Inorganic Chemistry	4
Engl. 101	English Composition	4
Ph. Ed. 11 or 12	Physical Education I	0
		16

2nd Term		
Math. 162[1]	Analysis II	4
Phys. 116[2]	Physics A	4
Chem. 124	General Inorganic Chemistry and Qual. Anal.	4
Elective[4]	Humanities or Social Sciences	4
Ph. Ed. 13 or 14	Physical Education II	0
		16

Sophomore Year

1st Term

Chem. 161	Organic Chemistry	4
Phys. 125[2,3]	Physics B	3
*Math. 163[1]	Analysis III	4
*Ch. E. 100	Introduction to Chemical Engineering	4
Elective[4]		4
Ph. Ed. 21 or 22	Physical Education I	0
		19

2nd Term

Chem. 162[3]	Organic Chemistry	3
Phys. 126[2,3]	Physics B	3
*Math. 164	Differential Equations	4
*Ch. E. 102	Material & Energy Balances	4
M. E. 101	Engineering Graphics	3
M. E. 105	Shop Practice	1
Ph. Ed. 23 or 24	Physical Education II	0
		18

Junior Year

1st Term

Chem. 251	Physical Chemistry I	4
Chem. 213	Quantitative Analysis I	4
Ch. E. 223	Applied Thermodynamics I	2
Ch. E. 243	Transport Phenomena I	4
Elective[4]		4
		18

2nd Term

Chem. 252	Physical Chemistry II	4
M. E. 112	Statics & Strength of Materials	3
Ch. E. 224	Applied Thermodynamics II	2
Ch. E. 244	Transport Phenomena II	4
Ch. E. 294	Plant Visits	0
Elective[4]		4
		17

Intersession

Ch. E. 245[6]	Chemical Engineering Laboratory	3

Senior Year

1st Term

Ch. E. 280	Engineering Metallurgy & Materials	4
Ch. E. 231	Applied Kinetics & Reactor Design	4
Ch. E. 250	Unit Operations	4
Ch. E. Elective[5]		2 to 4
Elective[4]		4
Ch. E. 271	Chemical Engineering Process Design I	1
		19 to 21

2nd Term

Ch. E. 212	Analysis of Chemical Engineering Data	3
E. E. 157	Elementary Electrical Engineering	4
Ch. E. 272	Chemical Engineering Process Design II	2
Elective[4]		8
Ch. E. 294	Plant Visits	0
		17

NOTE: Students enrolled in Naval and Air Force ROTC programs may use two ROTC courses (eight hours) as allowable electives in their Chemical Engineering curriculum. The other ROTC courses required must be taken as an over-load. 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.

*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 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]Chemical engineering students are not required to take the laboratory.

[4]The Chemical Engineering curriculum contains eight electives, including one in the freshman year. Of these, one is a chemical engineering elective. Of the remaining seven, at least 20 credits (five courses) must be selected from among the Humanities and Social Sciences in the College of Arts and Science with the following stipulations and exceptions: at least two Humanities courses; Economics 101 and at least one additional Social Science course; Psychology 101 may be considered as a Social Science subject. The remaining 8 credits may be satisfied by any courses offered by the University of Rochester 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.

[5]Chemical engineering electives are to be chosen from among the following: Ch.E. 200, 211, 260, 263, 265, 268, 278, 290, 292, and 295; or from selected courses in such disciplines as electrical engineering, mechanical engineering, optics, chemistry, physics, and mathematics. Certain chemical engineering courses in the 400 series may be open to students of exceptional ability who are approved for their choice by the Department. The student who elects Ch.E. 292 will be expected to distribute his work in the course over the entire senior year, registering for at least one credit each semester and receiving his mark at the end of the final semester. A student who elects more than two credits of chemical engineering elective must have the approval of the Department Chairman and the Assistant Dean of Engineering.

[6]Conducted during a period of 18 consecutive full working days, usually in the first three weeks of June.

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.

Credit—four hours.
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.

Credit—four hours.
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.
Three lectures 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 laboratory 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.

223. ***Applied Thermodynamics I.*** First and second laws of thermodynamics, and quantitative treatment of the relationships existing among the several thermodynamic properties of matter. Applications of the first law are made, particularly to systems of real gases and vapors. Math. 164 and Phys. 126 or 128 prerequisite and Chem. 251 corequisite.

Credit—two hours.
Two lecture-recitations a week.

224. ***Applied Thermodynamics II.*** A continuation of ChE 223, with particular reference to the second law and to chemical processes.

Credit—two hours.
Two lecture-recitations 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.

Credit—four hours.
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.

Credit—four hours.
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.

Credit—four hours.
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. Chem. 213 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.

Credit—four hours.
Three lectures and one laboratory a week.

260. ***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.

Credit—three hours.
Three lectures 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.

271, 272. ***Chemical Engineering Process Design.*** Opportunities for the chemical engineering senior to integrate the material he has mastered in his previous science and engineering courses. Problems related to the design of chemical plants, including economic as well as technical considerations. The student's effort culminates in one or more projects that present rough but complete estimates of a process plant layout, with marked-up flow sheets and cost of production.

Credits: ChE 271, one or two hours; ChE 272, two hours.
Usually one lecture and one or two three-hour design periods per 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 Metallurgy and Materials.*** Structure and properties of the metallic state, equilibrium phase diagrams, non-equilibrium phase transformation, corrosion and high temperature behavior of metals. For chemical engineers. Prerequisites Chemistry 252, Physics 125–126, M.E. 112.

Credit—four hours.
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.

Credit—four hours.
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.

Credit—four hours.
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.

Credit—one course.
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.

421. ***Advanced Chemical Engineering Thermodynamics.***

Credit—three hours.

431. ***Chemical Engineering Kinetics and Catalysis.***

Credit—three hours.

441, 442. ***Advanced Transport Phenomena.***

Credit—three hours each.

450. ***Advanced Unit Operations.***

Credit—three hours.

451. ***Filtration.***

Credit—two hours.

452. ***Agitation.***

Credit—two hours.

460. ***Nuclear Laboratory.***

Credit—three 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 prepare its students for a great variety of careers—in industry, graduate study, research and development laboratories, teaching, and many other engineering activities. To meet these all-encompassing requirements, the electrical engineering faculty believes it is most essential that the curriculum be based on 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, have been selected from a large number of possible alternatives on the basis of their potential for broad applicability to engineering. Course offerings of a practical or applied nature are few in number; while such material is to some extent the hallmark of engineering, the faculty feels that, in view of all other pressures, it should be the student's primary responsibility to acquire "know-how" when it becomes important to him.

The normal academic load of four courses per term reduces the time spent in formal instruction. The reduction in the time spent in class gives the student a correspondingly greater opportunity and responsibility to learn on his own. It is this ability to continue to learn as an individual which more than anything else is the "mark" of an educated man. Good engineers realize that their profession demands continuous self-study, and these habits are best inculcated early in one's professional career.

The primary objective of the curriculum is to prepare the student for the practice of electrical engineering. But the University's responsibility to the student transcends the practical. He must become more than an effective engineer; he must be exposed to the whole gamut of human experience. It is for this reason that 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.

Faculty

Daniel Ward Healy, Jr., PH.D. (Harvard).....Professor and *Chairman of Electrical Engineering*
Lloyd P. Hunter, D.SC. (Carnegie Institute of Technology)....Professor of Electrical Engineering

Hideya Gamo, D.SC. (Tokyo).....Visiting Professor of Electrical Engineering

David T. Blackstock, PH.D. (Harvard).....Associate Professor of Electrical Engineering
Edwin Lorenz Carstensen, PH.D. (Pennsylvania)....Associate Professor of Electrical Engineering
Gerald Howard Cohen, PH.D. (Wisconsin).....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

Daniel Spolane Ruchkin, PH.D. (Yale).....Assistant Professor of Electrical Engineering
†***Hing-Cheong So,*** PH.D. (Illinois).....Assistant Professor of Electrical Engineering
William Streifer, PH.D. (Brown).....Assistant Professor of Electrical Engineering
Herbert Bernhardt Voelcker, Jr., PH.D. (London)...Assistant Professor of Electrical Engineering

†On leave for 1963–1964.

DEGREE PROGRAM

Freshman Year

1st Term

Math. 161[1]	Analysis I
Phys. 115[2]	Physics A
Chem. 121[3]	General Chemistry I
Engl. 101	English Composition
Ph. Ed. 11 or 12	Physical Education I

2nd Term

Math. 162[1]	Analysis II
Phys. 116[2]	Physics A
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 B
E. E. 110	Network Analysis I
**Elective	Humanities or Social Science
Ph. Ed. 21 or 22	Physical Education I

NOTE: Students enrolled in Naval and Air Force ROTC programs may use one ROTC course (four hours) as an allowable elective in their electrical engineering curriculum. The other ROTC courses required must be taken as an overload. Detailed programs combining ROTC with engineering are available from the department counselors.

[1]An alternate approved sequence is Mathematics 171, 172, 173 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.

2nd Term

Math. 164	Differential Equations
Phys. 126[2]	Physics B
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. 201	Engineering Analysis I
E. E. 221	Electronics
Opt. 221	Introduction to Quantum Mechanics and Atomic Structure
**Elective	Humanities or Social Science

2nd Term

E. E. 202	Engineering Analysis II
E. E. 222	Feedback 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
Elective[4]	Technical
**Elective	Humanities or Social Science

2nd Term

E. E. 232	Microwave Engineering
E. E. 242	Electromechanical Energy Conversion
Elective[4]	Technical
Elective	Open

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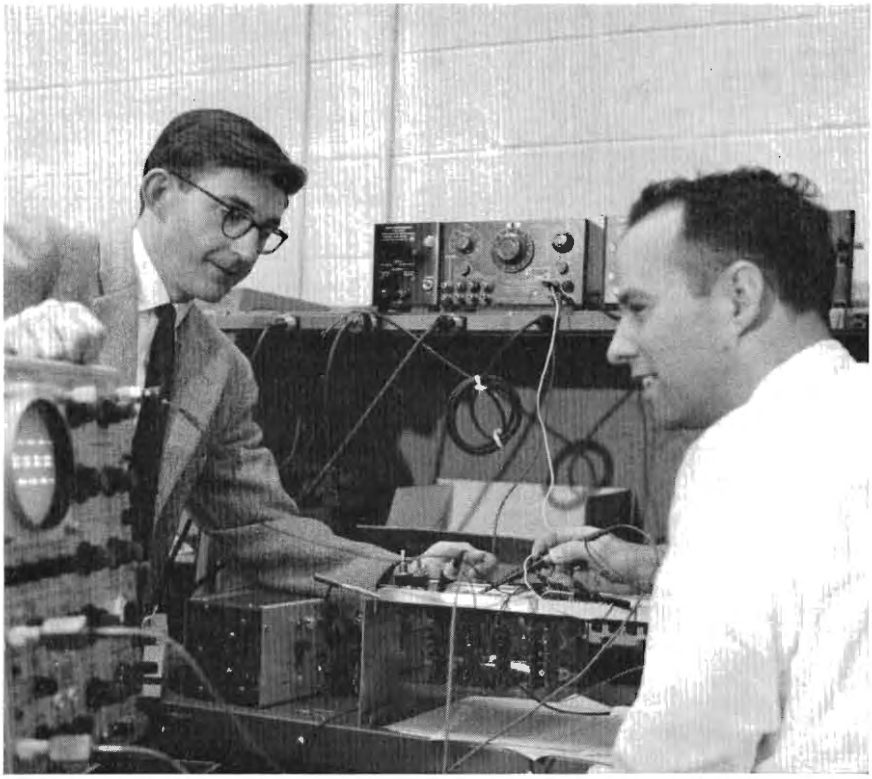
[4]Technical Electives available to Electrical Engineering students include:

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.

†Especially selected students may be permitted to carry one additional elective during each term for a maximum of 36 courses total.



COURSES OF INSTRUCTION

110, 111. ***Network Analysis I, II.*** An introductory circuit analysis course including the analysis of networks with both passive LRC elements and active elements as defined by their terminal characteristics. Topics include steady state and transient analysis of networks, piecewise linear analysis of nonlinear devices, and the techniques of solving problems by means of Laplace Transforms.

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 in the theory and engineering applications of matrices, 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 those illustrating the unique properties of the transistor. EE 221 prerequisite.

221. ***Electronics.*** An analysis of the basic circuits which are the building blocks of electronic devices, i.e., rectifiers, amplifiers, oscillators, and trigger or pulse circuits.

222. ***Feedback Systems Analysis.*** Theory of linear feedback systems and their analy-

sis and synthesis. Use is made of the techniques available from the theory of functions of a complex variable as developed in a companion course EE 202. EE 111 prerequisite.

231. *Electricity and Magnetism.* Foundations of electromagnetic field theory: boundary value problems of static and magnetic fields, multipole description of stationary distributions, quasi stationary fields and solution of Maxwell's equations for special cases.

232. *Microwave Engineering.* Theory of time varying fields with applications to transmission lines, wave guides, antennas and sources.

241. *Communication Systems.* Statistical methods in systems analysis, modulation and coding, measures of information, system models, comparison of communication systems.

242. *Electromechanical Energy Conversion.* An introduction to theory of electromechanical energy conversion with applications to rotating machines and incremental motion devices.

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.

401. *Computer Electronics.*

402. *Analog and Digital Computers.*

409. *Acoustics of Liquids and Solids I.*

431. *Advanced Network Analysis.*

Mechanical Engineering

THE DEPARTMENT OF MECHANICAL ENGINEERING has offered bachelor's degree programs for more than fifty years. In the past the primary emphasis was on preparation of students for immediate industrial employment following graduation. Recently the Department re-oriented and broadened its objectives and programs. To some extent the ever-increasing complexities of the sciences and technology have forced this change at Rochester as they have at other leading engineering schools. The change is due also to 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.

The program of the Department of Mechanical Engineering 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 thermo-electric 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 Engineering 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.

Faculty

Lewis Dalcin Conta, PH.D. (Cornell).....Professor of Mechanical Engineering

Martin Lessen, SC.D. (M.I.T.)..... Professor and *Chairman of the Department of Mechanical Engineering*

John Arthur Fox, PH.D. (Pennsylvania State).....Associate Professor of Mechanical Engineering
Robert G. Loewy, PH.D. (Pennsylvania).....Associate Professor of Mechanical Engineering
Oscar Edward Minor, B.S. (Rochester).....Associate Professor of Mechanical Engineering
Helmut Dietrich Weymann, DR.SC. (Aachen).....Associate Professor of Mechanical Engineering

H. Searl Dunn, PH.D. (Brown).....Assistant Professor of Mechanical Engineering
William Frederick Halbleib, PH.D. (Cornell).....Assistant Professor of Mechanical Engineering

Horace William Leet, M.E. (Cornell).....Professor Emeritus of Mechanical Engineering

DEGREE PROGRAM

Freshman Year

1st Term

Math. 161[1]	Analysis I
Phys. 115[2]	Physics A
Chem. 121[3]	General Chemistry I
Engl. 101	English Composition
Ph. Ed. 11 or 12	Physical Education I

2nd Term

Math. 162[1]	Analysis II
Phys. 116[2]	Physics A
Chem. 122[3]	General Chemistry II
Elective	Humanities or Social Science
Ph. Ed. 13 or 14	Physical Education II

Intersession

M. E. 104	Machine Shop

†Sophomore Year

1st Term

Math. 163[1]	Analysis III
Phys. 125[2]	Physics B
M. E. 120	Introduction to Mechanical Engineering
**Elective	Humanities or Social Science
Ph. Ed. 21 or 22	Physical Education I

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[1]An alternate approved sequence is Mathematics 171, 172, 173 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.

**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.

2nd Term

Math. 164	Analysis IV
Phys. 126[2]	Physics B
M. E. 121	Introduction to Mechanical Engineering
**Elective	Humanities or Social Science
Ph. Ed. 23 or 24	Physical Education II

†Junior Year

1st Term

M. E. 201	Engineering Analysis I
M. E. 221	Analytical Mechanics
Opt. 221	Introduction to Quantum Mechanics and Atomic Structure
**Elective	Humanities or Social Science

2nd Term

M. E. 202	Engineering Analysis II
M. E. 222	Continuum Mechanics
Opt. 222	Introduction to the Theory of the Solid State
**Elective	Humanities or Social Science

†Senior Year

1st Term

M. E. 223	Thermodynamics and Statistical Mechanics
M. E. 203	Mechanical Engineering Systems Design I
Elective	Technical
**Elective	Humanities or Social Science

2nd Term

M. E. 224	Transport Phenomena
M. E. 204	Mechanical Engineering Systems Design II
Elective	Technical
Elective	Open

NOTE: Students enrolled in Naval and Air Force ROTC programs may use one ROTC course (four hours) as an allowable elective in their mechanical engineering curriculum. The other ROTC courses required must be taken as an overload. Detailed programs combining ROTC with engineering are available from the departmental counselors.

COURSES OF INSTRUCTION

101. ***Engineering Graphics.*** For chemical engineers. Orthographic projection as a tool in solving problems in space, and also as the basis of communication among technically trained persons. Topics include: graphs, sectioning, conventions, dimensions, pictorials, assemblies, intersections, developments, along with "double auxiliary" methods of graphic solutions.

Credit—three hours.

104. ***Machine Shop.*** A course emphasizing standard machines and tools from the standpoint of their possibilities in performing various types of work. It is the aim of this course to acquaint the student with the abilities and limitations of modern machine tools, rather than to produce skilled machinists.

Credit —two hours.

105. ***Shop Practice.*** For chemical engineers. Simple machine tool operations, with demonstrations and practice in sheet metal working, soldering, welding, and pipe fitting, and lecture and plant visits in pattern making and foundry practice.

Credit—one hour.

112. ***Statics and Strength of Materials.*** For chemical engineers. Review of principles of statics and application to problems of engineering interest. The basic theories of strength of materials are covered—including properties of materials, axial loading, flexure, torsion, buckling, and combined stresses. Prerequisite: Math. 163, Physics 115–116.

Credit—three hours.

120, 121. ***Introduction to Mechanical Engineering.*** Introduction to engineering sys-

tems; 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 and Statistical Mechanics.*** Elementary kinetic theory, the first law, the second law, thermodynamic potentials, perfect gas, Van der Waals gas, Liouville's theorem, Boltzmann's principle, Maxwell-Boltzmann velocity distribution, specific heat, Maxwell-Boltzmann equation, collision integral, H-theorem.

224. ***Transport Phenomena.*** Non-equilibrium properties of gases and liquids such as diffusion, heat conduction, viscosity, and cross effects like thermal diffusion and electrical effects are treated on the basis of the kinetic theory of gases and/or irreversible thermodynamics. Solutions of the differential equations for heat transfer and diffusion.

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 Power 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.

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 optical engineering. 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

Robert Merrill Boynton, PH.D. (Brown)....
....Professor of Optics, Professor of Psychology (College of Arts and Science)
Miles Parker Givens, PH.D. (Cornell).....Professor of Optics
Robert Earl Hopkins, PH.D. (Rochester).....Professor of Optics and *Director of the Institute*
Walter Lewis Hyde, PH.D. (Harvard).....Professor of Optics
****Rudolph Kingslake,*** D.SC. (London).....Professor of Geometrical Optics

Robert Marsh Blakney, PH.D. (Rochester).....Associate Professor of Optics
Gordon Gladstone Milne, 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

Giancarlo Baldini, PH.D. (Milano).....Assistant Professor of Optics
Philip Werner Baumeister, PH.D. (California).....Assistant Professor of Optics
James Arthur Eyer, PH.D. (Rochester).....Assistant Professor of Optics
Albert Gold, PH.D. (Rochester).....Assistant Professor of Optics
M.V. Radha Krishna Murty, PH.D. (Rochester).....Assistant Professor of Optics

****John Cushing Evans,*** M.S. (Rochester).....Lecturer in Optics
****William P. Ewald,*** B.S. (Rochester).....Lecturer in Optics

*Part-time.

DEGREE PROGRAM

Freshman Year

1st Term

Math. 161[1]	Analysis I
Phys. 115[2]	Physics A
Chem. 121[3]	General Chemistry I
Engl. 101	English Composition
Ph. Ed. 11 or 12	Physical Education I

2nd Term

Math. 162[1]	Analysis II
Phys. 116[2]	Physics A
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 B
**Elective	Humanities or Social Science
**Elective	Humanities or Social Science
Ph. Ed. 21 or 22	Physical Education I

2nd Term

Math 164	Differential Equations
Phys. 126[2]	Physics B
**Elective	Humanities or Social Science
**Elective	Humanities or Social Science
Ph. Ed. 23 or 24	Physical Education II

†Junior Year

1st Term

Opt. 141	Geometrical Optics I
Opt. 221	Introduction to Quantum Mechanics and Atomic Structure
E. E. 221	Electronics
E. E. 201	Engineering Analysis I

2nd Term

Opt. 142	Geometrical Optics II
Opt. 222[3]	Introduction to the Theory of the Solid State
Opt. 162	Physical Optics I
E. E. 202	Engineering Analysis II

†Senior Year

1st Term

One of the following two courses

Opt. 253	Radiometry & Spectrophotometry
Opt. 241	Testing of Optical Units and Lens Systems I
Opt. 261	Physical Optics II
Opt. 231	Fundamentals of Electromagnetic Theory
Elective	Open

2nd Term

One of the following two courses

Opt. 254	Radiometry & Spectrophotometry
Opt. 242	Testing of Optical Units and Lens Systems II
Opt. 262	Physical Optics III
Elective	Humanities or Social Science
Elective	Open

NOTE: Students enrolled in Naval and Air Force ROTC programs may use one ROTC course (four hours) as an allowable elective in their optics curriculum. The other ROTC courses required must be taken as an overload. 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 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. Students majoring in Optics are expected to satisfy the language requirement of the College of Arts and Science in German, French, or Russian.

†Especially selected students may be permitted to carry one additional elective during each term for a maximum of 36 courses.

141, 142. ***Geometrical Optics I, II.*** Principles underlying the refraction, reflection, image translation and rotation, by systems of lenses and prisms. The Gaussian optics of lens systems is treated in detail. The course includes the theory of stops and pupils, the photometry of optical and projection systems, and the theory of visual systems such as magnifiers, telescopes, periscopes, and microscopes. The construction of spectrographs, monochromators, and refractometers is considered, and also the nature of lens aberrations and the different types of photographic objectives. *Laboratory:* In the laboratory classes many of the optical systems and instruments described in class are set up by the students, and their properties determined.

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.

162. ***Physical Optics I.*** The following topics are covered: wave motion, interference by division of wavefront and division of amplitude, diffraction phenomena, polarization. Prerequisites: Physics 126 or 128. Math. 164 is prerequisite or taken concurrently.

209. ***Computer Science.*** The programming of the digital computer is studied. Programs are written in compiler languages for the solution of problems in logic, statistics, mathematics, business. Prerequisites: One or more college-level mathematics courses are required.

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: Math 164 and Physics 126.

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.

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. ***Testing of Optical Units and Lens Systems I, II.*** Laboratory course, intended to accompany the course on Optical Design. Standard methods of testing optical units and measuring their properties. Experiments include: testing of surfaces, plates and prisms by Hardinger, Foucault, and interferometer methods; the lens-testing bench for the 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. 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.

253. ***Radiometry and Spectrophotometry I.*** Theories and the techniques involved in radiometric measurements. Particular attention will be given to errors in experimental results, sources of noise and the practical and theoretical limitations of radiation detectors. Discussion of special topics relating to radiometric and photometric problems encountered in physics and astronomy. Prerequisite: Physics 203 or equivalent.

254. ***Radiometry and Spectrophotometry II.*** The instruments used for spectrophotometry will be studied with emphasis on the practical and theoretical limits to sensitivity, resolution and range. Special topics in infrared techniques of detection will be discussed in terms of the spectral characteristics of the sources, the atmosphere and the components of the detectors.

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 college physics prerequisite.)

258. ***Physics of Photography.*** Latent image theory; mechanism of development; special exposure and development phenomena; physics of the developed photographic image; photographic photometry; photography with ultraviolet, infrared, X-ray, and nuclear particle radiation; analysis of subtractive color processes. Prerequisite: Optics 257. There is no formal laboratory, but a term paper or term project is required.

261. ***Physical Optics II.*** The following subjects are treated by classical electromagnetic theory; propagation, reflection and refraction of light, optical properties of metals, and optical dispersion. Prerequisite: Optics 162.

262. ***Physical Optics III.*** The course covers the Kirchoff 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. Prerequisite: Optics 261.

263. ***Polarized Light.*** The theory of the propagation of light in doubly refracting media; detection and measurement of plane and elliptical polarization; applications to petrography, photoelasticity, and polarimetry.

265. ***Applied Spectroscopy and Interferometry.*** Origin of spectra; classification and intensities of spectral lines; methods of exciting spectra of various types. The design, calibration and use of grating and prism spectrographs and interference spectroscopes. Spectrochemical analysis. Prerequisite: Physics 125–126.

283, 284. ***Mechanical Design of Optical Instruments I, II.*** A study of components and applications of optical instruments. Engineering of optical systems such as condensers, relays, visual and photoelectric instruments, timing, projection, and range finding systems. Principles of mechanical design including instrument engineering, kinematics, precision mechanisms, tolerances and materials. Laboratory experiments and analysis of finished instruments. Prerequisite: Physics 125–126.

293. ***Special Problems in Optics.*** A reading or research course open to seniors in optics by special permission.

471, 472. ***The Design of Lenses, Prisms and Optical Systems.***

474. ***Methods of Image Evaluation and Optical Systems.***

Department of Nursing

OF THE SCHOOL OF MEDICINE AND DENTISTRY

Donald E. Anderson, M.D. ..... Dean of the School of Medicine and Dentistry and Director of the Medical Center

Eleanor A. Hall, R.N., M.A. ..... Chairman

Ruby Hendryx, R.N., ED.M. ..... Assistant Chairman

Esther Thompson, R.N., M.A. ..... Director of Graduate Studies

Edna Muntz, B.A. ..... Registrar

Faculty

Eleanor A. Hall, R.N., M.A. (Columbia) ..... Professor of Nursing
Esther M. Thompson, R.N., M.A. (Columbia) ..... Professor of Nursing Education

Ruby Hendryx, R.N., ED.M. (Rochester) ..... Associate Professor of Nursing
Florence E. Dunn, R.N., M.A. (Columbia) ..... Associate Professor of Nursing Education
Madeline Kennedy, R.N., M.A. (Columbia) ..... Associate Professor of Nursing (Med.-Surg.)
Mary Norma O'Hara, R.N., M.A. (Columbia) .... Associate Professor of Nursing (Maternal-Child)
Martha Pitel, R.N., PH.D. (Minnesota) ..... Associate Professor of Nursing and Anatomy
Winifred Smith, R.N., M.A. (Boston) ..... Associate Professor of Nursing (Psychiatric)

Rita Chisholm, R.N., M.A. (Columbia) ..... Assistant Professor of Nursing (Public Health)
Josephine Craytor, R.N., M.S. (Rochester) ..... Assistant Professor of Nursing (Med.-Surg.)
Marion Mason, M.S. (Ohio State) ..... Assistant Professor of Nursing (Nutrition)
Marjorie Pfaudler, R.N., M.A. (Columbia) ..... Assistant Professor of Nursing (Rehabilitation)
Mary Wemett, R.N., M.S. (Rochester) ..... Assistant Professor of Nursing (Fundamentals; Med.-Surg.)
Alice Wightman, R.N., M.A. (New York) ..... Assistant Professor of Nursing (Public Health)

Sylvia Ajemian, R.N., M.S. (Colorado) ..... Instructor in Nursing (Medical-Surgical)
Mary Mabie, R.N., M.A. (Columbia) ..... Instructor in Nursing (Medical-Surgical)
Marilyn Sjevda, R.N., M.S. (Indiana) ..... Instructor in Nursing (Maternal-Child)
Virginia Wandover, R.N., M.S. (Western Reserve) ..... Instructor in Nursing (Med.-Surg.)

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.

The curriculum is so arranged as to provide a sound foundation in the humanities, social sciences and natural sciences. Upon this base are built the educational experiences in the nursing major designed to help the student acquire the knowledge, skills and understanding necessary to give care to individuals according to their physical, emotional and social needs, aiming at the greatest possible independence and self-direction for the persons served; to work with the physician and other members of the health team to carry out the total plan of care; to counsel and teach individuals and groups in the promotion and maintenance of health as well as in the nursing care of the sick; to approach the practice of nursing responsibility with a determination to improve its quality and to raise the standards of the profession in general.

This program leading to the degree, Bachelor of Science with a Major in Nursing, is designed to prepare for professional nursing practice in hospitals and public health nursing agencies and to provide a sound educational base on which graduates may build careers in the care of patients, in teaching, administration, and research, depending on their interests and capabilities.

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 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.

Graduates are eligible to take the state licensing examination (R.N.).*

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.

The hospitals at the University Medical Center are approved by the Joint Commission on Accreditation of Hospitals.

ADMISSION Students who plan to major in nursing should file application for transfer from the College of Arts and Science 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 may secure application forms and information concerning admission from the Office of Registrar, Department of Nursing.

To qualify for unconditional admission, a student must have satisfactorily completed 16 courses at the University of Rochester or a minimum of 60 semester hours at another accredited institution. To meet distribution requirements the program of study should include:

a. introductory courses in:
- English Composition
- Biology
- Psychology
- Chemistry (2 semesters)
- Sociology (2 semesters)

and additional courses from the humanities, social sciences, and natural sciences.

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.

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.

*The law of New York State requires every person admitted to the examination for license as a Registered Professional Nurse in New York State to submit evidence that she is a citizen of the United States or has declared her intention of becoming a citizen. In the latter case any license issued shall terminate and become void at the end of seven years from such declaration of intention if the holder has not become a citizen.

At the satisfactory completion of the baccalaureate program a student meeting the citizenship requirements of this state 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.

TUITION AND FEES

NURSING

Junior Year	*1st Term*	*2nd Term*	*Summer*
Tuition	$300.00	$300.00	$200.00
Room	150.00	150.00	85.00
Meals	247.50	247.50	100.00
Health Fee	17.50	17.50	——
Student Activity Fee	12.50	12.50	——
	$727.50	$727.50	$385.00

Senior Year			
Tuition	$300.00	$300.00	$200.00
Room	150.00	150.00	100.00
Meals	247.50	247.50	100.00
Health Fee	17.50	17.50	——
Student Activity Fee	12.50	12.50	——
	$727.50	$727.50	$400.00

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 receiving 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.

SCHOLARSHIPS AND LOANS A number of scholarships and loans are available to undergraduate students. Secure applications from the Office of the Registrar.

COURSE OF STUDY

*Freshman Year**

First Term

Course	Hours
English 101 English Composition	4
Chemistry 121 General Chemistry I	4
Anthropology 101 Introduction	4
Elective**	4

Second Term

Course	Hours
Elective	4
Chemistry 122 General Chemistry II	4
Sociology 102 Introduction	4
Elective	4

Sophomore Year

First Term

Biology 101 General Biology	4
Elective	4
Elective	4
Elective	4

Second Term

Psychology 101 Introduction	4
Elective	4
Elective	4
Elective	4

*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.

In the Department of Nursing

Junior Year

First Term

NUR200 Fundamentals of Nursing Practice	6
NUR212 Anatomy and Physiology	5
NUR217 Microbiology	3
NUR210 Nutrition	3
	17

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
	14

Summer Session (12 weeks)

NUR232 Public Health Nursing	6
NUR236 Management of Nursing Care	2
	8

Second Term

NUR226 Psychiatric Nursing	10
NUR230 Public Health	3
NUR240 Senior Seminar	3
	16

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 136 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 science of nutrition including biochemical aspects. The focus is on food in health and in disease as part of the total plan in preventive, therapeutic and rehabilitative nursing.

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.

217. ***Microbiology.*** A course in which bacteria, fungi and viruses are studied from the point of view of their biological characteristics in public health, industry and agriculture.

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. Experience 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 including the adolescent.

226. ***Psychiatric Nursing.*** In the psychiatric setting, skills and understandings pertinent to the nursing care of patients are developed with emphasis on the relationship of the nurse both to the individual patient and to groups of patients. Care of the patient is discussed in the larger context of family and community.

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 assess, plan and provide nursing care for a group of patients. Concepts of management are investigated.

240. ***Senior Seminar.*** The identification and exploration of problems within or related to the nursing profession. A substantial paper is required.

Administration

THE BOARD OF TRUSTEES OF THE UNIVERSITY

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Joseph E. Morrissey, A.B., 1967
Samuel S. Stratton, A.M., 1965

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