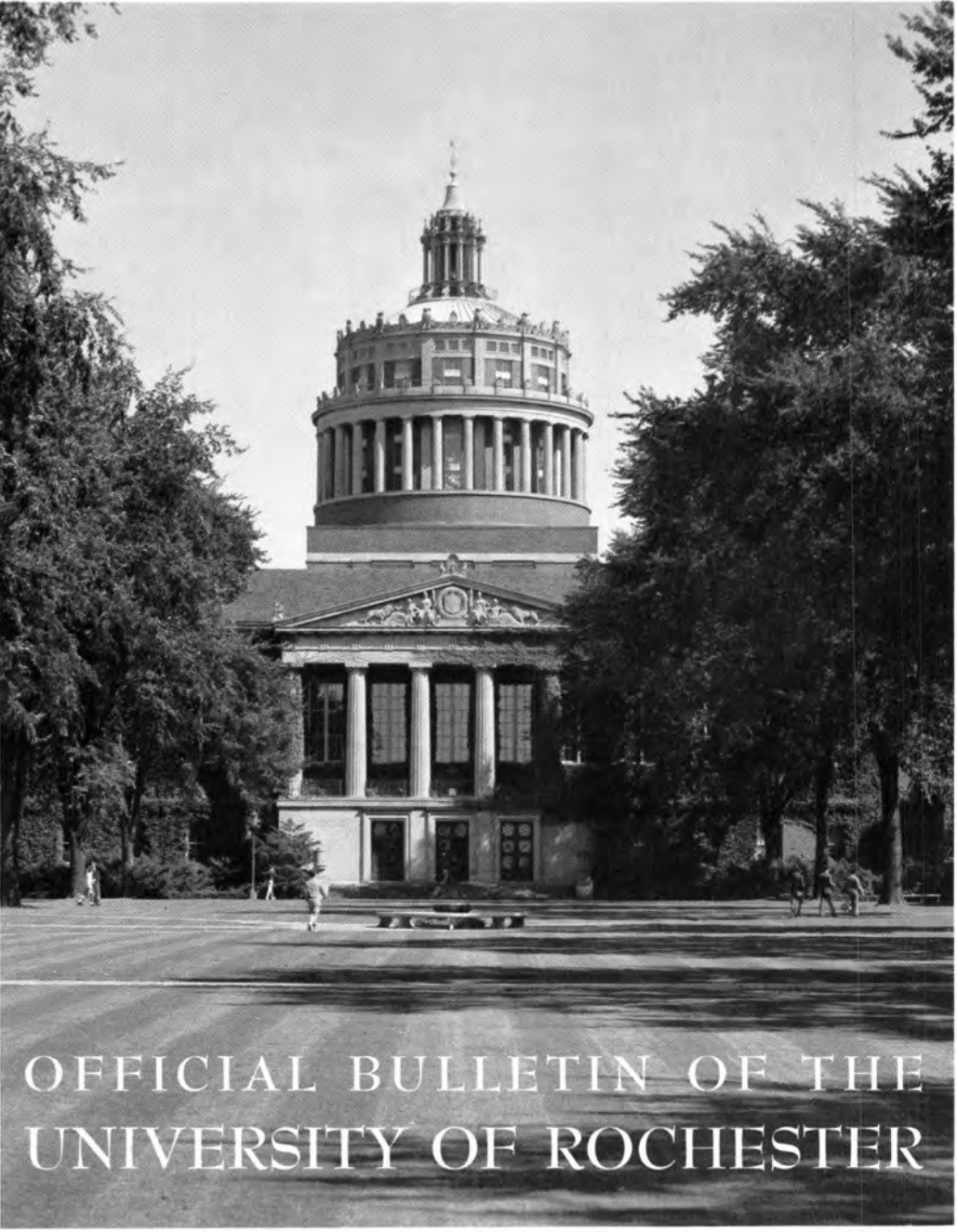

UNDERGRADUATE STUDIES

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

1961-1962

ES 56, NUMBER 3—SEPTEMBER 10, 1961

Bulletin of Undergraduate Studies 1961-1962

Official Bulletin

SERIES 56, NUMBER 3

SEPTEMBER 10, 1961

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UNIVERSITY OF ROCHESTER

COLLEGE OF ARTS AND SCIENCE
COLLEGE OF BUSINESS ADMINISTRATION
COLLEGE OF EDUCATION
COLLEGE OF ENGINEERING
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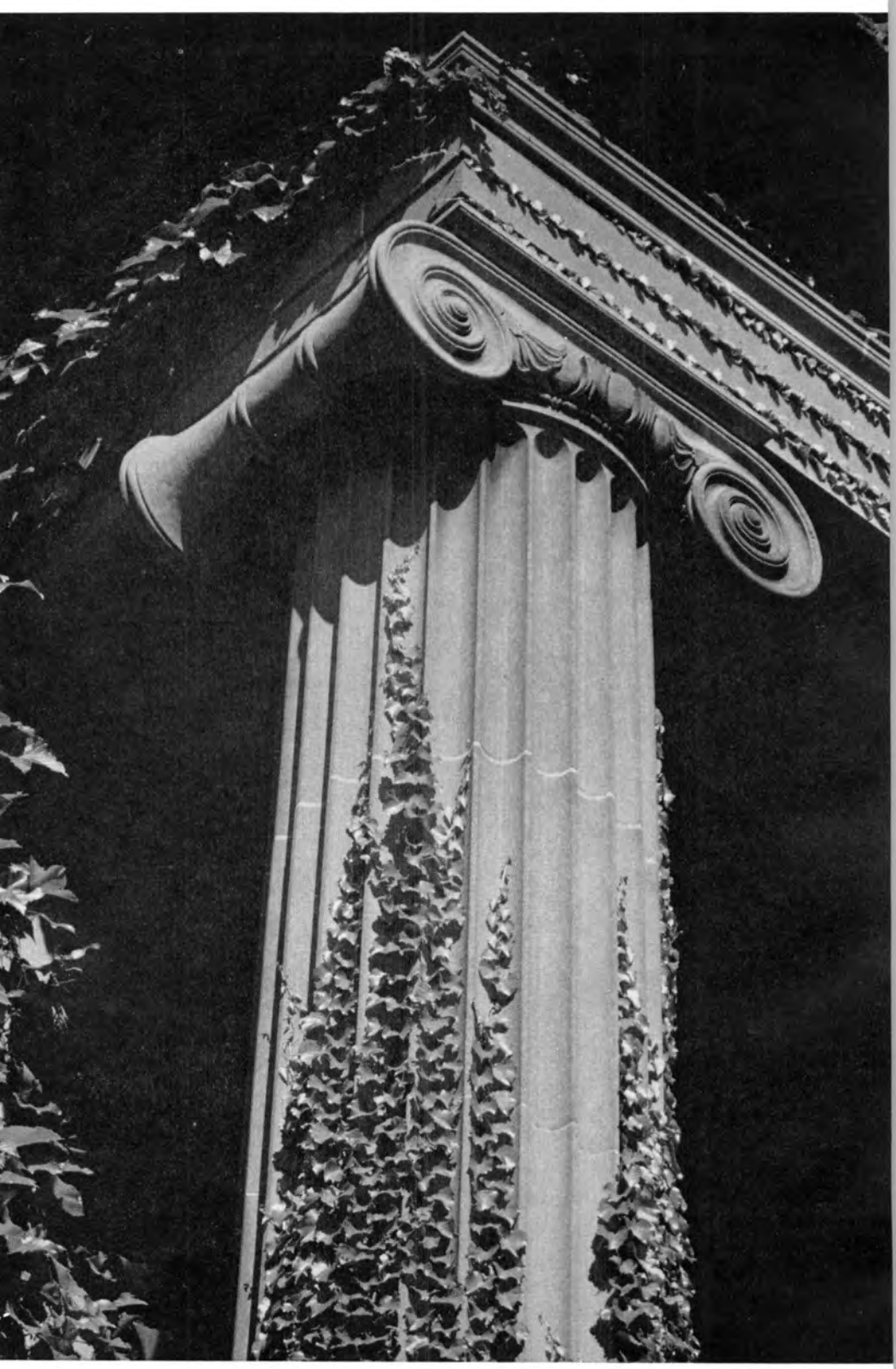


"Each generation must develop a philosophy of education adequate to the existing state of knowledge, to the demands made upon education by society, and to that vision of things to come that marks the best academic intelligence."

CORNELIS W. DE KIEWIET
President of the University

Calendar

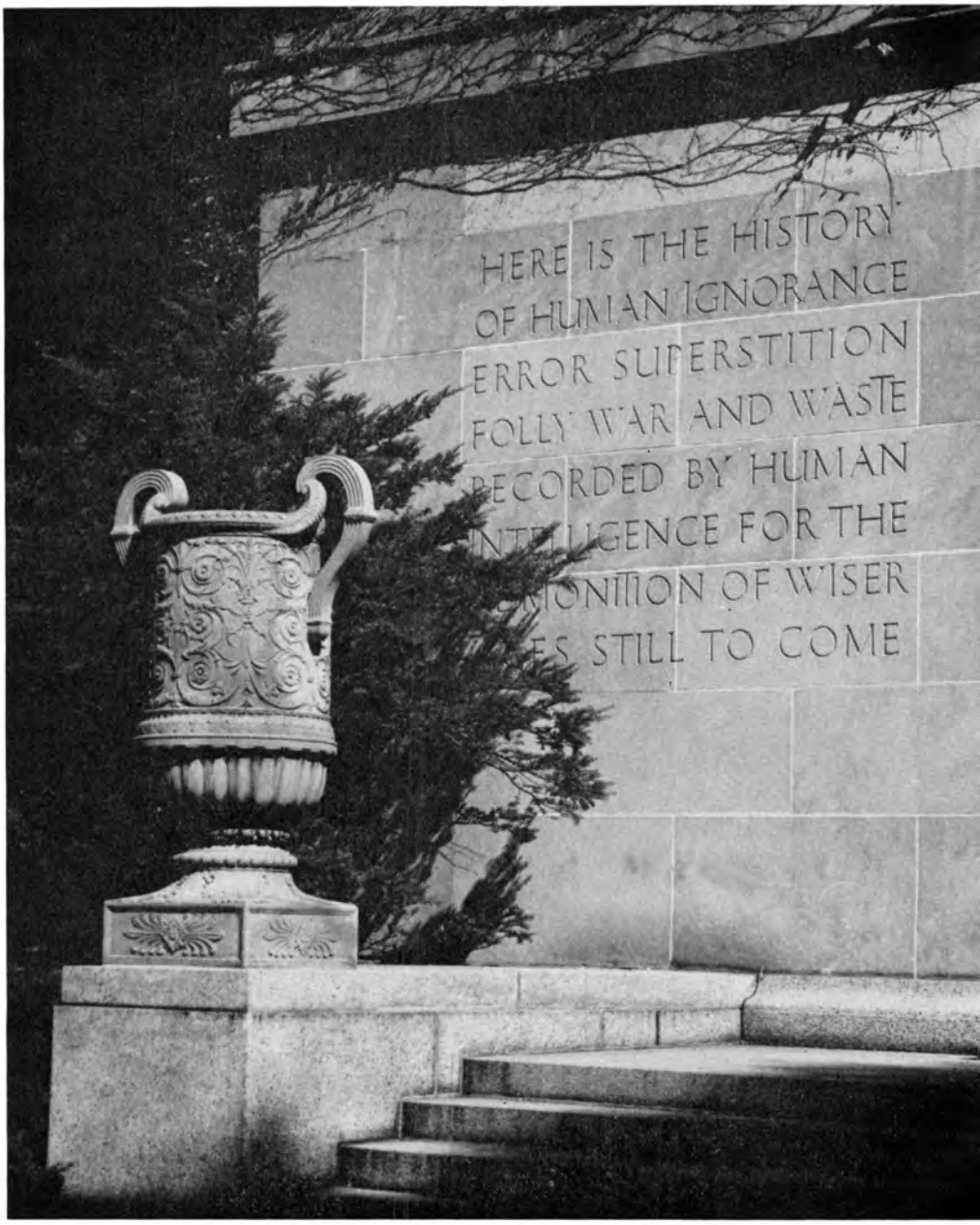
Fall 1961

September	**14**—*Thursday*	Registration begins.
	20—*Wednesday*	Instruction begins
October	**6**—*Friday*	Last day for payment of undergraduate tuition
November	**22**—*Wednesday*	Thanksgiving recess begins at noon
	27—*Monday*	Classes resume
December	**19**—*Tuesday*	Christmas recess begins at close of classes
January	**3**—*Wednesday*	Classes resume
	13—*Saturday*	Last day of classes
	16—*Tuesday*	Term examinations begin
	26—*Friday*	Term examinations end

Spring 1962

January	**31**—*Wednesday*	Instruction begins for Spring Semester
February	**16**—*Friday*	Last day for payment of undergraduate tuition
March	**24**—*Saturday*	Spring Recess begins at close of classes
April	**2**—*Monday*	Classes resume
May	**18**—*Friday*	Last day of classes
	21—*Monday*	Term examinations begin
	30—*Tuesday*	Memorial Day Holiday
June	**1**—*Friday*	Term examinations end
	10—*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

University of Rochester

THE UNIVERSITY OF ROCHESTER, founded in 1850, is a privately controlled, non-denominational institution offering diversified programs of undergraduate and graduate education for men and women. The educational program of the University embraces studies in the humanities, social sciences, the natural sciences, and the professional fields of engineering, business administration, education, music, medicine, and nursing.

These studies are offered through seven major academic units: the College of Arts and Science, the College of Business Administration, The College of Education, the College of Engineering, University School of Liberal and Applied Studies, the School of Medicine and Dentistry (including the Department of Nursing), and the Eastman School of Music.

The central core of the University's programs and services is the College of Arts and Science, around which have developed the schools and colleges for professional and advanced study. The University's faculties share the conviction that undergraduate education should be based on a broad program of studies in the humanities, the social sciences, and the natural sciences. As a result, all full-time undergraduate students on the University's River Campus are enrolled in the College of Arts and Science for their first two years. Many students take their entire undergraduate program in the College; others transfer at the end of their sophomore year to one of the professional units for specialized study in business administration, engineering, education or nursing.

All regularly enrolled undergraduates studying full-time on the River Campus are members of a single student body, sharing the residence and dining halls and the many extra-curricular phases of campus life.

The University is fully accredited by the Middle States Association of Colleges and Secondary Schools and is a member of the Association of American Universities.

Educational Aims

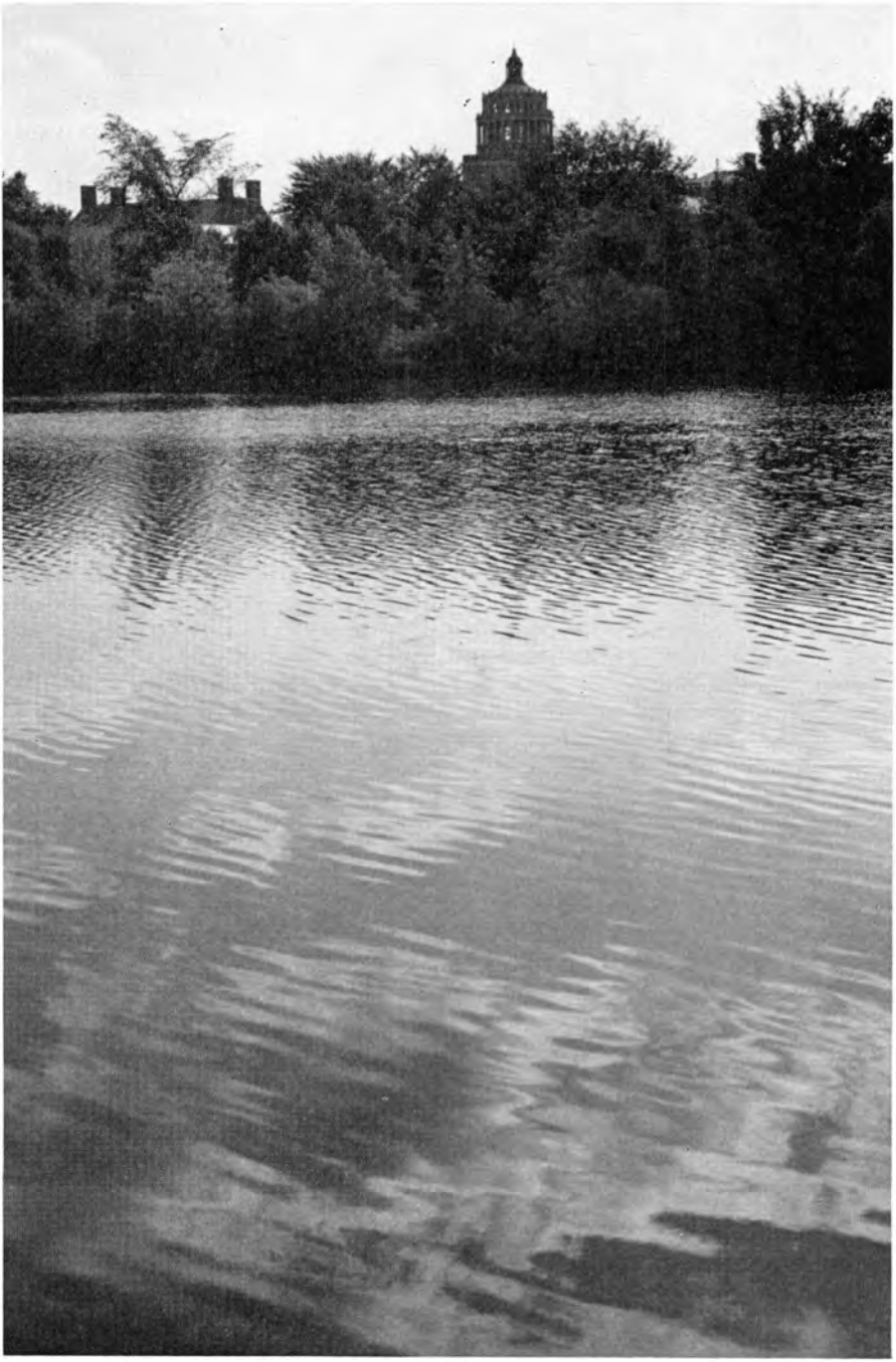
THE ACADEMIC PROGRAMS offered for River Campus undergraduates are based on the belief that educated men and women in the modern world must have command of exact knowledge in some special field, suitable to their interests and competence, to equip them for useful occupations in their community and nation. They must also have the opportunity to learn and understand their wider responsibilities for enlightened leadership as citizens in a complex social order. In the light of these demands, liberal education at Rochester is designed to evoke clarity of thought, direction of purpose and integrity of character. Ideally, of course, such qualities should remain as permanent acquisitions of persons enjoying the privilege of higher education.

To assist the student in developing these qualities, the University serving in a free society places its faith and emphasis on these main objectives:

1. A Liberal Education. *Knowledge:* The University believes that a liberal education should offer students such knowledge of their cultural heritage as to enrich their experience and provide them with sources of wisdom for the future, to comprehend the nature of the physical world, and to appreciate the problems of the social, political, and economic world in which they live.

2. A Professional Education. *Specialization:* In addition to a liberal education, the University aims to train students in special professional studies based on a core of the humanities but with intensified work in various fields which will enable them to be versatile in the application of their knowledge, well received by other universities for advanced work, and well equipped to qualify for responsible positions in the productive life of their communities.

3. Preparation for the Future. *Character:* The most important aim of any university is to give students such training as will enable them to face the future without fear. The University hopes to develop in its graduates free, inquiring minds, released from prejudices, able and willing to think in accordance with facts and with the laws of inference, to choose wisely with discrimination and sympathy and ready to assume their responsibilities to society. The union of knowledge, reason, sympathy, guided by moral and ethical values, is the final goal of education.



The River Campus Setting

THE UNIVERSITY OF ROCHESTER recognizes both the general purpose of enlarging and informing each student's range of productive talent and the specific purpose of training the intellect. The excitement of expanding experience and the discipline of dealing rationally and critically with such experience are available to the student. A distinguished faculty, a student body varied in background and interest, and physical facilities of high quality provide a favorable environment for the student's intellectual and personal growth.

The University's schools and colleges are located on three campuses. The River Campus contains five academic units: the College of Arts and Science, the College of Business Administration, the College of Engineering, the College of Education, 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, and Rochester Municipal Hospital. The Eastman School of Music has its own academic buildings in the center of Rochester; the Eastman School residences and recreational center are located on the Prince Street Campus, which also houses the University's Memorial Art Gallery.

The University faculty of Rochester has long held the belief that its educational aims can best be realized in an academic setting of moderate size and high academic quality. Full-time undergraduate enrollment on the River Campus currently totals some 2,200 students (about 1,500 men and 700 women). The University's students come from all parts of the United States and many foreign countries. Eighty-five percent of the River Campus undergraduates live on campus.

The University's relatively compact size encourages a close relationship between students and faculty—a relationship that gives personal meaning to the concept of a university as a community of scholars. The diverse interests of the various schools and colleges—and the increasing collaboration among many departments—provide an invigorating academic climate for student and teacher alike.

The University's programs have been aided by generous support from many benefactors. Its endowment has enabled it to attract a highly competent faculty and to provide excellent facilities for teaching, research, and campus living.

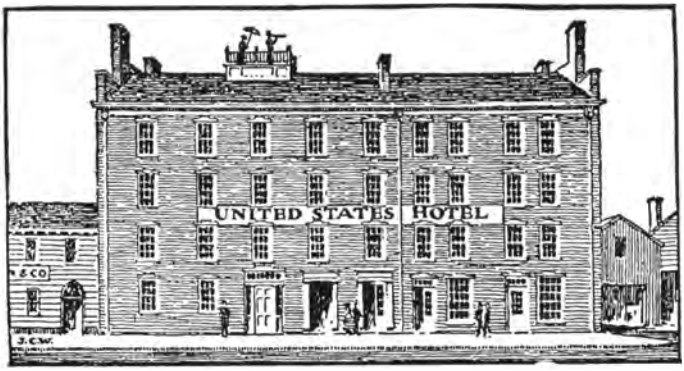
The Campus is situated on high rolling ground overlooking the Genesee River. Academic buildings are in Georgian and Greek Revival styles of architecture with Doric or Ionic columns. Most of the principal classroom and laboratory buildings are arranged around the spacious Eastman Quadrangle. The Quadrangle, on the highest ridge of the campus, faces the Genesee River and is dominated at its head by the massive tower of Rush Rhees Library. In the 185-foot Library tower is the Hopeman Memorial Chime of nineteen bells.

The Georgian-style residence halls for men and the fraternity houses are on the lower campus. The Women's Residence Halls and physical education build-

ing are situated on a knoll in the northeast section of the campus. A new 500-student dormitory and dining center for junior and senior students will be ready for occupancy in 1963.

Adjacent to the River Campus is the 650-acre Genesee Valley Park, with its broad meadows, groves, creeks for canoeing, two eighteen-hole golf courses, ice skating rinks, and hiking trails.

Although its secluded location at the city's southwest boundary isolates the River Campus from the urban bustle, the University enjoys many advantages from its cordial relations with the community. Rochester is known as one of the country's great music centers and as a city of high cultural and civic aims. Concerts by the Rochester Philharmonic and Civic Orchestras and by Eastman School of Music symphonic and chamber music ensembles, choruses, opera groups, instrumentalists, and vocalists provide a wealth of music throughout the year. At the School's magnificent Eastman Theatre, concerts are given by world renowned artists and visiting orchestras. Excellent museums (including the University's Memorial Art Gallery), libraries, theatres, churches, and schools add to the city's appeal. Rochester is nationally known for its many beautiful parks. Lake Ontario at the city's northern edge affords good swimming and sailing. Nearby are a number of fine state and county parks; the scenic beauties of the Genesee Country, the Finger Lakes region, and the Bristol Hills attract visitors from all parts of the nation.



The United States Hotel was the home of The University of Rochester from 1850 to 1860

Historical Sketch

THE STORY OF the University's growth illustrates a philosophy that combines respect for sound traditions with vitality and flexibility in response to changing conditions. The University started in November, 1850, with seventy students and seven professors. Its first campus was the old United States Hotel near the Erie Canal; the building was furnished with "five pine tables, six arm chairs, one hundred common chairs, thirty setees for the chapel, seven stoves, and seven boxes of wood."

Although founded chiefly by Baptists, the University was nondenominational from the start and finally severed the official Baptist connection in 1908.

The University moved to its own 24-acre Prince Street campus in 1861. Under the founder, Ira Harris, and the presidents who served the University until 1900 (Martin Brewer Anderson and David Jayne Hill), a traditional curriculum was available for young men.

A new era began in 1900 when Rush Rhees was elected President. Susan B. Anthony led a group of Rochester women to demand admission to the University. Aided by a bequest from the anthropologist, Lewis H. Morgan, to provide "female education of high grade in the City of Rochester," women were admitted and two new buildings were erected for their exclusive use.

During the twenties the small liberal arts college began to move toward true university stature. In 1918 George Eastman presented to the University the property and corporate rights of the Institute of Musical Art. Later Mr. Eastman purchased a site for new buildings, erected a modern music school, and provided generous funds for its endowment. In 1925 the School of Medicine and Dentistry was opened with funds provided by the General Education Board

and George Eastman. The School was the first wholly new medical school built under a nationwide program to reorganize medical education.

In 1930 the River Campus became the new College for Men, and the College for Women took full possession of the Prince Street Campus.

During the presidency of Alan Valentine, from 1935 to 1950, the University grew in prestige as its programs in the arts and sciences, music, and medicine attained impressive quality and strength. Of special importance during this period was the introduction of the Honors Program, which gave opportunities for qualified students to work independently with individual faculty instruction. College departments were strengthened, particularly those of psychology, chemistry and physics.

In 1938 the Institute of Optics, the nation's only private university center for teaching and research in optics, was founded to help meet the need for academically trained personnel in the optical industry and in branches of science and industry which require optical instrumentation and information.

The Department of Physics and Astronomy became one of the country's outstanding centers for teaching and research in nuclear physics and cosmic ray studies. In connection with the Department's activities a 240,000,000-volt cyclotron and laboratory were built shortly after World War II; at that time the cyclotron was the largest atom smasher in the United States.

Dr. Cornelis W. de Kiewiet, a distinguished historian and educational administrator, became the University's fifth president in 1951. Under President de Kiewiet's leadership, the University has moved to achieve full stature among the nation's leading institutions of higher learning. A number of changes in this direction have been made.

One of the first changes was the merger of the College for Men and the College for Women. A major building program provided academic and residence facilities for the coeducational College of Arts and Science, which opened in 1955.

In recent years a number of significant educational and student service programs have been introduced. Among them are pioneering programs in Non-Western Civilizations and in Canadian Studies. These programs, which cut across the customary departmental lines, are designed to give students a broad understanding of the history, philosophy, economics, culture, and political concerns of areas which are emerging as major forces in world relations.

In 1958 the University's long-established programs in business administration, education, and engineering were given full professional status as the School of Business Administration, the College of Education, and the College of Engineering and in 1961 the School of Business Administration became the College of Business Administration.

In a move to strengthen the University's offerings in nursing, the separate faculties in nursing which had existed in the College of Education and the Department of Nursing of the School of Medicine and Dentistry were consolidated within the Department of Nursing at the Medical School July 1, 1961. The unified faculty in the Department of Nursing assumed responsibility for all nursing education at undergraduate and graduate levels.

An important development at Rochester has been the University's growing stature as a center for research and research training. During the past decade the University's obligation to participate creatively in the discovery and application of new knowledge has been met through a steady expansion of research

activities. This University-wide surge of interest in research has had major impact both in attracting eminent scholars to the faculty and in enriching the total academic climate of the University.

Another development has been the growth of interdisciplinary programs, in which the scholars from many fields pool their experience and talents in programs of teaching and research in important areas of knowledge. The University's new Brain Research Center, for example, brings together specialists from psychology, anatomy, biochemistry, physiology and pharmacology, as well as engineers, mathematicians and physicists. The recently established program in biomedical engineering—one of the few offered in this field—is conducted by the College of Engineering in cooperation with the School of Medicine and Dentistry. In the field of genetics-cellular biology, collaborative efforts are being developed by the Department of Biology in the College of Arts and Science and various departments of the Medical School.

In line with these developments, cooperative activities between optics and engineering were strengthened by the consolidation of the Institute of Optics within the College of Engineering on Sept. 1, 1961.

With the growing recognition of the interrelationship among many academic disciplines, collaborative projects in teaching and research undoubtedly will increase in the years ahead.

* * *

A brief description of each of the University's major divisions follows. Information on undergraduate programs offered by the College of Arts and Science, the College of Business Administration, the College of Education, and the College of Engineering appears in the section on degree programs, Page 79.

An *Official Bulletin* is issued for each of the following: University School of Liberal and Applied Studies, Eastman School of Music (Regular and Summer Sessions), School of Medicine and Dentistry, Department of Nursing, River Campus Evening Session, River Campus Summer Session, and Graduate Studies. For information on obtaining such publications, refer to inside back cover of this *Bulletin*.

College of Arts and Science

Oldest of the University's schools and colleges, the College of Arts and Science provides a wide range of undergraduate and graduate courses in the humanities, the natural sciences, and the social sciences. Undergraduate programs lead to the degrees Bachelor of Arts and Bachelor of Science; graduate programs, to the degrees Master of Arts, Master of Science, and Doctor of Philosophy. The College conducts programs of research and scholarly endeavor in each of its areas of study.

College of Business Administration

Courses in business have been available at the University since the 1920's, and undergraduate and graduate degree programs, since 1945. The College offers, on a broad base of two or more years of study in the arts, sciences, and humanities, a group of professional courses leading to the degree Bachelor of Science with a major in business administration, accounting or industrial management. Graduate study is offered leading to the degrees Master of Business Administration (M.B.A.) and Master of Science (M.S.).

College of Education

The University has provided courses in teacher education for many decades, initially through extension classes, then through a Department of Education, and later through a Division of Education. The College of Education offers the degrees Bachelor of Science in Education with majors in elementary and secondary education, Master of Education, Master of Arts in Education, and Doctor of Education, as well as the Certificate of Advanced Study for special programs in professional education.

College of Engineering

Courses in engineering have been given at the University for half a century, until recently in the College of Arts and Science. The College of Engineering is primarily an upper division and graduate level college, offering work through the PH.D. level in chemical, electrical and mechanical engineering, and in optics. Through the Institute of Optics, now a department of the College, a complete training in geometrical, physical, and physiological optics is offered.

School of Medicine and Dentistry

The School of Medicine and Dentistry is located in the University Medical Center adjacent to the River Campus. The School offers a four-year program leading to the M.D. 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 study in the preclinical sciences, radiation biology and health physics.

Department of Nursing (School of Medicine and Dentistry)

The University of Rochester has conducted educational programs in nursing since 1925. The Department of Nursing offers programs leading to the degrees 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. Requests for the *Official Bulletin* of the Department of Nursing should be addressed to the Registrar, Department of Nursing, University of Rochester School of Medicine and Dentistry, 260 Crittenden Boulevard, Rochester 20, N. Y.

Eastman School of Music

The Eastman School, 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 degree 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

University School provides university training to persons who, because of employment or for other reasons, 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, during 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 the degree Bachelor of Science with a major in general

studies, and to the 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 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 the work for Graduate Studies.

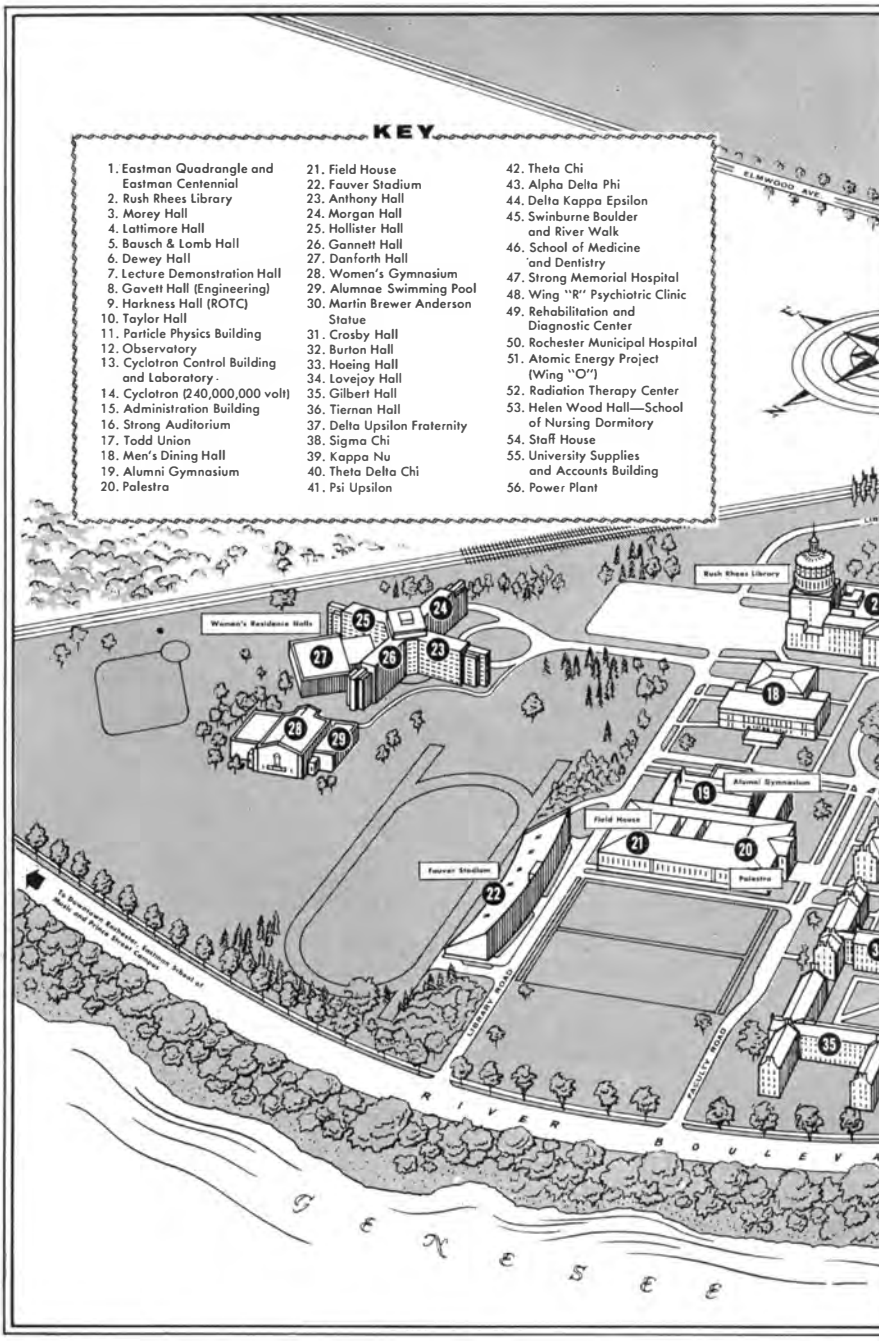
Evening and Summer Sessions

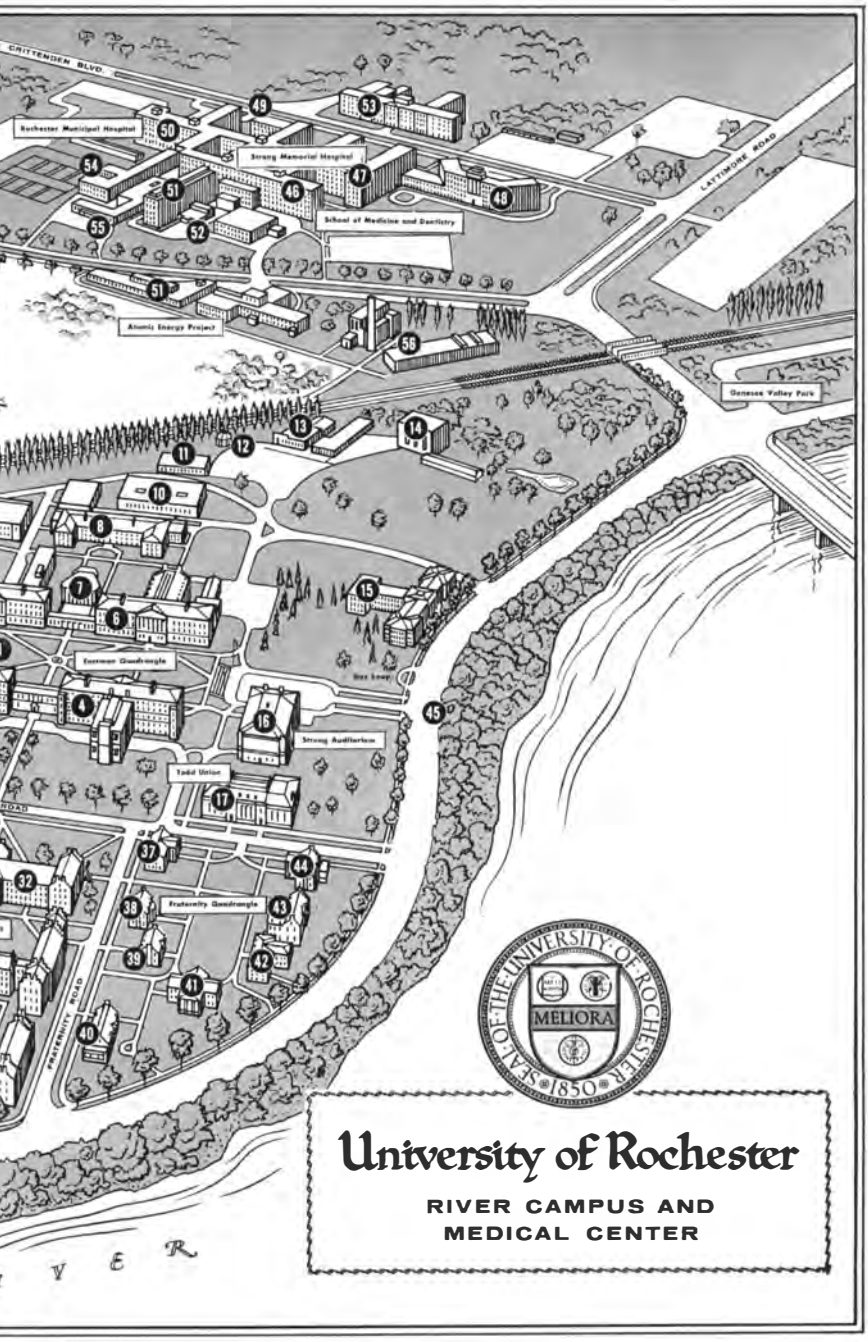
Evening Session

Six academic units participate in the River Campus Evening Session: the Colleges of Arts and Science, Education, Engineering, and Business Administration; the Department of Nursing of the School of Medicine and Dentistry; and University School of Liberal and Applied Studies. Offerings are designed primarily for part-time students. The College of Arts and Science and the College of Engineering give evening session programs leading to the Master's degree. The College of Education, the College of Business Administration 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 University School until admitted to the school or college of their choice.

Summer Session

In 1921 the University instituted instruction through summer study. There are two Summer Sessions: one on the River Campus and the other 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 study 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. Gavett 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. Gannett 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. Sigma Chi
39. Kappa Nu
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
ELMWOOD AVE.
Rush Rhees Library
Women's Residence Halls
Alumni Gymnasium
Field House
Palestra
Fauver Stadium
LIBRARY ROAD
FACULTY ROAD
To Downtown Rochester, Eastman School of Music and Power House Complex
RIVER BOULEVA
GENESEE



University of Rochester

RIVER CAMPUS AND MEDICAL CENTER

River Campus Facilities

2.* ***Rush Rhees Library.*** Books are the indispensable tools of student and teacher. The University Library has a total collection of approximately 700,000 volumes and receives annually more than 5,000 periodicals. The several libraries of the University are under the same administration and are joined by a delivery system which makes any book in the collection available to each campus.

The main collection of some half-million volumes is in Rush Rhees Library, named for Rochester's third president. Rush Rhees Library's rich resources embrace the regularly used books and periodicals for assigned and collateral course reading, a number of important collections and source material in many fields. The collections on American political history are particularly outstanding. These include the papers of William H. Seward, President Lincoln's Secretary of State; Thurlow Weed, nineteenth-century political leader; and former Governor Thomas E. Dewey, who placed all of the papers dealing with his public career on permanent deposit in Rush Rhees Library when he left political life in 1954.

In the Treasure Room are the rare books, first editions, priceless manuscripts, and incunabula which lure the book-lover, collector, and scholar. Among them are early printed books, significant editions of several American authors, collections on Mark Twain, Washington Irving, the English drama, and the Hoeing Collection of books on the Restoration and eighteenth century English literature.

A noteworthy feature of the Library is the Welles-Brown Room, a spacious tastefully-appointed room containing choice editions of the classics and a selection of the best work of modern authors. It is designated as a browsing room to encourage the student's recreational reading and love of fine books.

Other University libraries available to River Campus students are the Sibley Music Library at the Eastman School of Music, housing one of the most complete music collections outside the Library of Congress; the Memorial Art Gallery

*Numbers refer to location on campus map, Page 18 and 19.

Library; and the Edward G. Miner Library at the School of Medicine and Dentistry.

Grouped around Eastman Quadrangle, so named to perpetuate the name of the University's great benefactor, George Eastman, are these four structures:

3. ***Morey Hall,*** named for William Carey Morey of the Class of 1871, for forty-eight years a distinguished Professor of History and Political Science. It houses the classrooms and offices of many of the liberal arts departments, the office of the Dean of Students, the administrative offices of the College of Arts and Science, the Laboratory of Psychology, and the Brain Research Center.

4. ***Lattimore Hall,*** which houses the Department of Chemistry and is named for Samuel Allan Lattimore, Professor of Chemistry for forty-two years. The national editorial offices of the *Journal of the American Chemical Society,* which were moved to the Rochester campus in 1950, are located here.

5. ***The John J. Bausch-Henry Lomb Memorial Laboratory,*** housing the Department of Physics and Astronomy. It was named in recognition of a generous gift by the families of the founders of the Bausch & Lomb Optical Company. Special facilities for research include a cyclotron capable of producing eight-million-volt protons for nuclear research. Currently under construction is a new building adjoining the main physics building, for programs in physics, astronomy, and mathematics.

13. A large cyclotron and an associated laboratory, completed in 1949 and 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.

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

6. ***The Chester Dewey Building,*** bearing the name of the University's first Professor of Chemistry and Natural Science. It is shared by the Departments of Biology, Geology, Geography, Anthropology and Sociology, and the College of Business Administration.

7. The new Lecture-Demonstration Hall. Currently under construction, the Hall will provide special facilities for science demonstrations, lectures, and special meetings and conferences.

9. ***Harkness Hall,*** the naval and air science building, named for the late Rear Admiral William Harkness, Class of 1858, a noted naval astronomer. It contains classrooms, an armory, a practice range, naval reference library, and other facilities for the instruction of the Naval Reserve and Air Force Officers' Training Corps units.

8. ***Gavett Hall*** of the College of Engineering, named in honor of the late Joseph W. Gavett, Jr., Professor of Mechanical Engineering and Chairman of the Department of Engineering in the College of Arts and Science from 1921 until his death in 1942. It provides classrooms, laboratories, offices, and shop facilities for instruction and research in chemical, electrical, 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, 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. To provide for the expanding programs of the College, an additional floor was

recently constructed in the electrical engineering wing of Gavett Hall, and mezzanine facilities for chemical engineering and optical research were added.

10. ***Taylor Hall,*** headquarters of the College of Education. It is named for the late Earl B. Taylor, Professor of Education and first Dean of University School.

16. ***The Henry Alvah Strong Auditorium,*** a memorial gift of Mrs. Henry Alvah Strong and her son, L. Corrin Strong. It contains a large hall used for many University functions, and an organ given by Mrs. 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.

15. ***The Administration Building,*** facing on River Boulevard at the corner of Library Road, housing the central University administrative offices, offices of the University registrar and bursar, and the headquarters of University School of Liberal and Applied Studies.

On the lower campus to the west and north of Eastman Quadrangle are the following buildings:

31–36. ***Crosby, Burton, Lovejoy, Hoeing, Tiernan, and Gilbert Halls,*** forming a pleasant men's residence area, adjacent to Fraternity Quadrangle, with accommodations for approximately 1,050 students. Burton and Crosby Halls were built in 1930, and are named respectively for George Nelson Crosby, of Rochester, and Henry F. Burton, Professor of Latin from 1877 to 1918. Lovejoy and Hoeing Halls were first occupied in 1953 and Gilbert Hall was completed in 1959. Lovejoy Hall is named for the late Frank W. Lovejoy, a devoted Trustee of the University. Hoeing Hall is named for the late Charles Hoeing, Dean of the College for Men from 1914 to 1929. Tiernan Hall honors Martin F. Tiernan, an alumnus of the Class of 1906, a Trustee since 1928, and a generous benefactor of the University. Gilbert Hall was recently dedicated to the memory of the late Donald Wood Gilbert, Professor of Economics, Provost, and Vice President of the University.

17. ***Todd Union,*** facing the men's residential area, a student center housing offices and meeting rooms for such extra-curricular coeducational groups as religious organizations, the campus newspaper, the campus radio studio, glee clubs and student government. It is named for the late George W. Todd of Rochester.

19. ***Alumni Gymnasium*** for men, housing 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,*** close to the Alumni Gymnasium, 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 stadium is named for the late Dr. Edwin Fauver, for many years head of the Department of Physical Education and College Physician. The Sculpture Studio and offices of the Department of Foreign Languages and of the Non-Western Civilization Program are located in the building.

37–44. ***Fraternity Quadrangle,*** with 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. These houses provide additional residence accommodations.

18. ***Men's Dining Hall,*** in close proximity to the residential buildings. 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.

At the northeast corner of the River Campus, on the crest of a hill, are:

23–26. ***The Women's Residence Halls,*** consisting 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.

The four wings of the Residence Halls are named in honor of Susan B. Anthony, Mary T. L. Gannett, Emily Weed Hollister, and Lewis Henry Morgan,

pioneers in women's education at the University. The dining hall is named for Mrs. Henry Danforth of Rochester, a devoted friend of the College for Women.

A 500-student dormitory and dining center for juniors and seniors. Currently under construction, this new living center will feature apartment-type suites and is scheduled for occupancy in 1963.

FACILITIES OF THE UNIVERSITY MEDICAL CENTER

The principal units of the Medical Center are:

The School of Medicine and Dentistry

Strong Memorial Hospital. A gift from Mrs. Gertrude Strong Achilles and Mrs. Helen Strong Carter in tribute to their parents, Henry Alvah and Helen Griffin Strong, provided for the erection of this hospital.

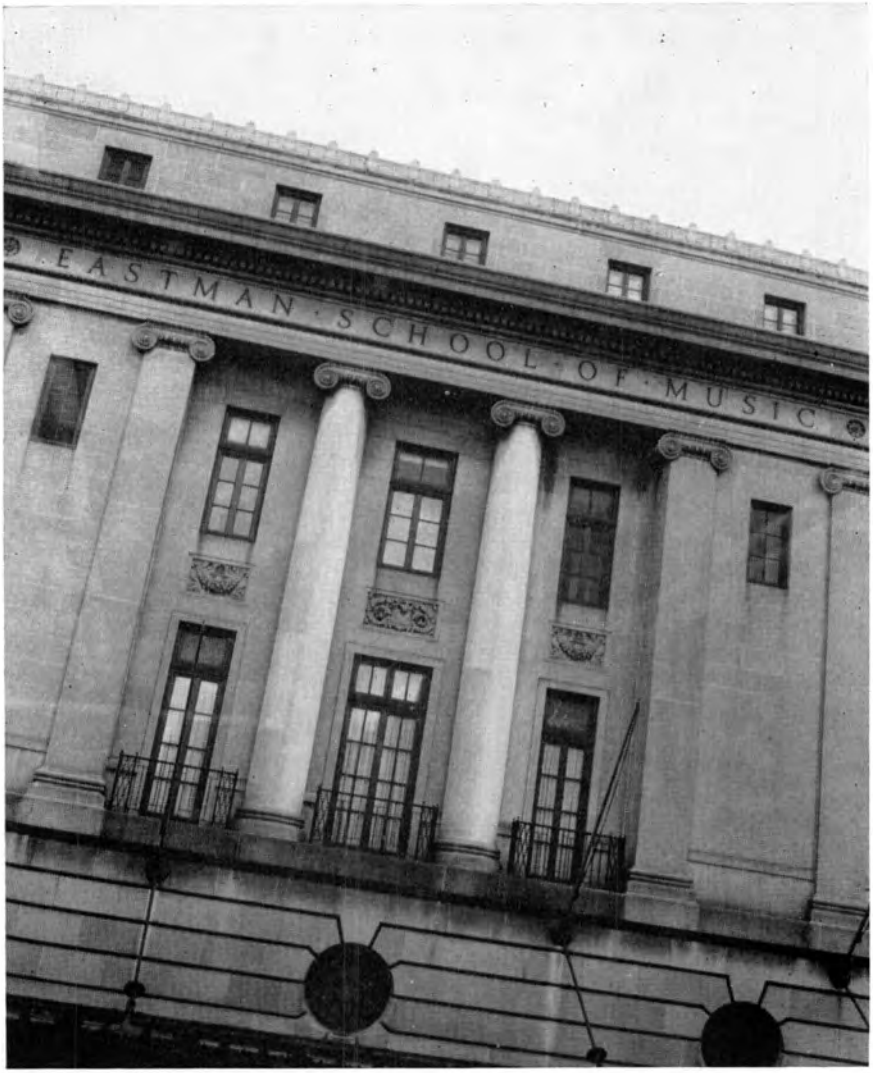
Rochester Municipal Hospital, operated under contract with the city of Rochester.

Wing R Psychiatric Clinic. Opened in 1948, the Clinic was made possible by a gift from Mrs. Helen W. Rivas. Its primary concern is the study and care of patients whose illnesses promise improvement under modern therapy.

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

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

These units are located on a 60-acre tract adjacent to the River Campus. The Center, which contains about 1,000,000 square feet of floor area, was one of the first medical units in the country to house both medical school and hospital in a single building. Operated under administrative control, Strong Memorial and Rochester Municipal Hospitals have a total bed capacity of 775 and provide unusual facilities for clinical teaching.



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,

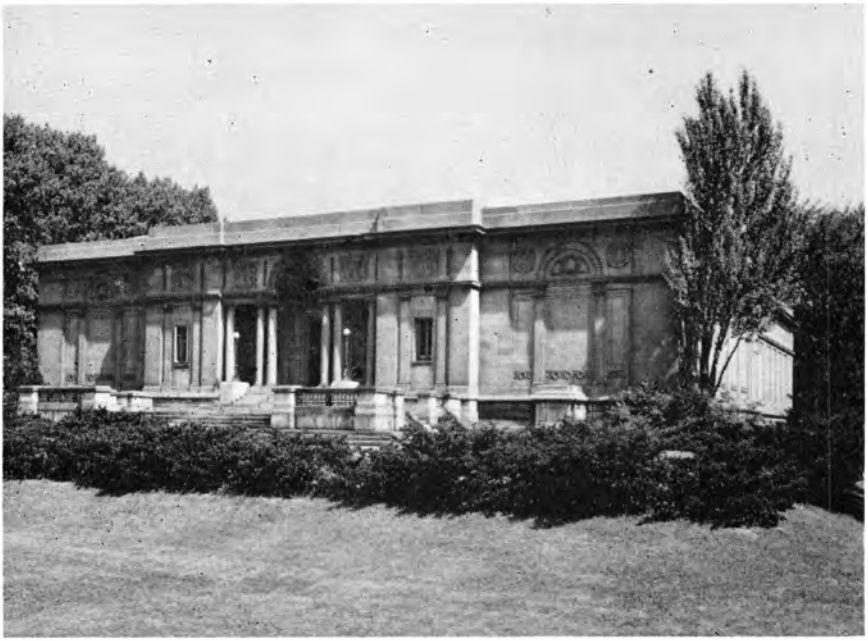
and by visiting artists and ensembles. The School's Sibley Music Library is believed to house the largest collection of music literature and source materials of any music school in the world.

The residential campus on Prince Street, within easy walking distance of the School, contains men's and women's living centers, student union, and recreational facilities. Nearby Hutchison House provides additional facilities for recitals, social events, and professional meetings.

THE MEMORIAL ART GALLERY

The Memorial Art Gallery shares the Prince Street Campus with the Eastman School of Music. It is the center of creative art activities for students and for the entire area. Its increasingly important permanent collections range from predynastic Egypt to contemporary times and include paintings, sculpture, tapestries, furniture, and related decorative arts. These serve as invaluable teaching aids to the University's Fine Arts Department. Outstanding among its treasures are paintings by El Greco, Rubens, Matisse, Picasso, Strozzi, Delacroix, Courbet, Gilbert Stuart, Winslow Homer, Monet, Degas, Renoir, and others.

Monthly loan exhibitions from October through June give students and public a continuously changing and provocative picture of contemporary and historic art. Paintings from the Gallery's collections are on view in various parts of the University and colorful framed prints are rented each term to students for their dormitory rooms. The Gallery's Creative Workshop has an enrollment of over 1,000 students in painting, sculpture, ceramics, weaving, and enameling classes.



Admissions

General Statement

ADMISSION is selective. In this selective process 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. 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 academic 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 88. (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 course listings: see page 205 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, astrophysics and electrical engineering. Preparation in both chemistry and physics is desirable for these fields.

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 33). 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 Schools and 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 with a member of the Committee on Admission whenever possible. Such an informal conference is usually very helpful in making college plans. It also 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 a member of the Committee on Admission.

Scholastic Aptitude and Achievement Tests

All applicants for admission as freshmen are expected to take the Scholastic Aptitude and Achievement Tests offered several times a year by the College Entrance Examination Board. The dates on which the test will be given are shown below:

Saturday, December 2, 1961
Saturday, January 13, 1962
Saturday, March 3, 1962
Saturday, May 19, 1962
Wednesday, August 8, 1962

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. Achievement tests should be taken 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 9896, 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 14 are required to post an Admission Deposit of $50 by May 1. Any students admitted after April 14 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 any 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 the 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.

Since it is not always possible to take early action on scholarship applications, this Early Decision Program is best suited to those students not in urgent need of financial assistance.

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.

Action on applications for admission to advanced standing will ordinarily not be taken before May 1.

It is probable that in 1962 no applications for admission can be accepted from transfer students whose homes are outside commuting distance of Rochester. (This limitation does not apply to applicants for the B.S. degree in Nursing who have completed their two years of requirements in liberal arts.)

Students with two or more full years of college work elsewhere who seek admission to the College of Engineering, College of Business Administration, or the College of Education, 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 $43.00 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 the 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 Week occurs one 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 jointly by student leaders and the Dean of Students and his staff.

During the Orientation Week entering students learn about the nature and aims of college study, personnel services available to students, and extracurricular activities. Through residence hall meetings the students become acquainted with the Directors of Residence Halls and their staff. Women students spend two days at a camp in the Bristol Hills sponsored by the women of the junior class.

In addition, each freshman has an appointment to discuss his academic program with his faculty adviser. Tests taken by freshmen are used by faculty advisers in planning academic programs and for future counseling, and may also be used for placement in fields of study such as English, Languages, Mathematics, and Physics.

Detailed information and a program for Freshman Week are mailed to freshmen in August. Fees for the Week, including meals, are about $25.

Tuition and Fees

Tuition and Laboratory Fees

Tuition is $1275 a year including laboratory fees. This amount is intended to cover the number of courses specified in the catalogue for the degree for which the student is a candidate. The annual tuition charge does not include the special fees listed below. All fees are payable at the beginning of each term and must be paid on or before the final date for payment given in the calendar. If a student has not completed financial arrangements by this date his registration for the term will be cancelled. Bills are not sent by mail; each student is required to obtain his own bill from the Accounting Office. A special fee of $10 plus service charge and interest will be added for late payment. Students who fail to register their courses by before the first day of instruction in each term are liable to a special charge of $5.

The University has made arrangements with outside sources for a program which provides for monthly payment of tuition, room and board. Details may be secured through the Accounting Office.

Fees for Extra Courses

If the number of courses a student takes for credit in any term exceeds the number specified in his course of study, he will be required to pay an extra fee for such courses at the rate of $160 per course ($40 per credit hour). There will be no extra charge, however, when a full-time student is merely an auditor. Any student may audit credit courses provided that he has the consent of the instructor. Each student's regular

program as approved from year to year by the Dean of Students shall be covered by the normal tuition of $637.50 a term.

Application Fee An application fee of $10 must accompany all applications for admission. This fee is not returnable.

Health Service Fee A health service fee of $25 is paid by all students. A description of the services covered is given on page 54.

Student Activity Fees An activity fee is paid by all students. This fee varies slightly from year to year in accordance with the budget prepared by the Finance Board of the College Cabinet. For the year 1961–62 the fee is expected to be $25.

An athletic fee of approximately $25 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 $1275.

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.

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

Resident students rent mail boxes from the River Campus Station Post Office at the annual rate of $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 135. 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		$1275
Student activity and athletic fee for men other than freshmen		50 approx.
Student activity, athletic fee and social fee for women and freshmen men		55 approx.
Health service fee		25
Books and supplies	30–	50 *
Residence hall room (including linen service)		
Men	261–	351
Women	310–	350
Board		500
		$2180–$2250

Expenditures for personal necessities, organization dues, recreation, and travel vary from one individual to another. Students who watch their expenditures closely report amounts ranging from $250 to $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 $2450. The average annual expenditure is approximately $2600.

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 $1900. 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.

*Engineering students should add $50 for slide rules, drawing instruments and supplies.

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 33)

Procedure for Making Application

Applicants for scholarships should file no later than February 1 a complete application for admission. They are also required to submit financial statements to the College Scholarship Service, Princeton, N. J., in which the University of Roch-

ester 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 annually 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 may 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 Scholarships

The University of Rochester is an approved university in which New York State Scholarships may be used.

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 on page 41.

[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.

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 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 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.

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 Pfaudler Scholarship is contributed by the Pfaudler Company 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 Katherine Upton Wilson Scholarship for Xerox People is provided through gifts of members of the Wilson Family. Eligibility is restricted to sons and daughters of Xerox employees with three or more years of service. Criteria for award include personal qualifications, evidence of general promise for successful college work and financial need.

The 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 candidate as well as financial need.

The Ellen Hawkins Carlson Scholarship for Xerox People is provided in memory of Mrs. Carlson by her son. Eligibility and method of selection of

recipients are the same as for the Katherine Upton Wilson and Joseph R. Wilson scholarship described above.

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 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.

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 ALUMNI REGIONAL 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 this award are nominated by the regional alumni clubs located in Baltimore, Batavia, Boston, Buffalo, Capital District of New York, Chicago, Cincinnati, Northern Ohio, Detroit, Ithaca, Long Island, Niagara Falls, Northern New Jersey, Philadelphia, Pittsburgh, Rocky Mountain, San Francisco, Schenectady, Southern California, Southern Tier of New York, Susquehanna Valley of New York, Syracuse, Washington, Wayne County, West-Fair (Westchester County, N. Y., and Fairfield County, Conn.), and Wilmington, Del. From the nominees, three men and two women are usually selected for award in each entering class. 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 Admission Office or through the regional club presidents (whose names may be obtained through the Office of Alumni Relations). Nominations for Alumni Regional Club Scholarships should be forwarded not later than Feb. 1, and the applications of the nominees must be complete and on file in the Admission Office by Feb. 1. Nominees for Alumni Regional Club Scholarships are not required to file duplicate applications or any special forms.

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.

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, 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 CHARLES A. BROWN PRIZE SCHOLARSHIP, endowed by the late Charles A. Brown of Chicago, A.B., 1879, 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, supported by annual contributions of Alumni in memory of Dr. Casey and Professor Long. The basis for award is the same as for the Alumni War Memorial Scholarship described above.

THE MARTIN F. TIERNAN PRIZE SCHOLARSHIPS, supported by a gift from Martin F. Tiernan, A.B., 1906. Terms of the gift 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. These scholarships are awarded to candidates resident in the Chicago district.

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

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

THE WILLIAM EASTWOOD SCHOLARSHIP, endowed by Albert B. Eastwood in memory of his father and awarded every four years to a promising candidate in need of financial assistance.

THE LUTHER EMMETT HOLT PRIZE SCHOLARSHIP, 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 and awarded every four years without restriction as to the residence of the holder.

THE NEW YORK ALUMNI PRIZE SCHOLARSHIP, endowed by Alumni of the Greater New York area, and awarded to a candidate residing in that area.

THE GRAFLEX PRIZE SCHOLARSHIP IN MECHANICAL ENGINEERING, endowed by Graflex, Inc. Awarded to a student at the beginning of his junior year in mechanical engineering on the basis of personal qualifications, achievement and apti-

tude in this field. Preference is given to a child or grandchild of an employee of the company.

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

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

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

SCHOLARSHIPS FOR WOMEN

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. This scholarship is awarded on the basis of high intellectual ability and attainment, strength of character, personality, and qualities of leadership.

THE ALUMNAE SCHOLARSHIPS, contributed annually by the Alumnae Association of the University of Rochester. Preference is given in the award to the daughter of an alumna needing financial assistance.

THE AUGUSTA LANEY HOEING SCHOLARSHIP, contributed by Alumnae of the Alpha Sigma Sorority in honor of Mrs. Charles Hoeing, and honorary member of the sorority. Preference is given to members of the Alpha Sigma Sorority.

NEW YORK ALUMNAE CHAPTER SCHOLARSHIP, 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 MARGARET PARKHURST MOREY SCHOLARSHIP, contributed by Alumnae of the Alpha Sigma Sorority in honor of Mrs. William C. Morey, an honorary member of the sorority.

THE SIGMA KAPPA UPSILON SCHOLARSHIP, endowed by the Sigma Kappa Upsilon Sorority. It is given to an undergraduate of that sorority upon recommendation of the Scholarship Committee of the sorority.

THE RIDA S. MOORE SCHOLARSHIP, endowed by the late Mrs. Clarence King Moore. Awarded every four years.

THE SUSAN HUNTINGTON HOOKER SCHOLARSHIP, honoring 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 HAZEL WILBRAHAM MEMORIAL SCHOLARSHIP, named for an alumna and former professor of physical education, and 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 administrator of the fund 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.

Fellowships and Prizes

THE University offers prizes and fellowships to encourage superior work in connection with regular college studies, or to stimulate interest in subjects allied to college courses.

Competitors for graduate fellowships and undergraduate prizes must be candidates for a degree.

A student, if on probation or on warning, may not compete for a prize except with the consent of the Dean of Students.

No prize shall be awarded unless at least one candidate offers work of marked excellence.

All essays for which prizes are awarded shall be deposited in the University library for the use of the public.

Full details about fellowships and prizes, terms of competition and award, persons in charge, and the form in which essays should be submitted may be obtained from the Office of the Dean of Students.

Full information about graduate fellowships, scholarships, and assistantships may be secured from the Associate Dean for Graduate Studies.

Undergraduate Prizes

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

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 101–102.

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 Director 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

THE EMIL KUICHLING PRIZE is awarded annually to that man of the class in applied 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, through academic achievement, proven leadership and sterling character has excelled and inspired his fellow students in the College of Engineering.

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 women 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.

Languages

THE SIGMA KAPPA UPSILON PRIZE of $10 is awarded annually to the woman student who has shown the greatest achievement in a foreign language.

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 ALUMNAE 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 Alumna 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 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 that male member of the graduating class who in the opinion of the Dean of Students shall have

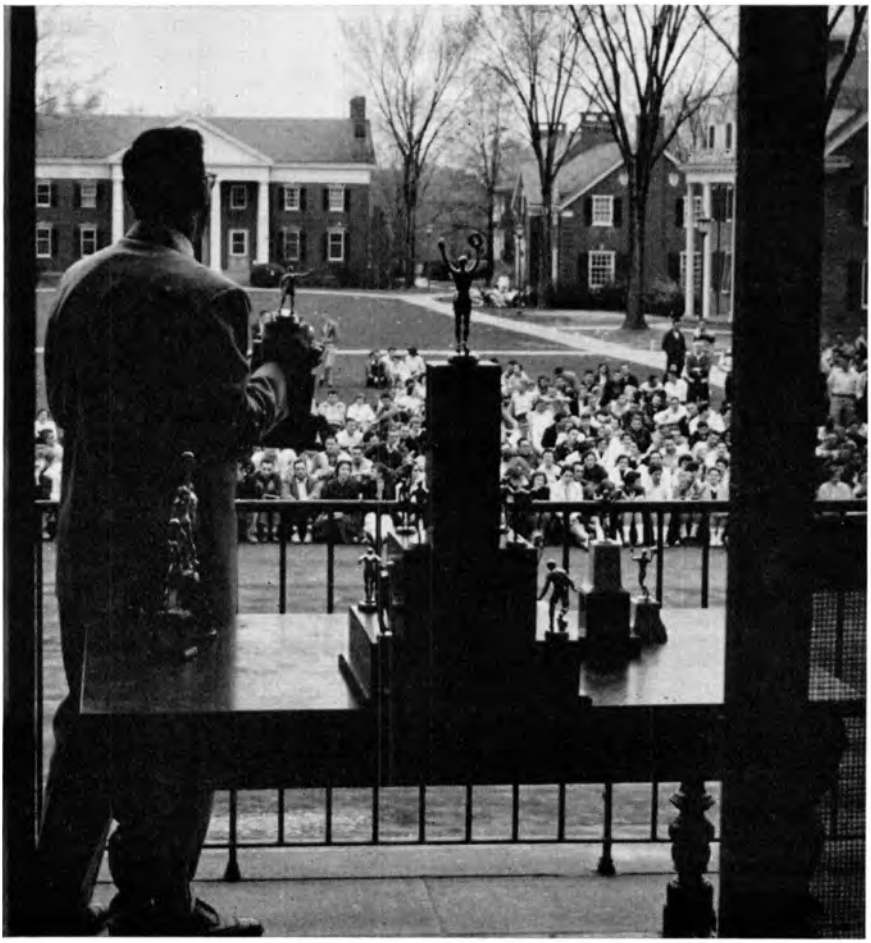
excelled all his men classmates in wholesome, unselfish, and helpful influence among his fellow students.

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.

THE 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

FOR UNDERGRADUATES

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 Dean of Students, the Assistant Deans of Students, the Director of Men's Residence Halls, the Director of Women's Residence Halls, the Director of Student Activities, the 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.

Additional counseling services are available to students in the following persons or agencies:

Medical officers, members of the Departments 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, Placement Office, the Testing and Counseling Service, the Psychological Clinic and the Department of Psychiatry.

Placement The placement officers help current graduates to obtain suitable positions. Placement assistance continues to be available to graduates of former years whenever they are seeking new employment. There is no charge for this service.

Each student is urged to register with the Placement Office early in the senior year in order to take advantage of both on-campus and off-campus interviews before and after graduation.

Good 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 students and graduates. Personnel representatives from approximately 200 firms come to the Placement Office each year to interview graduating students.

Placement credentials compiled in the senior year 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 early in the spring. Whenever it is possible, summer placements are made with the aim of helping the student gain work experience in line with his career objective.

Educational Placement Bureau

The Bureau is maintained by the College of Education to assist University of Rochester students and graduates in securing teaching positions and to assist school officials in filling vacancies.

Students in all schools, colleges, or departments of the University of Rochester may register with the Bureau. The office is in Taylor Hall, River Campus.

The Testing and Counseling Service

The Testing and Counseling Service, sponsored by the Office of the Dean of Students, is available for the students and faculty of the University of Rochester. Requests for testing and counseling of high school students and recent high school graduates will be accepted as staff and time permit. The typical fee for testing and counseling individuals outside the University seldom exceeds $25.

Student counseling which supplements the services provided by the faculty, faculty advisers, religious advisers and the deans is available. Special attention is given to study skills, reading difficulties, and vocational and educational planning. Complete testing service is provided to aid in appraising students' aptitudes, interests, personality traits and related factors. Emphasis is placed upon counseling initiated by the student and every effort is made to assist each individual in accepting responsibility for his decisions and actions.

Group activities for both men and women, sponsored by students, counselors and alumni, include career coffee hours, and discussion meetings in lounges on campus and in alumni homes. Students thus meet representatives of various vocations and professions while they are forming their vocational goals.

The tests given to all entering students during Freshman Week are administered and scored by the staff of the Testing and Counseling Service. Other tests administered periodically during each year include the Graduate Record Examination, Medical College Admissions Test, the Navy College Aptitude Test, Law School Admission Test, tests of the National League for Nursing, and the National Selective Service Test.

The Testing Service renders assistance, upon request, to the faculty in the construction, scoring and interpretation of course examinations.

Area colleges, high schools, and elementary schools may obtain information regarding the cost of test scoring and other statistical services by contacting the Testing and Counseling Service, the University of Rochester, River Campus Station, Rochester 20, New York.

Health Service

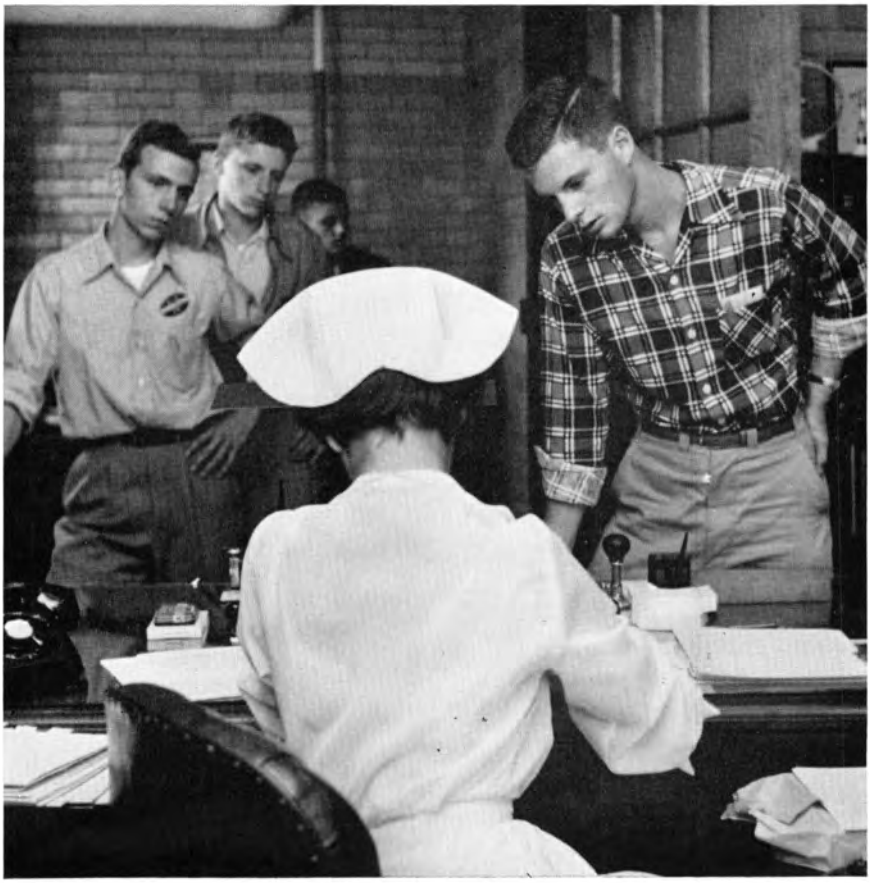
The health of the student body is under the care of physicians at the Student Health Service. The out-patient department for men and women students is housed in the medical office in the men's gymnasium. Infirmary patients, both men and women, are housed in the Women's Residence Halls. The infirmary is open twenty-four hours daily for the treatment of all types of illness; com-

plicated cases are admitted to the University Medical Center directly or by transfer from the infirmary on the recommendations of the student health physicians. Short term psychiatric care is available through the Department of Psychiatry in the Medical School.

All full-time students are entitled to the services of the medical officers and to such infirmary, dispensary or hospital care as may be thought necessary by the medical officers 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.




Women's Council
Yellow Key
MARCHING
ARTS
RADIO CLUB

Student Life

AND INTERESTS

STUDENT LIFE on the River Campus is centered 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 an opportunity to develop both vocational and avocational interests, to learn leadership skills, to foster friendships, and to promote opportunities for 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 also are located in Todd Union, which serves as 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 a cabinet of eighteen elected student delegates. The Cabinet 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 Hellenic 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; UGH, a semi-annual humor magazine; a directory; a handbook; calendar; and the ROCHESTER INDICATOR, the publication of the engineering students.

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 students each put on their own 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 with other students with 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.

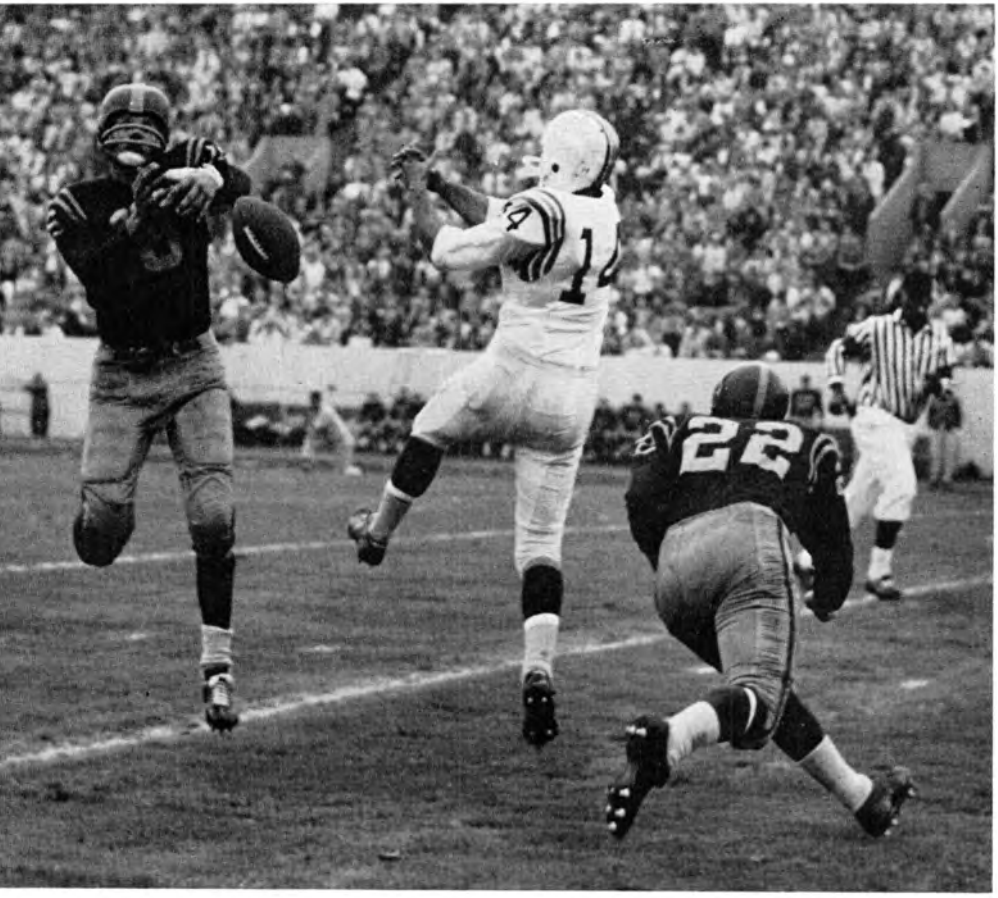
> *The athletic policy of the University of Rochester has been developed to further the best interests of the students who participate in intercollegiate athletics.*

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 are sponsored by the Women's Athletic Association and include archery, badminton, baseball, basketball, dancing, fencing, hockey, riding, swimming, tennis and volleyball. Women students participate in Play Days with women's groups from other colleges. Dancing 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.

Fraternities, Sororities There are eleven social fraternities for men and five for women. Ten of the eleven men's fraternities are national; the eleventh, and all of the sororities are local groups. The fraternities are Alpha Delta Phi (1851), Delta Upsilon (1852), Delta Kappa Epsilon (1856), Psi Upsilon (1858), Theta Delta Chi (1867), Kappa Nu (1911), Theta Chi (1920), Beta Delta Gamma (1926), Sigma Chi (1932), Tau Kappa Epsilon (1954), and Sigma Alpha Mu (1954). The sororities are Theta Eta (1903), Alpha Sigma (1903), Theta Tau Theta (1906), Gamma Phi (1909), Sigma Kappa Upsilon (1923). The Hellenic 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 has no tie with any particular denomination, 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 an interdenominational chaplain to Protestant students, and is assisted by chaplains or advisers to Protestant denominational groups. Working with him are chaplains for Roman Catholic and Jewish students, provided by their own organizations for work at the University.

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 meet 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 served by the Episcopalian Chaplain 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 provided 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 is designed to contribute to the artistic and aesthetic development of the student. Opportunity is provided for students with musical interests to participate in active choral and instrumental organizations.

The Men's Glee Club The Men's Glee Club, founded in 1875, sings at numerous functions of the University and makes a significant contribution to the cultural life of the city of Rochester through its appearances with the Rochester Philharmonic Orchestra; in concerts for high schools, local industries, and service clubs; on television programs. Spring tours take the Glee Club to cities and communities in many parts of this country and Canada.

The Women's Glee Club The Women's Glee Club appears locally and at special University events. In addition, the organization presents two concerts with the men's chorus of another Eastern university.

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.

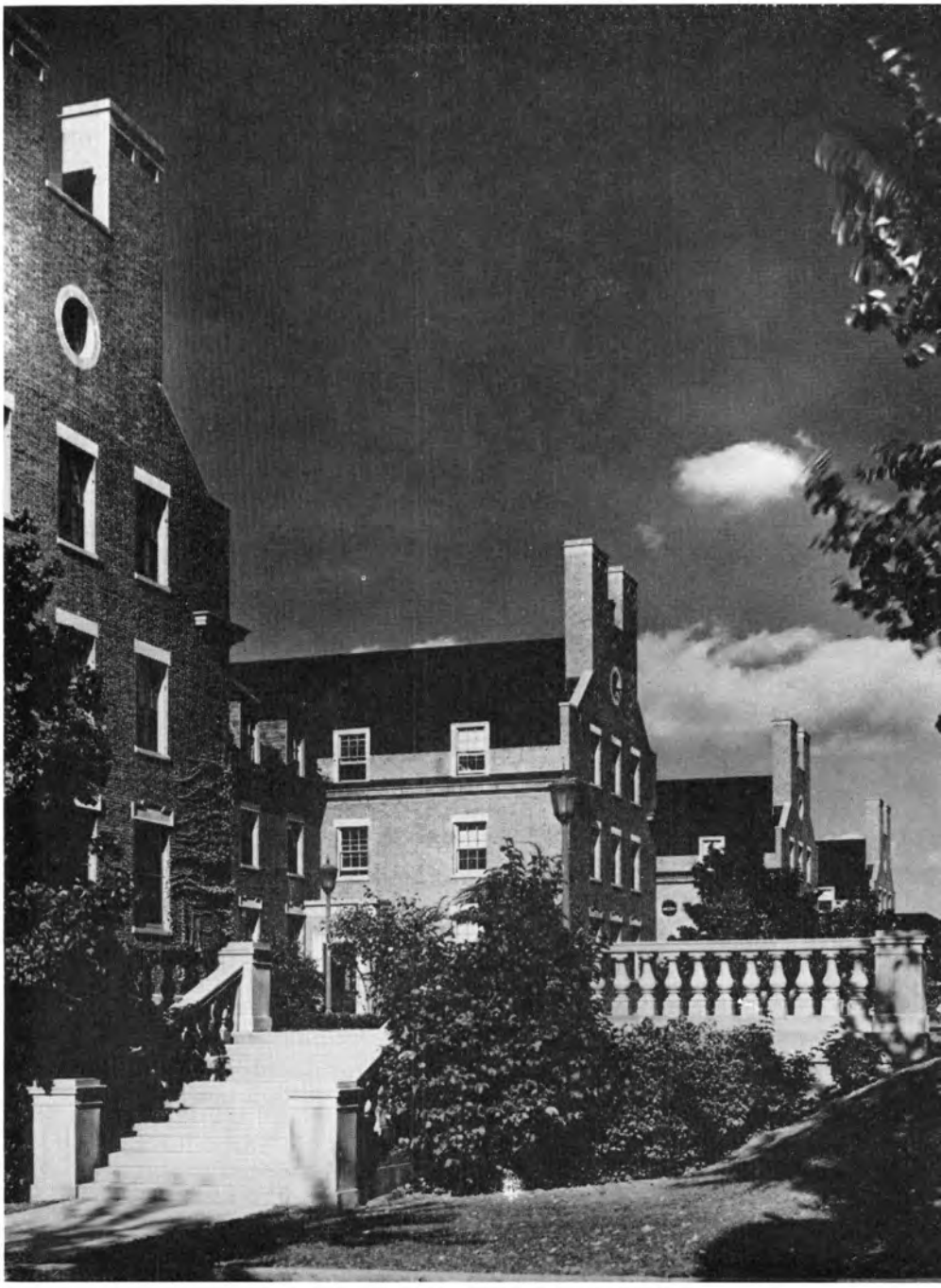
The All-University Symphony Orchestra The All-University Symphony Orchestra draws its membership from the student bodies, faculties, and alumni of all schools and colleges of the University. Outstanding soloists are featured in concerts presented in Strong Auditorium.

The Concert Band The Concert Band is organized during the second semester and prepares musical presentations for University functions and civic organizations. The repertoire includes original music for band and arrangements of the symphonic masterpieces.

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

STUDENT CONFERENCES

Among the most stimulating events of the college year are the student conferences held on subjects of wide interest and significance, such as recent ones on "The Western Impact on Contemporary Africa", "Social Nonconformity: Studies in Deviant Behavior" and "The Open and Closed Society." Men and women of national and international reputation in various fields are invited as speakers, and formal sessions are followed by coffee hour discussions. Undergraduates take a prominent part in the planning and conduct of the programs. Cost of the conferences are defrayed from funds for public lectures provided by the late Jesse L. Rosenberger, of the Class of 1888, and the late James C. Cutler of Rochester, and from general funds of the University.



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.

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 of the residence halls is operated 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. The facilities within the halls include lounges, game rooms, 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 students for advanced degrees 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.

Annual room rentals in the residence halls range from $261 to $351 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. Men may stay overnight in these rooms at any time at a cost of fifty cents per night, with linen furnished for an additional fifty cents.

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

Housing for Women Excellent accommodations for women students are provided in the Women's Residence Halls on the River Campus. This modern seven-story building, built in 1955, offers many attractive features for student living and social activities. 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. The rate for a single room is $350 per academic year, and the rate for a double room is $310 for the 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 Rochester Halls is under the administration of the Associate Dean of Students, and includes a Director of Women's Residence, a Head Resident and graduate 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

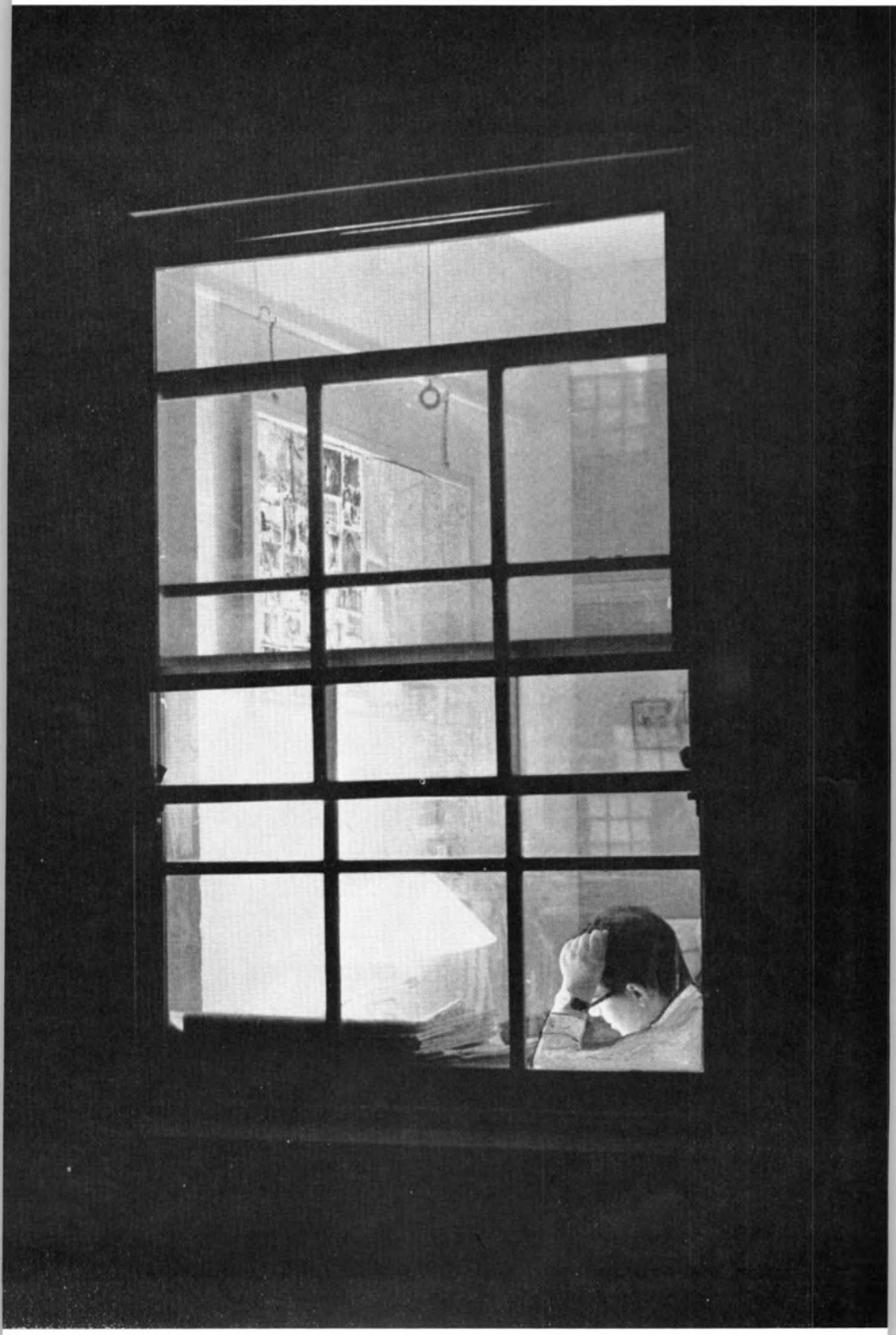
Residence Halls. City students affiliate themselves with the Residence, have full use of all social areas in the building, and take part in all the activities and social functions of the Residence. Sleeping quarters are provided in the Residence for the use of non-resident women. Bunk beds are furnished. 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 Women's Residence Halls.

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 men students 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 women residents 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.

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 have been fully informed.

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 does not release a student from a room contract.

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

Residence Policy See Page 67.

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.

Program Approval At a specified time during the second term of each year the student must obtain approval from his adviser for the studies he intends to pursue in the following year. A special fee of $5 is charged each student who fails to obtain program approval by the prescribed date.

Dropping of Courses

1. During the first seven weeks of any semester, a student may drop a course if its elimination does not reduce his program below four courses of registration and if he has the consent of the instructor of the course and of his faculty adviser or departmental counselor. He may drop a course even though his academic program is reduced to fewer than 4 courses if the instructor, the adviser, and the Dean of Students give their approval. Such dropping shall be without penalty.

2. Only during the first seven weeks of each semester may a student change his registration from one course to another. Such change requires the approval of the faculty adviser, the instructor of the course being dropped, and the instructor of the course being added. Such change shall be without penalty.

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.

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 if his grade is C; one and one-half points of credit if his grade is D+; or one point of credit if his grade is D.

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 towards the completion of requirements for a degree may be warned, placed on probation, or dropped from college.

It is not the policy of the University to apply rigid numerical criteria in determining when warning, 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 warned or 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.

A student on probation (1) may not be absent from classes, (2) may not hold class or other office or participate in extracurricular activities, (3) may not represent the University in any public function, and (4) should expect dismissal at the end of the period of probation if his work has not shown marked improvement.

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.

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.
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 of the University of Rochester

UNDERGRADUATE DEGREE PROGRAMS

THE UNDERGRADUATE DEGREE programs of the River Campus colleges have two aims. The first is to introduce the students to the provinces of intellect: the humanities, the social sciences, and the natural sciences. The second is to give the student a thorough competence in the subject or area of his choice.

Some of the students will regard their undergraduate education as terminal. Others will go on to graduate and professional studies. For all students, however, the University believes that a broad, common education in the basic areas of human knowledge is essential. It is generally agreed that 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 history, language, literature, science, mathematics, and philosophy, are the foundation of any specialization as well as the foundation of the adequate and effective conduct of life.

The first two years of college for all River Campus undergraduates is largely composed of liberal studies within the College of Arts and Science. The student then has the option of completing his education within the College of Arts and Science, or transferring for the junior and senior years to the College of Engineering, the College of Education, the College of Business Administration, or the Department of Nursing. Students planning to transfer to one of these units should consult both the Arts and Science section of the catalogue and the section for their special college; the Arts and Science program for these students should be acceptable to their special college. In some cases the program may include courses from these colleges during the first two years.

COLLEGE OF ARTS AND SCIENCE

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

Anthropology and Sociology
Biology
Chemistry
Economics
English
Fine Arts
Foreign Languages
General Science
Geology and Geography
History
Mathematics
Music
Non-Western Civilizations
Philosophy
Physics
Political Science
Psychology

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 degree is offered for the following majors:

Astrophysics
Biology
Chemistry
Geology
Physics

COLLEGE OF EDUCATION

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

Elementary Education
Secondary Education

COLLEGE OF ENGINEERING

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

Chemical Engineering
Electrical Engineering
Mechanical Engineering
Optics

COLLEGE OF BUSINESS ADMINISTRATION

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

Accounting (C.P.A.)
Business Administration
Industrial Management

EASTMAN SCHOOL OF MUSIC

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

SCHOOL OF MEDICINE AND DENTISTRY

The Department of Nursing offers programs leading to a Bachelor of Science degree with a major in nursing and to a Bachelor of Science degree 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 1,200 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 controlled by 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: Biology, Chemistry, Economics, English, Geology, History, Mathematics, Physics, and Psychology. The degrees Master of Arts and Master of Science also are given for work in these departments, and in the following departments of the College: Fine Arts, Foreign Languages, and Political Science.

The College of Engineering 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, and Doctor of Education, as well as the Certificate of Advanced Study for special programs in professional education.

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 M.A. and M.S. degrees.

The School of Medicine and Dentistry offers work 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 20, New York.

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 20, New York.

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 selected 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 two parts, the basic course (freshman and sophomore years), and the advanced course (junior and senior years). The Air Science courses listed on page 110 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 at which a permanent Naval Reserve Officers' Training Corps Unit has been 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, has been constructed by the University to house 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 applying for 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 two years in the Naval Reserve or for three years in the Marine Corps Reserve, if offered; to serve for two 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 the unit of the University which is primarily 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 is different from applied education; it precedes applied education and is basic to it. Thus the College of Arts and Science serves the entire University in its concern for that basic knowledge on which each of the other units must draw. All the fields of theoretical knowledge are appropriate to the arts and sciences, and the study and teaching of these fields 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 eighteen departments: Air Science, Anthropology and Sociology, Biology, Chemistry, Economics, English, Fine Arts, Foreign Languages, Geology and Geography, History, 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, which is a research and graduate instruction center focusing the skills and knowledge of numerous disciplines on the study of the central nervous system; Canadian Studies, which provides a center for the study of Canada and Canadian-United States relations from an interdisciplinary point of view; Far Eastern Civilization, which provides an organized elective sequence in Chinese and Japanese language and culture; General Science; and Non-Western Civilizations, which provides an undergraduate concentration in the emerging areas of the world outside of Europe and North America. A joint program with the Eastman School of Music enables undergraduates in the College of Arts and Science to receive an A. B. degree 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, students may plan a five-year program which leads to a B. S. degree in Engineering and an A. B. degree with a concentration in the social sciences or humanities.

All full-time undergraduate students in the River Campus day session are enrolled in the College of Arts and Science for their first two years. During this period their courses, primarily in the liberal arts, 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, 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. Students who intend to major in one of the fields of study offered in the College of Arts and Science remain in that College for their junior and senior years.

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 are two major sub-divisions: the general program and the Honors Program. The general program enables the student to concen-

trate 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, Foreign Languages, Geology, Geography, History, Mathematics, Music, Non-Western Civilizations, Philosophy, Physics, Political Science, and Psychology. 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.

Honors Seminars The Honors Program is distinguished from the regular program of courses 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 that is especially 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 the opportunity to choose an educational program 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 enriches his program with electives chosen 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 the A.B. degree must complete 32 courses or their equivalent. Candidates for the B.S. degree 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:* 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 during each of their first four terms. Physically handicapped students may be excused or given modified programs on recommendation of the university health service.

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[1]:

Humanities—English, Fine Arts, Foreign Language, Music, and Religion.
Social Science—Anthropology and Sociology, Economics, Geography, History, Philosophy[2], Political Science, and the interdisciplinary courses in Non-Western Civilizations.
Natural Science—Astronomy, Biology, Chemistry, Geology, Mathematics, Physics, and Psychology[3].

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 at least two literature courses (selected from departments of English and/or Foreign Lan-

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

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

3. Psychology courses classified under Natural Science include 101, 201, 251–252, 255, 256, 293, 297. All other Psychology courses are classified as Social Science.

guages). The faculty strongly recommends that students and faculty advisers give special consideration to English 103, History 101–102, and Mathematics 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. 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 interdepartmental programs in General Science and in Non-Western Civilizations. Since the requirements in these fields vary from the requirements for the usual departmental concentration, interested students are urged to consult the special sections on these programs in this bulletin.

The A.B. Program with Honors

Honors seminars are offered in seven fields: Comparative Literature, Economics, English, Foreign Languages, Political Science, History, and Philosophy. The student can concentrate in any one of these fields, except Comparative Literature and Foreign Languages. 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 curosity 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 172). 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 A.B. students in the general program may register for a fifth course in any term only with the permission of their faculty advisers or departmental counselors and the administrative committee. Ordinarily such permission will be given only to superior students who have sound reasons for taking an overload.

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.

B.S. students may be required to take five courses in as many as four of their eight terms. They may register for additional courses only if approved by their faculty advisers or departmental counselors and the administrative committee.

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.

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.

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1. Approved substitutes are used by the departments of Biology, Chemistry, General Science, Geology, Mathematics, Non-Western Civilizations, and Psychology.

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 Study 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 an adequate grounding in science. Two plans of study are open:

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

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

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

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

Although medical schools vary considerably in their admission requirements, the following courses represent the minimum commonly required for a premedical program: Biology, 1 year; Chemistry, 1 year each in inorganic and organic; Physics, 1 year; English, 1 year; Foreign Language. Since many schools have additional requirements, the student should plan carefully to meet the specific requirements of the medical 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 members of this committee are Mr. Muchmore, Chairman; Miss French; Messrs. Andreas, Gollin, Knapp, and White.

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 applications 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. Wiltsey, Chairman of the Pre-Legal Advisory Committee, will be glad to consult with students preparing for entrance to law school. (See catalogues of law schools for specific requirements for admission.)

The Administrative Officers

THE COLLEGE OF ARTS & SCIENCE

McCrea Hazlett, PH.D. (Chicago).....Dean of the College of Arts and Science
302 Morey Hall
Arnold Ravin, PH.D. (Columbia).....Associate Dean
304 Morey Hall
Marian A. McClintock, ED.M. (Rochester)....Administrative Assistant to the Deans of the College
302 Morey Hall
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

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.)

COMPARATIVE LITERATURE

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

343. ***Modern European Novel.*** Masterpieces of the European novel in the nineteenth century: Balzac, Stendhal, Flaubert, Zola, E. Brontë, Butler, James, Turgenev, Tolstoy, Dostoevsky.

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

349. ***Modern European Drama.*** Leading European dramatists since 1870: Ibsen, Hauptmann, Strindberg, Chekhov, Gorki, Molnar, Toller, Pirandello, Lenormand, Lorca, Shaw.

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.*** A study of the theories of value, production and distribution, with emphasis on modern work in these areas. An analysis of market structures. An introduction to general equilibrium theory and Keynesian modern income analysis. Economics majors should include this course in their Junior year program.

323. ***Labor Economics.*** A study of labor in a modern, industrial economy. Emphasis is placed on economic analysis of such problems as wages, labor productivity, employment and unemployment. Attention is also given to the history and growth of trade unions and to their relations with the government.

325. ***Economic Development.*** Selected problems in the theory and strategy of economic development will be intensively explored with particular emphasis upon criteria for investment allocation, the concept of balanced growth, the theoretical and empirical aspects of underemployment, and agrarian reform and its economic effects. The seminar will be oriented towards discussion based on assigned readings, papers by each member and by visiting lecturers.

363. ***Public Finance and Fiscal Policy.*** The subject matter in this seminar will include governmental expenditures, taxation and debt at the federal, state and local levels. Administrative, historical and theoretical aspects will be investigated. A major emphasis will be the economic effects of fiscal policies. American institutions will provide the main illustrative examples, but student papers may be based on experience in other countries.

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

369. ***International Economics.*** The theory of international trade and balance of payments problems. Commercial policy is examined 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 105 or English 103, 104 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 the chief literary works, with emphasis on *The Canterbury Tales* and *Troilus and Criseyde.*

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

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

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

313. ***Eighteenth Century Literature.*** A study of the 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 Poetry.*** A study of the major writers.

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

322. ***Modern Poetry.*** The 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 the 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 an artistic form, using representative plays from classical, Renaissance and modern literatures.

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

FOREIGN LANGUAGES

Honors Seminars in French and German 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 not required.

311. ***The Age of Goethe.*** A study of the work of Goethe and important contemporaries traditionally associated with him under the designation of German classicism. Knowledge of German not required.

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

332. ***Leading Contemporary French Novelists.*** The psychological novel: Proust, Gide, Mauriac, Lacretelle, Alain-Fournier, Duhamel. The social novel: Malraux, Jules Romains, Aragon, Martin du Gard.

341. ***Modern French Drama and Poetry.*** Romantic drama: Hugo, Vigny, Musset. Realism: Augier, Dumas fils, Brieux. Psychological drama: Curel, Sarment, Lenormand. Lyric poetry: Hugo, Baudelaire, Verlaine, Verhaeren.

351. ***Modern German Thought and Literature.*** An examination of the contributions of representative authors from 1880 to the present. No German required.

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.*** A historical study of the British Empire and Commonwealth with attention given to both Western and non-Western peoples and with particular emphasis on the incentives, problems, expedients, political forms, and ideals within the Empire-Commonwealth since the American Revolution. Some previous knowledge of the political and social history of Britain since the Revolution of 1688 will be expected.

325. ***French Canada.*** A study of the persistence of the French tradition in North America from colonial times to the present day. The effect of political and economic developments upon French-Canadian culture will be examined.

327. ***Seventeenth Century.*** A study of seventeenth century history, primarily in England, dealing with the political, economic, social, intellectual, and religious aspects of the period.

328. ***Canada-United States Relations.*** This seminar will deal with problems in the relations of Canada and the United States from 1763 to the present and will afford students an opportunity to study the analogies and differences in developments in Canada and the United States or Canada and other members of the British Commonwealth. The approach will be largely in terms of history and literature. Previous knowledge of British Commonwealth or American History will be expected.

333. ***American Economic History.*** This seminar will discuss the economic evolution of the United States from the simple agrarian nation of 1789 to the complex industrial society of today. Topical questions to be treated are: 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.*** This seminar will focus on the parallel evolution of American domestic and diplomatic history between 1890 and 1945. It will stress the relationship between domestic reform and the politics of American foreign policy.

337. ***American Colonial History.*** A study of the 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. ***The Social History of American Thought.*** This seminar will deal with the development of American thought from 1865 to the present day. Special attention will be given to the social background of intellectual currents.

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

351. ***Europe in the 18th and Early 19th Centuries.*** A comprehensive study of European history, 1715–1815. Particular stress is placed 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.*** A study of the diplomatic history of Europe and the wider world from the Paris Peace Conference to the present.

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

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

366. ***Russia since Waterloo.*** This seminar will emphasize diplomatic history, with some attention paid to domestic policy.

367. ***The Modern Middle East.*** After a rapid survey of the historical background, this seminar will stress the period since 1800. Particular attention will be given to the genesis of Turkish and Arab nationalism, to problems of economic development, and to the changing relations between the Middle Eastern states and the Western powers.

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.

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

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.

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.*** A study of 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.*** Intensive 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 of 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.*** A study of the metaphysical and psychological problem of the relation of mind and consciousness to bodily conditions, the foundations of psychological theory, the concept of human freedom, and philosophical disputes about immortality. The study will be 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 particularly in the philosophy of Locke and Berkeley.

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.

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.

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

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

340. ***Political Leadership.*** A consideration of leadership as it affects the political process. Personal characteristics and the functions of political leaders will be examined in the context of various political institutions.

350. ***Contemporary India and Its Role in World Affairs.*** This seminar will discuss the emergence of independent India from centuries of historical struggle to achieve a united country, beginning with the earliest times. It will also analyze political, economic, social and cultural developments in contemporary India, and the effect of these developments on India's foreign policy.

360. ***Comparative Political Problems of Selected Non-Western Areas.*** (Such as India, Pakistan, China, Ghana, Nigeria, Brazil.)

COURSES IN THE COLLEGE OF ARTS AND SCIENCE

Air Science

Richard V. Collins, MAJ. (USAF) B.S. (R.P.I.).....Professor of Air Science and *Chairman of the Department*

R. W. Abraham, CAPT. (USAF), M.A. (George Washington).....Assistant Professor of Air Science
Arthur F. Creighton, Jr., CAPT. (USAF), B.A. (New Hampshire)..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.

The College grants credit toward the A.B. or B.S. degrees for work in Air Science, to the maximum extent of three courses. If the student carries the full Air Science course, 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. In addition to courses in Air Science, the cadet must include in his program the following civilian courses:

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 course.
One one-hour Leadership Lab a week.

82. ***Foundations of Aerospace Power I.*** An elementary survey of air power to include the military instruments of national security, the elements and potentials of air power, the evolution of air warfare, and the study of air vehicles. The leadership laboratory begun in the first semester is continued. A Freshman course.
Two lecture-recitations.
One one-hour Leadership Lab a week.

92. ***Air Force Leadership Lab II.*** A continuation of Air Force Leadership Laboratory I with emphasis on proficiency in instructing and directing the laboratory activities of subordinate cadets. Includes military organization and functions up to wing level. Military exercises in use of the command voice and conducting personal inspections are also included. A Sophomore course.
One one-hour Leadership Lab a week.

93. ***Air Operations.*** An introduction to the meteorological and navigational aspects of the air age to include temperature and pressure lapse rates, 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 course.

One lecture recitation.
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 course.

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

101. ***Foundations of Aerospace Power II.*** An introduction to aerospace missiles and aircraft; their propulsion systems; aerospace defense; modern targeting and electronic warfare; high explosive, nuclear, chemical, and biological warheads; and aerospace strategic and tactical organizations and operations with contemporary Air Force weapon systems. Also includes problems, mechanics, and military implications of present and future space operations, and contemporary aerospace military thought.

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. This includes staff organization and functions, communicating, instructing, and techniques of problem solving. A Junior course.

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

202. ***Air Force Officer Development II.*** Principles and practices of leadership. This 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 course.

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

Anthropology and Sociology

Bernard 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 Sociology

Dean Harper, M.S. (Iowa).....Assistant Professor of Sociology
Alfred Harris, PH.D. (Cambridge).....Assistant Professor of Anthropology
Walter Hinchman Sangree, PH.D. (Chicago).....Assistant Professor of Anthropology
****Grace Harris,*** PH.D. (Oxford).....Assistant Professor of Anthropology
****Vera John,*** PH.D. (Chicago).....Assistant Professor of Anthropology

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

All concentrators in the department are required to take Anthropology 101 and Sociology 102.

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.

*Part-time

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.

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

206. ***Departmental Seminar for Senior Anthropology-Sociology Concentrators.*** The primary purpose of this seminar will be to review the major contemporary trends in Social Anthropology and Sociology in an effort to formulate an integrated picture of social processes.

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. Consideration of the 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.

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

242. ***The Civilizations of Aboriginal Middle America.*** The 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; the 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; the growth of civilization in the Central Andes; the Empire of the Inca; the 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.*** An intensive examination of 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.

250. ***Social Change in 18th and 19th Century India.*** The nature of pre-British Indian society; organization of British rule in India; the response and changes in Indian

society, with particular emphasis on social and political structures.

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.*** An examination of thought, research and writings of major theorists and schools of anthropology until 1930.

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

269. ***Dynamics of Culture and Society.*** An examination of problems in methodology and theory of selected aspects of society and culture.

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.*** An examination of the 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.

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

Ernst Caspari, PH.D. (Gottingen).....Professor of Biology and *Chairman of the Department*
Johannes Friedrich Karl Holtfreter, PH.D. (Freiburg, Germany).....Professor of Zoölogy
Wolf Vishniac, PH.D. (Stanford).....Professor of Biology

Allen McCulloch Campbell, PH.D. (Illinois).....Associate Professor of Biology
Richard Lewontin, PH.D. (Columbia).....Associate Professor of Biology
William Breuleux Muchmore, PH.D. (Washington).....Associate Professor of Biology
Arnold Warren Ravin, PH.D. (Columbia).....Associate Professor of Biology and Associate Dean of the College of Arts and Science
****Babette Brown Coleman,*** PH.D. (Cornell).....Associate Professor of Botany
****James Charles Peskin,*** PH.D. (Columbia).....Associate Professor of Biology

Thomas Bannister, PH.D. (Illinois).....Assistant Professor of Biology
Jerome Sidney Kaye, PH.D. (Columbia).....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

*Part-time.

Derek Bone, PH.D. ..... Research Associate in Biology
Venkatram N. Iyer, PH.D. (Bombay) ..... Research Associate in Biology
Rachel McMaster Kaye, PH.D. (Columbia) ..... Research Associate in Biology
Bruce Love, PH.D. (Rochester) ..... Research Associate in Biology
**Alice del Campillo Campbell*, PH.D. (Michigan) ..... Research Associate in Biology
**Rajul V. Iyer*, PH.D. (Bombay) ..... Research Associate in Biology
**Minna Rotheim*, PH.D. (Rochester) ..... Research Associate in Biology

Herman S. Forest, PH.D. (Michigan State) ..... Postdoctoral Fellow 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 a prerequisite for all other courses in the department.

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 towards the descriptive, genetic, evolutionary and developmental aspects of Biology. Plan B serves the needs of students wishing to specialize in the study of electrophysiology, structure and properties of macromolecules and cell organelles, the mechanism of enzymatic reactions and photobiological phenomena. Plan B requires that the student develop a considerable background in Physics and Mathematics. Synopses for the course requirements for the B.S. degree under plans A and B are given below.

PLAN A

FIRST YEAR

1. Math. 161 Analysis I	1. Math. 162 Analysis II
2. Biol. 101 General Biology I	2. Biol. 122 Invertebrate Zoology
3. Chem. 123 General Inorganic	3. Chem. 124 General Inorganic
4. Engl. 101 English Composition	4. Foreign Language (Group I)‡
Physical Education	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
   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. 101 General Physics

   or

   Phys. 107 Physics I
4. Elective

1. Group I
2. Chem. 162 Organic Chemistry
3. Phys. 102 General Physics

   or

   Phys. 108 Physics I
4. Elective

FOURTH YEAR

1. Biol. 265 Cellular Phys. and Metabolism
2. Phys. III General Physics B

   or

   Phys. 117 General Physics II
3. Other science elective
4. Biology Elective
   Biol. 295 Senior Seminar

1. Biology Elective
2. Phys. 112 General Physics B

   or

   Phys. 118 General Physics II
3. Other science elective
4. Elective
   Biol. 296 Senior Seminar

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*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.*** An examination of the principles unifying modern biological knowledge. An introduction to the structure and physiology of cells, followed by a discussion of the generalized structure of animals and plants. The principles of development, genetics and evolution will be presented. The laboratory will introduce 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. It aims at giving the student an 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 will be considered. Biology 101 prerequisite.

Three lectures and one three-hour lab a week.

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

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

125. ***Comparative Chordate Anatomy.*** A study of the structural changes in the line of descent leading from primitive jawless fish to modern mammals, principally as a background for the understanding of human anatomy. The structure of a series of fossil vertebrates and the development and structure of a number of modern chordates are dealt with by laboratory observation, dissection or lecture. Biology 101 is prerequisite.

Two lectures or conferences, two three-hour labs a week.

131. ***The Plant Kingdom.*** A study of the general biology of plants, with a 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 is prerequisite.

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

132. ***Biology of Flowering Plants.*** An 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 is 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. Prerequisites: Mathematics 161, 162 (or equivalent).

220. ***Cytology.*** An introduction to the study of cells. Topics discussed will include the morphology and chemistry of chromosomes, mitochondria, the Golgi apparatus, centrioles, and the ergastoplasm. Prerequisite: Biology 101, Chemistry 121 and 122 (or 123 and 124) and Physics 101–102.

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 is prerequisite.

Three lectures, one lab a week.

241. ***General Embryology.*** The 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.*** A study of the processes common to all cells. Topics discussed include the substances of which cells are composed, the metabolic

processes by which the substances are formed, the thermodynamic and kinetic characteristics of these processes, the processes of diffusion, osmosis, and passive and active transport and the origin of bioelectricity. In the laboratory, opportunity is afforded for the carrying out of highly quantitative experiments on respiration, mineral nutrition, water relations, permeability, reactions of isolated organelles, and other cellular phenomena. It is strongly recommended that students registering for the course have prior training in quantitative analysis, organic chemistry, general physics, and calculus.

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

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

272. ***Comparative Microbiology.*** An analysis of the physiological patterns of certain algae, bacteria and protozoa, and the evolutionary trends in these patterns. Topics considered are growth curves and their interpretation, adaptation and mutation, the evolution of metabolic pathways, the limitation imposed by size, and the evolution of structure. Biology 221, Biology 265 and Chemistry 161–162 (which may be taken concurrently) are prerequisites: Biology 131 is strongly recommended.

Three lectures, three 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.*

195–196. ***Senior Seminar.*** A required course for all senior students concentrating in Biology, in which several questions related to important problems in modern biology will be 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 weeek.

COURSES OFFERED IN THE SCHOOL OF MEDICINE, with approval for college credit in certain cases.

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.

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.*** A study of the 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.*** A study of the normal embryonic development of mammals, including consideration of the mechanisms of development. Illustrations will be drawn largely from the normal and abnormal development of man, although other species will be used to illustrate the evolutionary and experimental aspects of embryology. Prerequisite: Biology 101 or the instructor's permission.

Two lectures a week.

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

Alan Cowey, PH.D. (Cambridge).....Postdoctoral Fellow in Brain Research
William Hayes, PH.D. (Princeton).....Postdoctoral Fellow in Brain Research
Douglas Kimura, PH.D. (McGill).....Postdoctoral Fellow in Brain Research

The Center for Brain Research, jointly sponsored by the College of Arts and Science, the College of Engineering and the School of Medicine and Dentistry, is concerned with education at the PH.D. level and with research in major problems of the nervous system's function. Advanced undergraduates with special permission may be admitted to one or more of the 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
Ethel Louetta French, PH.D. (Rochester).....Professor of Chemistry
Marshall DeMott Gates, Jr., PH.D. (Harvard).....Professor of Chemistry
W. Albert Noyes, Jr., D-ES-SC (D'ETAT), SC.D. (Paris)..Distinguished Senior 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).....Assistant Professor of Chemistry

Robert Luis Autrey, PH.D. (Harvard).....Instructor in Chemistry
Bernard Baker, PH.D. (Northwestern).....Instructor in Chemistry
Marshall Blann, PH.D. (California).....Instructor in Chemistry
Jack Kampmeier, PH.D. (Illinois).....Instructor in Chemistry

Jesus Souto, LICENCIATE.....Technical Associate in Chemistry

Derek Chapman, PH.D. (Nottingham).....Postdoctoral Fellow in Chemistry
Lawrence David Colebrook, PH.D. (Aukland).....Postdoctoral Fellow in Chemistry
Ghazi A. W. Derwish, PH.D. (London).....Postdoctoral Fellow in Chemistry
Rachel H. Gourlay, PH.D. (London).....Postdoctoral Fellow in Chemistry
Dusanka Pavlovic, B.SC. (Zagreb).....Postdoctoral Fellow in Chemistry
Graham Scott Pearson, B.SC. (St. Andrews).....Postdoctoral Fellow in Chemistry
Paul Sigal, PH.D. (California Institute of Technology).....Postdoctoral Fellow in Chemistry
Ralph Thomas, ARIC (Swansea).....Postdoctoral Fellow in Chemistry
Charles Anthony Wellington, PH.D. (St. Andrews).....Postdoctoral Fellow in Chemistry
Roger Whiteoak.....Postdoctoral Fellow in Chemistry
Joseph Zung, PH.D. (Cincinnati).....Postdoctoral Fellow in Chemistry
****Clarence Heininger,*** PH.D. (Rochester).....Postdoctoral Fellow in Chemistry

Ralph William Helmkamp, PH.D. (Harvard).....Professor Emeritus of Chemistry
Willard Riggs Line, PH.D. (Columbia).....Professor Emeritus of Chemistry

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

*Part-time.

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 specific 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 and an advanced laboratory course.

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.
2. Engl. 101 English Composition	2. Group I
3. Math 161 Analysis I	3. Math. 162 Analysis II
4. Phys. 101 General Physics A.	4. Phys. 102 General Physics A.
or	
Phys. 107 Physics I	Phys. 108 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. III General Physics B	4. Phys. 112 General Physics B
or	
Phys. 117 Physics II	Phys. 118 Physics II
Physical Education	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.

THIRD YEAR[1]

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

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

FOURTH YEAR[2]

1. Chem. 291 Thesis research
2. Chem. 415 or 435
3. Chem. (413, 451)[3,4]
4. Elective[5]
5. Elective
   Chem. 295 Senior Seminar

1. Chem. 292 Thesis research
2. Chem. (412)[3,4]
3. Group II
4. Elective[5]
5. Elective
   Chem. 296 Senior Seminar

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[1]In the second term of the junior year, each student should select a thesis advisor and possibly the general area in which he will plan to do his thesis research. His advisor 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 three 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.*** A careful study of the fundamental principles of chemical science and of the chemistry of several important metals and non-metals and their compounds. This course, less advanced than Chemistry 123, is primarily intended for pre-medical students and others who may plan to follow with Chemistry 141, 142 and for mechanical and electrical engineers and others not planning to continue work in Chemistry. Upon recommendation of the department, students may be transferred to Chemistry 123 during or at the end of the first term.

Two lectures, two recitations, one lab a week.

122. ***General Chemistry II.*** A continuation of the concepts introduced in Chemistry 121 with more emphasis placed on the descriptive chemistry of the various elements of the periodic table. Organic chemistry is discussed briefly. An abbreviated scheme of semi-micro qualitative analysis is carried out in the laboratory. Emphasis is placed on structure of the atom and related topics. Prerequisite: Chemistry 121.

Two lectures, two recitations, one lab a week.

123. ***General Inorganic Chemistry.*** A more advanced course than Chemistry 121, designed primarily for students majoring in Chemistry, Chemical Engineering and Physics. The general principles underlying chemistry and some of the important non-metals and their compounds are considered. 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 are studied. 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 physio-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.

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.*** A course 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. The course is more rigorous and exacting than Chemistry 142. Chemistry 123 and 124 prerequisite. May not be taken for graduate credit.

Two lectures and two labs a week.

214. ***Quantitative Analysis II.*** This course is a continuation of Quantitative Analysis I. A more comprehensive study is made of the principles of the science. Some of the laboratory work will involve the quantitative separation and determination of constituents in materials of industrial importance. Electrochemical, colorimetric, and other photometric methods will be included. May not be taken for graduate credit.

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 (111–112 or 117–118); 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 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.

*293–4. ***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.

95–96. ***Senior Seminar.*** A 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 in this seminar is the approved substitute for a comprehensive examination in chemistry.

No credit.

One hour a week.

401. ***General Biochemistry.*** This course 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. The course is 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 to be emphasized 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 will be 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.*** The study of 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.

*Taken with the consent of the instructor.

*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.

*Taken with the consent of the instructor.

*452. ***Advanced Physical Chemistry II.*** Emphasis will be 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.

East Asian Studies Program

THE PROGRAM IN EAST ASIAN STUDIES enables a student concentrating in an area in the social sciences or humanities to follow, in addition, an interdepartmental program in Chinese and Japanese culture and civilization. A student selecting this program will, in addition to fulfilling the degree requirements of his department, arrange the following special program which will be drawn from his electives.

1. A basic course in East Asian history and civilization.
2. Two years of Chinese language.
3. Three electives drawn from advanced East Asian courses given in the departments of Anthropology and Sociology, Economics, Fine Arts, Geology and Geography, History, and Political Science.
4. An 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 program should consult with Mr. Harootunian, Mr. Hall, or other members of the East Asian Studies committee.

Economics

William Edward Dunkman, PH.D. (Columbia).....Professor of Economics
Lionel Wilfred McKenzie, PH.D. (Princeton).....Professor of Economics and *Chairman of the Department*
Sho-Chieh Tsiang, PH.D. (London).....Professor of Economics

Robert R. France, PH.D. (Princeton).....Associate Professor of Economics
Ronald Winthrop Jones, PH.D. (Massachusetts Institute of Technology).....Associate Professor of Economics
Hugh Rose, M.A. (Pembroke College, Oxford).....Associate 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
Richard N. Rosett, PH.D. (Yale).....Assistant Professor of Economics
Edward Zabel, PH.D. (Princeton).....Assistant Professor of Economics

Kang Chao, A.M. (Michigan).....Research Associate and *Assistant Professor of Economics

Roth Clausing, PH.D. (Columbia).....Professor Emeritus of Economics

*Part-time.

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.*** A 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. Analyses will include conditions of free competition and various degrees of monopoly control. Some attention also is given to the theory of distribution dealing with wages, rent, interest, and profits.

209. ***National Income Analysis.*** National income accounting concepts will be 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.*** An 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.*** Building upon Economics 211, a more intensive study of monetary policy is undertaken in which the interrelations of money, incomes, expenditures, price levels, interest rates, and foreign exchange rates are emphasized. Federal Reserve and fiscal policies are reviewed with attention to post-World War II problems. Economics 211 prerequisite.

223. ***Labor Problems.*** An analysis of the problems raised in the process of determining wages and other conditions of employment in an industrial society. Emphasis is placed on the impact of the policies and practices 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 of this course will deal with problems of underdeveloped areas and with the strategy of development. This will involve an examination of the stimulants to economic change and growth, and the conditions and prerequisites for industrialization. Part II will survey and appraise contemporary development theories against the background of factors discussed

in Part I. Prerequisite: Economics 207 or the permission of the instructor.

227. ***Major Factors in American Economic Development.*** An analysis of the main features of American economic growth since 1800. Recent statistical studies of national product, industrial structure and capital formation will be evaluated. Considerable use will be made of price theory and modern growth theory.

231. ***Economic Statistics.*** The basic ideas and methods of descriptive statistics and statistical inference. Subjects covered are sampling distributions, statistical tests, estimation of parameters, regression, and time series. The size of this class may not exceed 25.

245. ***Government and Business.*** This course examines, against the historical background and in relation to general economic theory, the problems created for the American economy by the intervention of government in the workings of the free enterprise system especially in the fields of business enterprise, finance, foreign trade, labor, and agriculture. Particular attention is given to recent legislation and judicial decisions.

249. ***Comparative Economic Systems.*** Analysis of the functioning and comparative performance of the American and Soviet economies in terms of the pattern of resource allocation, degree of economic control and planning, market structure, and stagnation or growth. This will involve the definition of theoretical criteria for model economic systems by which the actual American and Soviet experience may be appraised.

253. ***The Canadian Economy.*** This course, conducted by the seminar method, will study the development and structure of the expanding Canadian economy in terms of population growth, gross product and other basic characteristics. The critically important economic relations of the United States and Canada will receive special attention. With consent of the instructor.

263. ***Taxation and Fiscal Policy.*** A study of the principles, practices and economic effects of government expenditure, revenue, and debt with special reference to taxation in the United States.

269. ***International Economics.*** An examination of 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.

285. ***Senior Seminar.*** Required of all seniors concentrating in economics, with the exception of Honors majors. Students will write short essays on particular problems in economics which will 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 attention to the theories of pure competition, monopolistic competition, oligopoly, and general equilibrium. The works of major economists are given special emphasis. The subjects are developed to their present state in economic theory. Prerequisites: Economics 207 and 209.

Credit—three hours.

481. ***Introduction to Mathematical Economics.*** An elementary survey of topics in economic theory. Mathematical concepts are used to facilitate the understanding of these topics. Macro-economic as well as micro-economic models but an introduction to dynamic models is also presented. Prerequisites: Mathematics 151, Economics 207, Economics 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 105, 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*
William Henry Gilman, PH.D. (Yale).....Professor of English
Kathrine Koller, PH.D. (Johns Hopkins).....Joseph H. Gilmore Professor of English
Bernard Nicholas Schilling, PH.D. (Yale).....Professor of English
Ronald S. Crane, PH.D. (Pennsylvania).....Visiting Professor of English (Term II)

Joseph Frank, PH.D. (Harvard).....Associate Professor of English
Robert Benedict Hinman, PH.D. (Johns Hopkins).....Associate Professor of English
William Alexander Jamison, Jr., PH.D. (Princeton).....Associate Professor of English
James William Johnson, PH.D. (Vanderbilt).....Associate Professor of English
Ralph James Kaufmann, PH.D. (Princeton).....Associate Professor of English
Hyam Plutzik, M.A. (Yale).....Associate Professor of English

Richard M. Gollin, PH.D. (Minnesota).....Assistant Professor of English
Howard Horsford, PH.D. (Princeton).....Assistant Professor of English
Lisa Rauschenbusch, A.M. (Cornell).....Assistant Professor of English

John Knapp Donaldson, Jr., M.A. (Middlebury).....Instructor in English
James Delmont Ellis, M.A. (Iowa State).....Instructor in English
Phillip B. Graham, PH.D. (Yale).....Instructor in English
David Hadas, A.M. (Columbia).....Instructor in English
Russell A. Peck, A.B. (Princeton).....Instructor in English
George W. Ray, III A.M. (Colgate).....Instructor in English

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

THE DEPARTMENT OF ENGLISH offers work leading to a concentration for the A.B. degree, for the A.B. degree in the Honors Program, and, at the graduate level, for the A.M. and PH.D. degrees.

English 101 or its equivalent is required of all students seeking a bachelor's degree on the River Campus. Since it is 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 102, 103, 104, 105 before registering for higher level courses. Students who expect to concentrate in English are urged to select English 102, 103, and 105. 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, 123, 132. The following count as allied fields: 103, 217, 230, 231, 232, 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: Mediaeval or renaissance literature (English 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.

The two to four courses in the allied fields are to be selected from among specified

courses in History, Philosophy, Fine Arts, German, French, Classical or Comparative Literature, Anthropology, or the courses offered by the English Department in areas outside English and American Literature.

Students majoring in English 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: 220, 223, 224, 225, 270, 273, 274, 275.

101. ***English Composition.*** Instruction and practice in expository and argumentative writing and in the preparation of research papers, together with a study of discursive prose and exercises in logic and in critical analysis of essays covering a variety of disciplines. Required of all freshmen except those exempted by the department on the basis of previous school record and high standing in placement tests.

102. ***Introduction to Literature.*** Readings in a wide variety of works of literature designed to enrich appreciation and critical ability. Emphasis in English 102 is centered on an understanding of the techniques of language and literature rather than on their historical development. The student's enjoyment of literature will be fostered by introducing him to essays, plays, poems, stories, and novels, and by providing him with the opportunity to express his critical insights through discussion and writing. Open to all students but especially recommended for freshmen.

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 studied in English 103 are selected from the classics of ancient and medieval periods. Open to all students.

104. ***English and American Masterpieces.*** A continuation of English 103. Books studied in English 104 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.*** A selective historical survey of English literature. 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. ***Advanced Narrative Writing.*** Short story workshop. Each student will be expected to write from 18,000 to 20,000 words during the term. The class will meet once a week for three hours for criticism and discussion. Frequent conferences with individual students will be held. The student will be encouraged to improve by constant comparison of his work with the best achievements in fiction. 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.

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.

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.*** For English concentrators, but not for other students, English 201 is a prerequisite for English 202. Does not carry graduate credit.

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

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

210. ***Modern British Literature.*** A study of British plays, poems, and, in particular, novels, from 1914 to the present.

211. ***Modern Poetry and Criticism.*** An introduction to representative twentieth-century poetry and literary criticism.

214. ***English Drama.*** A study of the history and development of English drama from its medieval beginnings to Oscar Wilde.

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

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

217. ***History of the English Language.*** A survey of the 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.

220. ***Medieval Literature.*** A study of major medieval writers: Langland, the Pearl poet, and—especially—Chaucer.

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.*** A study of the leading poets and prose writers from Donne and Bacon through Milton.

225. ***Restoration and Eighteenth-Century Literature.*** A study of poetry and prose between 1660 and 1798.

226. ***Romantic Literature.*** A study of the 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.*** A study of major Victorian poets from Browning through Hardy and of 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.

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

Howard Sutermeister Merritt, PH.D. (Princeton).....Associate Professor of Fine Arts

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

THE DEPARTMENT OF FINE ARTS offers courses in the history and theory of the visual arts and in creative art. Such work may lead to a concentration for the A.B. degree, and, at the graduate level, to the A.M. degree. These programs provide basic training for college teaching, museum work, and other professional applications of the discipline.

Fine Arts 101 and 102 are prerequisite to most Fine Arts courses and to the concentration program. Concentrators are expected to have completed Fine Arts 101 and 102 by the end of the sophomore year.

A concentration program normally consists of eight advanced courses in Fine Arts. Ordinarily at least one course will be taken in four 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.

*Part-time.

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.*** This course is a general introduction to Renaissance and modern art with special emphasis on the Italian, Flemish, Dutch, and French schools of painting. It is a sequel to Fine Arts 101, but may be taken separately.

103. ***Introduction to the Art of India and the Far East.*** A selective survey of the art of India, China, and Japan. Examples of architecture, sculpture, painting, and metal work are discussed in their historic sequence and interpreted with regard to form and content.

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. The course is concerned with the analysis of different methods of artistic expression, and seeks to develop personal standards for judging quality. It is designed primarily for freshmen. No previous art training is 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 will be assigned. Students will be allowed a free choice of projects in wood, stone, ceramics, and plaster. Some lectures and papers will be included. No previous experience is required. The class will be limited to fifteen students.

Two three-hour studio periods a week.

113–114. ***Drawing and Painting.*** An opportunity to practice basic principles of drawing and painting in various media. The development of natural ability, often present but not recognized, is encouraged. The course 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.

200. ***Mythology.*** A 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 will also be stressed. Slides and photographs will be used in the classroom for illustration. Prerequisite: Fine Arts 101, English 103, 104, or History 101–102, or the equivalent. No graduate credit.
Two hours a week.

201. ***The Art of Early Civilizations.*** The course is devoted to a review of painting, sculpture, and architecture of the Stone Ages, the Aztec, Mayan and Incan civilizations of our own hemisphere, and of Egyptian, Mesopotamian, Persian and Minoan peoples. The lectures, which are illustrated, are designed to throw light on the religion, traditions, society, and cultural values of ancient peoples as they are expressed in their art forms. Prerequisite: Fine Arts 101, or History 101–102, or the equivalent.
Three hours a week.

202. ***Greek and Roman Art.*** The course is devoted to a review of the painting, sculpture, and architecture of ancient Greece and Rome. The lectures, which are illustrated, are designed to throw light on the religion, traditions, society, and cultural values of the Greeks and Romans as they are expressed in their art forms. Prerequisite, one of the following: Fine Arts 101, 200, History 101–102, Classics 251, 252, or the equivalent.

204. ***Medieval Art.*** The course deals with the origin and development of Romanesque and Gothic art in France, Italy, Spain, Germany, and England, with emphasis on architecture and sculpture. Fine Arts 101 or History 101–102 prerequisite.

206. ***Renaissance and Modern Architecture.*** The course aims to develop a knowledge of the theory and problems of Renaissance and modern architectural design and to trace the development of architecture in Europe from the beginning of the Renaissance through the baroque and modern periods. Fine Arts 101, 102 or History 101–102 prerequisite.

215. ***Interrelations of Art, Literature, and Philosophy.*** The motivating ideals in the viewpoints of the Egyptian, Mesopotamian, Hebrew, Hindu, Chinese, and Greek cultures will be sought through an examination of the interplay of the art, literature, and philosophy of these peoples. Prerequisite, one of the following: History 101–102, Fine Arts 101, 102, or Philosophy 101, 102. No graduate credit.
Two periods a week.

216. ***Interrelations of Art, Literature, and Philosophy.*** The motivating ideals in the viewpoints of the Roman, Medieval, and Modern cultures will be sought through an examination of the interplay of the art, literature, and philosophy of these peoples. Prerequisite, one of the following: History 101–102, Fine Arts 101, 102, or Philosophy 101, 102. No graduate credit.
Two periods a week.

222. ***The Painting of China and Japan.*** Masterpieces of Far Eastern painting will be studied in their historic contexts and in their relation to each other. Oriental painting techniques as well as individual, period, and national styles will be stressed.

231. ***Italian Painting.*** A survey of the principal schools of painting in Italy from the late thirteenth century to the eighteenth century. Fine Arts 102 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.*** A study of the 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.*** A study of European painting from about 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. The works of Cezanne, Gauguin, Vincent van Gogh, Munch, Matisse, and Picasso receive special emphasis. Fine Arts 102 prerequisite.

245. *American Architecture.* A study of the 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 will be given to the English colonial tradition, to the spirit of nationalism underlying the architecture of the Early Republic, and to the American contributions to the development of modern architecture. Study will be made of structures in Rochester and vicinity which illustrate phases of American architecture. Fine Arts 101 or History 101–102 prerequisite.

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 will be considered. Fine Arts 102 or History 101–102, or an equivalent, prerequisite.

Two periods a week.

251–252. *Advanced Sculpture Studio.* Students will be encouraged to work toward greater technical competence and more personal expression. Stone, wood, ceramics, plaster, and metal will be the media available. The course will include figure and portrait modelling, and some lectures and papers. Prerequisite: Fine Arts 111–112 or previous experience. 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 will include a study of the fundamentals of color and composition and experiments with such materials as tempera, casein, watercolor, and oil paint; attention will also be given to supports, grounds, and pigments, including the new plastic paints and mediums. The course will be based on a progressive series of advanced studies which stress independent research and individual development. Demonstrations, special assignments, and field trips to museums and exhibitions will be 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.

Foreign Languages

D(elos) Lincoln Canfield, PH.D. (Columbia) ..... Professor of Spanish and *Chairman of the Department of Foreign Languages*
Arthur Monroe Hanhardt, PH.D. (Cornell) ..... Professor of German
Howard Graham Harvey, PH.D. (Harvard) ..... Professor of French
Louise Alfreda Hill, PH.D. (Johns Hopkins) ..... Professor of French
Virginia Moscrip, PH.D. (Chicago) ..... Professor of Classics
Virgil William Topazio, PH.D. (Columbia) ..... Professor of French

Eduardo Betoret-Paris, PH.D. (Kansas) ..... Associate Professor of Spanish
William Harrington Clark, Jr., PH.D. (Columbia) ..... Associate Professor of German

Wilhelm Braun, PH.D. (Toronto) ..... Assistant Professor of German
Robert T. Giuffrida, PH.D. (George Washington) ..... Assistant Professor of German
George Kent, PH.D. (California) ..... Assistant Professor in Chinese
Antanas Klimas, PH.D. (Pennsylvania) ..... Assistant Professor of German
Dean Hubert Obrecht, PH.D. (Pennsylvania) ..... Assistant Professor of Spanish
John Howard Whittemore, PH.D. (Yale) ..... Assistant Professor of French

John Knapp Donaldson, Jr., M.A. (Middlebury) ..... Instructor in Foreign Languages
Vladimor Butkoff, M.A. (Syracuse) ..... Instructor in Russian

Robert Alexander MacLean, PH.D. (Chicago) ..... Professor Emeritus of Classics

THE DEPARTMENT OF FOREIGN LANGUAGES offers work in Classics, French, German, and Spanish leading to a concentration for the A.B. degree and to the A.M. degree.

In modern languages the elementary course 101–102 and the intermediate course 103 (or their equivalents) are prerequisite to more advanced courses. French 121 or German 121 or Spanish 121 and French 131, 132 or German 131, 132 or Spanish 131, 132 are courses required of all students concentrating in these fields. They may be taken in the freshman or sophomore years or, exceptionally, in the junior year.

A program of concentration will normally consist of six to eight courses in the foreign language. If the student concentrates in literature, he will take advanced courses in that field, and (in French) the Senior Seminar. If he specializes in language, he will take advanced courses in language-linguistics (211, 235, 237).

In the belief that the interchange of students between the United States and other countries is a contribution to international understanding as well as to the enrichment of the individual, the department advocates the Junior Year Abroad for qualified students of French, German and Spanish.

Language laboratories, conducted by native assistants, offer special opportunities for intensive oral-aural training as several levels, and laboratory exercises constitute an integral part of the language and linguistics courses.

A student will add to his work in a foreign language enough additional courses to bring the total in his concentration to ten. The related field may be chosen from: Fine Arts, another foreign language or literature, English literature, History, Philosophy, or Political Science.

Chinese

101–102 ***Elementary Chinese.*** Introduction to the study of the structure of Chinese and its basic vocabulary. Exercises in pronunciation and in intonation.

103. ***Intermediate Chinese.*** Basic principles of the morphemic system of writing. Practice in the recognition of certain fundamental characters.

Classics

LATIN

NOTE: Latin 105 and Latin 104 or its equivalent, are prerequisite to further work in Latin. Allied courses for students concentrating in Classics or in Latin may be chosen from Fine Arts, History, Philosophy, Political Science, or another literature.

104. ***The Aeneid of Vergil.*** An introduction to epic literature, open to students entering college with three years of Latin.

105. ***An Introduction to Latin Literature.*** Selections from various Latin writers.

206. ***Horace: The Odes and Epodes.*** A study of Horace as lyric poet.

223. ***A Survey of Latin Poetry.*** Selections from the principal Latin poets.

225. ***Letters of Cicero and Pliny.*** A study of the letters and the historical background.

227. ***Tacitus: Agricola and Germania.*** A survey of the first century of the Roman Empire.

228. ***Roman Comedy.*** Reading of several plays of Plautus and Terence, and a study of the relations of Greek and Roman Comedy.

230. ***Vergil: The Eclogues and Georgics.*** The earliest writings of Vergil, their literary background and influence.

233. ***Roman Satire.*** A study of satire in Roman literature as illustrated by selections from Horace and Juvenal.

235. ***Roman Philosophy.*** Selections from Lucretius and Cicero.

245. ***Latin Principles I.*** A course designed to meet the needs of prospective teachers of Latin. A thorough review of the principles of Latin syntax and practice in the writing of Latin are combined with lectures and readings on the development of the Latin language and the life and character of the Romans.

246. ***Latin Principles II.*** A continuation of 245.

GREEK

NOTE 1: It is recommended that students who are preparing to teach Latin in the secondary schools take two years' work in Greek.

NOTE 2: Advanced courses other than those listed below will be offered by members of the department as the occasion for such courses arises.

101–102. ***Elementary Greek.*** Easy selections from Greek authors will be read in class.

211–212. ***Introduction to Greek Literature.*** More extensive reading in a variety of Greek authors including Homer and Plato.

221. ***Greek Drama.***

222. ***Greek History.***

231. ***Greek Philosophy.***

241. ***Greek New Testament.*** Translation and study of passages from the Gospels and Epistles.

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.

Interrelations of Art, Literature and Philosophy
(See Fine Arts, p. 119)

EUROPEAN LITERATURE IN TRANSLATION

285. ***Modern European Novel and Drama from 1850–1900.*** Readings in English translation of such representative authors as: Flaubert, Zola, Tolstoy, Dostoyevsky, Ibsen, Strindberg, Hauptmann.

286. ***Modern European Novel and Drama Since 1900.*** Readings in English translation of such representative authors as: Chekov, Gide, Mauriac, Sartre, Camus, Pirandello, Silone, Garcia Lorca, Mann.

LINGUISTICS

205. ***Introduction to Linguistics.*** A study of the principles of structural analysis of speech phenomena, both synchronic and diachronic, and their application in dialectology and in pedagogy. Examination of material from English, French, German, Italian, Spanish and less familiar languages. Prerequisite: fulfillment of the foreign language requirement.

French

101–102. ***Elementary French.*** 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.

103. ***Introduction to French Civilization.*** A study of the important trends in the development of the civilization of France as reflected in representative works of French literature. Prerequisite: French 101–102 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.

131. ***Survey of Literature to 18th Century.*** Main currents of French literature from its beginnings to the end of the 17th century. Reading and appraisal of poetry, drama and novels typical of each period.

132. ***Survey of Literature from 18th Century to Present.*** Main currents of French literature of the 18th, 19th and 20th centuries. Reading and appraisal of poetry, drama and novels typical of each period.

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.*** A study of the formation, development and present state of French as one of the Romance Languages. Examination of Old French texts.

237. ***Romance Philology.*** A 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.

238. ***Examination of Romance Texts.*** A study of writings in Old French, Provençal Italian, Spanish and Portuguese.

241. ***Practicum in French.*** Investigation of special linguistic problems under the direction of a member of the departmental staff.

252. ***The Renaissance.*** Rabelais, Ronsard, Montaigne and other humanists of the sixteenth century. Prose, poetry and theater.

255. ***17th Century French Literature.*** The Classical Drama: Corneille, Moliere, Racine.

265. ***The 18th Century.*** Montesquieu, Diderot, Rousseau, Voltaire, Beaumarchais.

275. ***19th Century French Literature.*** Drama and Poetry. Drama: Dumas, Augier, Becque, Brieux, Curel. Poetry: Lamartine, Hugo, Vigny, Musset, Baudelaire, Verlaine, Rimbaud, Mallarmé.

285. ***20th Century French Literature.*** Drama and Poetry. Drama: Claudel, Lenormand, Giraudoux, Anouilh, Sartre, Camus. Poetry: Laforgue, Valery, Appollinaire, Eluard, St. John Perse.

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

295. ***French Senior Seminar.*** The novels of the nineteenth and twentieth centuries will be read and discussed in French at weekly meetings under the guidance of two professors (Hill & Topazio). The authors whose works will be read are: Balzac, Stendhal, Flaubert, Zola, Maupassant, A. France, Proust, Gide, Duhamel, Mauriac, Malraux, Sartre, and Camus. This course will be required of all majors (and will be open to others only by special permission of instructor).

German

101–102. ***Elementary German.*** An introductory study of the structure of the German language and its basic vocabulary. Reading of selected graded texts.
Three hours, one lab a week.

103. ***Introduction to German Civilization.*** A study of the important trends in the development of German civilization as reflected in representative works of German literature. Prerequisite: German 101–102 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 101–102 or equivalent.

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

131. ***Survey of German Literature to 1800.*** The main currents of German Literature from its beginnings to the present day. Reading and appraisal of poetry, novels and plays typical of each period.

132. ***Survey of German Literature from 1800 to the present.*** A continuation of German 131.

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.*** A study of the 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 under the direction of a member of the departmental staff.

265. ***Eighteenth Century Literature I.*** A study of the development of German literature during the eighteenth century with emphasis on the works of Lessing and Schiller.

266. ***Eighteenth Century Literature II.*** A continuation of German 265.

269. ***Goethe.*** A study of Goethe's life and works.

275. ***Nineteenth Century Drama and Poetry.*** A study of the most important writers of German Romanticism and Realism with emphasis on the works of Kleist, Grillparzer, and Hebbel.

276. ***Nineteenth Century Prose Literature.*** A study of the more important prose writings.

285. ***Modern German Drama and Poetry.*** The development of German literature since 1880 with emphasis on the works of Hauptmann, Thomas Mann, Hofmannsthal.

286. ***Modern German Prose Literature.*** A continuation of German 285.

291. ***Senior Reading Course.*** For seniors concentrating in German. The character and scope of these courses are determined by special needs and interests of the individual students. By special permission only.

Credit to be arranged.

Russian

101–102. ***Elementary Russian.*** An introductory study of the structure of Russian and its basic vocabulary. Exercises in pronounciation and intonation. Reading of graded texts.

Three hours, one lab a week.

103. ***Introduction to Russian Civilization.*** A study of the important trends in the development of the civilization of Russia as reflected in representative works of Russian literature. Prerequisite: Russian 101–102 or equivalent.

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

131. ***Survey of Russian Literature before 1800.*** The main currents of Russian Literature from its beginnings. Reading and appraisal of poetry and prose. Prerequisite: Russian 103, 105 or equivalent.

132. ***Survey of Russian Literature since 1800.*** The principle development in Russian Literature during the Nineteenth and Twentieth Centuries. Prerequisite: Russian 103, 105 or equivalent.

Spanish

101–102. ***Elementary Spanish.*** An introductory study of the structure of the Spanish language and its basic vocabulary. Reading of selected graded texts.

Three hours, one lab a week.

103. ***Introduction to Hispanic Civilization.*** A study of the important trends in the development of the civilization of Spain and Hispanic America as reflected in representative works of Hispanic literature. Prerequisite: Spanish 101–102 or equivalent.

Three hours, one lab a week.

105. ***Readings in Scholarly and Technical Spanish Prose.*** Controlled readings in technical prose as a preparation for specialized use of the language. In the second semester students will read in their special fields of interest. Prerequisite: Spanish 101–102 or equivalent.

106. ***Specialized Technical Readings.*** Spanish readings in specialized areas of interest. Prerequisite: Spanish 105 or its equivalent.

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

131. ***Survey of Hispanic Literature I.*** The main currents of Spanish literature from its beginnings to the present day. Reading and appraisal of poetry, novels and plays typical of each period.

132. ***Survey of Spanish-American Literature.*** A study of the development of the literature of the Spanish-speaking countries of America.

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.*** A study of the formation, development and present state of Spanish as one of the Romance Languages.

236. ***Old Spanish Texts.*** Examination of old Spanish texts.

237. ***Romance Philology.*** A 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 under the direction of a member of the departmental staff.

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 nineteenth 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 departmental staff.

Geology and Geography

John Edward Hoffmeister, PH.D. (Johns Hopkins).....Professor of Geology and *Chairman of the Department*

Robert Burnett Hall, Jr., PH.D. (Michigan).....Associate Professor of Geography
Robert George Sutton, PH.D. (Johns Hopkins).....Associate Professor of Geology

William Akers Bassett, PH.D. (Columbia).....Assistant Professor of Geology
Lawrence William Lundgren, Jr., PH.D. (Yale).....Assistant Professor of Geology
Alan Gibson Macpherson, M.A. (McGill).....Assistant Professor of Geography

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

Geology 101 and 102 are prerequisite for all other courses in Geology; however, exceptions to this regulation may be made by the departmental counsellor.

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 Advanced Mineralogy	1. Geog. 208 Economic Geography II
2. Geol. 235 Stratigraphy	2. Geol. 246 Structural Geology
3. Elective	3. Elective
4. Phys. 101 General Physics A	4. Phys. 102 Physics A
or	
Phys. 107 Physics I	Phys. 108 Physics I

FOURTH YEAR

1. Geol. 252 Regional Geology	1. Geol. 274 Advanced Paleontology
2. Geol. 241 Introductory Petrology	2. Chem. 142 Elementary Quant. Analysis
	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

101. ***Introductory Physical Geology.*** A study of 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.*** A study of the 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 receive attention.

Two lectures, one recitation, 1 lab a week.

121. ***Introductory Paleontology.*** A course designed to introduce the student 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.*** The basic principles involved in the description, classification, and genetic interpretation of minerals are discussed. Emphasis is placed on the manner in which the mineralogy of each of the major groups of rocks is determined by the chemical and physical environment in which these rocks are formed. 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.

*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.

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

227. ***Intermediate Mineralogy.*** The optical properties, crystallography, and atomic structure of minerals are discussed. 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 101–102 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.*** A study of the 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.*** This course includes 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.*** An introductory survey of geochemistry. The course is designed to present a review of the contributions of chemistry, physics, and the other sciences to our understanding of the evolution of the earth. The following topics will be discussed: 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 will include discussions of the principles of the geochemical separation of the elements and the processes by which this separation is effected. Chemistry 121, 122 or 123, 124 and Physics 101–102 prerequisite.

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 advisor 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.

207. ***Economic Geography I.*** A presentation of the world's most important agricultural resources and the environmental factors that

control their production. Included are 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.

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.* A study of the physical and cultural geography of the continent of Europe.

258. *Geography of North America.* A study of the 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.*

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, 201–202, 203, 205, 209, 211, 220, 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.

As the substitute for the comprehensive examination the student must take, in the second term of his senior year, either Philosophy 282, The Organization of Knowledge, which is designed to serve as an integrating course for the general science program and will be taken by most students, or Philosophy 252, Philosophy of Science, which may be taken by qualified students who secure the permission of the instructor. This course will be taken for credit, in addition to the thirty-two courses usually required for the A.B. degree.

History

Willson Havelock Coates, PH.D. (Cornell) ..... Professor of History
****J. Alexis Fenton,*** PH.D. (Columbia) ..... Professor of History
Arthur James May, PH.D. (Pennsylvania) ..... Professor of History
Glyndon Garlock Van Deusen, PH.D. (Columbia) ..... Professor of History and *Chairman of the Department*
H. Mason Wade, M.A. (McGill) ..... Professor of History and Director of Canadian Studies

John Barrett Christopher, PH.D. (Harvard) ..... Associate Professor of History
Hayden V. White, PH.D. (Michigan) ..... Associate Professor of History

Milton Berman, PH.D. (Harvard) ..... Assistant Professor of History
Harry Harootunian, PH.D. (Michigan) ..... Assistant Professor of History
Edward L. Towle, M.A. (George Washington) ..... Assistant Professor of History

Joseph A. Kessler, M.A. (Colorado) ..... Instructor in History
Christopher Lindley, A.B. (Cornell) ..... Instructor in History

Dexter Perkins, PH.D. (Harvard) ..... Professor Emeritus of History

*Part-time.

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 counsellor.

A program of concentration of 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 areas: 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 counsellor. All courses offered to make up 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 97.

101–102. ***Introduction to Western Civilization.*** A broad survey of the European background of western civilization from ancient times to the present day. Intellectual, religious, social, economic, and scientific developments are considered, as well as political evolution and international affairs.

211. ***The Graeco-Roman World.*** A study of the basic ideas, institutions and problems of Graeco-Roman civilization during the transition from tribe to city-state to empire. Particular attention is given to Athenian culture of the fifth century B.C. and the unification of the Mediterranean world under Rome.

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, 1490–1867.*** 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 establishment of British rule and the evolution of responsible government.

224. ***The History of Canada, 1867–1961.*** A general course in Canadian history from the beginnings of the Dominion until the present day. Canadian developments are related to those in the United States, Great Britain and France. Emphasis is given to the rise of national feeling and relations with the United States.

226. ***Economic History of the St. Lawrence and Great Lakes Basin.*** An historical approach to the study of the economic relations between Canada and the United States, focusing geographically upon New England, the Maritime Provinces and the region of the Great Lakes and comparatively upon the fur trade, maritime industries, agriculture, business enterprises, public transport, mining and foreign trade. The general economic growth of the area will be studied in relation to its transition from an intercolonial to an international area.

227. ***Seventeenth Century England.*** A study of the political, social, economic, religious, and intellectual aspects of English history during a most critical and decisive phase, and in the context of the expanding Western European civilization. The course will begin with the Tudor background of the period. History 221 or 245 prerequisite or by permission of the instructor.

228. ***Social History of American Thought I.*** This course will deal with American thought from colonial times to the Civil War.

229. ***Social History of American Thought II.*** This course will deal with American thought from the Civil War to the middle of the twentieth century.

230. ***The History of the American West.*** This course will examine the expansion of the American West from the Revolution to the early 20th Century. Special attention will be devoted to the problems of settlement in various western areas and the effect of government policy on the pattern of westward expansion. Emphasis will also be given to the historiography of the American frontier, focusing on the writings of Frederick Jackson Turner.

231. ***The History of the United States I.*** A general history of the United States from 1760 to 1865.

232. ***The History of the United States II.*** A general history of the United States from 1865 to the present.

233. ***American Economic History I.*** An advanced course covering the principal events in the economic life of the United States from the American Revolution to the Civil War.

234. ***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.

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

237. ***American Colonial History.*** An examination and analysis of the roots of American Civilization to 1789. Emphasis is placed on the interplay between European expansion in the New World and the emergence of a separatist movement in the North American colonies, the problems of the 17th Century American society, the crisis leading to the American Revolution, and the rise of the new American nation.

238. ***Recent History of the United States, 1890–1929.*** This course will deal with the relation between 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.*** This course will deal with the relation between domestic and diplomatic developments in the United States from the beginning of the Great Depression to the end of World War II.

240. ***The City in American History.*** A study of the origins and growth of urbanism in the United States. Special emphasis will be placed on the impact of the city on the economic, political, and cultural development of the nation. The course will also include a discussion of the emergence of urban problems, the rise of the city political machine and boss, the growth of satellite towns and suburbia, and an analysis of urban institutions.

241. ***Medieval Civilization.*** A study of the emergence of a European civilization with emphasis upon the fusion of the Graeco-Roman, Christian, and Germanic traditions, and an analysis of the main institutional, artistic, and intellectual contributions of medieval society to the subsequent history of European peoples.

245. ***Renaissance and Reformation.*** A study of the transition from medieval to modern times in both Northern and Southern Europe. Beginning with a brief analysis of the medieval cultural synthesis, this course will deal with its breakdown and the emergence of new cultural forms up to 1556.

251. ***The Age of Absolutism, 1556–1789.*** A study of political, economic, and cultural developments. Special attention is given to the Age of Louis XIV and the Enlightenment.

252. ***The Age of Revolution, 1789–1870.*** A study of political, economic, and cultural developments. 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.*** A study of the 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 until the First World War.

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

258. ***Cultural Foundations of the Slavic World.*** This course will embrace the cultural history of the various Slavic and non-Slavic peoples of the European East—such as Russians, Greeks, Germans (Ostdeutsch), Balts, Turks, and Mongols—and will trace the effects of cultural penetration from Western Europe, Islam, and Inner Asia. The underlying patterns of cultural continuity, on the one hand, and of cultural diversification on the other, will be delineated and analyzed. Original East European and Russian contributions in the fields of folklore, music, architecture, literature and religious thought will be outlined and evaluated. Special attention will be paid to the perennial conflict of cultural orientation as reflected in such ideological groupings as "Easterners" and "Westerners," Trilingualism, Uniatism, Hussitism, Third Rome, Pan-Orthodoxy, etc. It will cover, chronologically, the period from the era of primitive Slavic paganism to the eighteenth century.

261. ***History of China and Southeast Asia Since 1800.*** A study of 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.

265. ***A History of Russia I.*** An intensive study of imperial Russia with the emphasis on the 19th century and ending with the outbreak of the First World War.

266. ***A History of Russia II.*** An intensive study of Russia since 1914.

267. ***The Middle East in Modern Times.*** Attention will be directed mainly to the developments of the past century and a half. Particular stress will be placed on the Young Turk Revolution and its aftermath, the growth of Arab nationalism, the roots of Arab-Israeli tensions, the strategic importance of the Middle East, and the record of attempts to modernize and "Westernize" the middle Eastern states.

281. ***World Communism.*** The object of the course is to give the student a dispassionate view of the rise of Communism both as an ideological movement and as a power factor in international relations. The first part of the course will trace the development of Communist ideology. The second section will deal with the power structure of Communism, with special emphasis on the Soviet Union and Communist penetration into various parts of the world. The third part will deal with the relations of Communism with free societies.

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.

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
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

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
Richard Paul Goblirsch, PH.D. (Wisconsin).....Assistant Professor of Mathematics
Kenneth Allen Ross, PH.D. (Washington).....Assistant Professor of Mathematics
Neal Jules Rothman, PH.D. (Louisiana).....Assistant Professor of Mathematics
Yuzo Utumi, D.SC. (Osako).....Visiting 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

Bruce Lercher, M.S. (Wisconsin).....Instructor in Mathematics
David Edward Schroer, B.A. (Cornell).....Instructor in Mathematics

Charles William Watkeys, A.M. (Harvard).....Professor Emeritus of Mathematics

THE DEPARTMENT OF MATHEMATICS offers a concentration for the A.B., an intensified concentration for an A.B. with Special Merit, and graduate work leading to the A.M. and Ph.D.

The prerequisite to concentration in mathematics is a four-semester sequence in analysis, culminating in Mathematics 164 or 174. The standard sequence is Mathematics 161, 162, 163, 164. Freshmen are placed after careful consideration of their entering records including a placement test. Ordinarily, they will start with Mathematics 161 (as will those who concentrate in physics or engineering). Students with unusually thorough high school preparation may enter the sequence with Mathematics 162. Students demonstrating an extraordinary flair for mathematics—as determined after a personal interview with a representative of the department—will be invited to enter the intensified analysis sequence, Mathematics 171, 172, 173, 174. It parallels the standard sequence so that transfers in either direction, when appropriate, can be made without difficulty.

Each new course in analysis depends heavily upon its predecessor. A student who receives a grade of D in Mathematics 161, 162, or 163 is strongly advised to repeat the course before attempting to go on.

Students not needing immediate technical proficiency in calculus are advised to begin with Mathematics 100. In particular, this course, which is offered each semester, is especially well suited as a one-semester elective. Students who eventually enter the analysis sequence but whose command of the manipulative skills of high school mathematics is not strong are also advised to begin with Mathematics 100, which presupposes less in the way of such skills but offers opportunity for improving them.

A mathematics concentration for the A.B. consists of Mathematics 237, Mathematics 247, and four to six additional courses in mathematics numbered 200 or higher. Admission is limited to students with high standing in their preparatory courses.

In addition to the six to eight advanced mathematics courses, a student concentrating in mathematics is expected to select appropriate courses in a related field to bring the total in his concentration to ten. These are to be courses beyond the introductory level,

and the selection is subject to approval by the mathematics department. The related field may be chosen from among: Biology, Chemistry, Economics, Philosophy, Physics, Psychology.

For the A.B. with Special Merit, the general requirements, including the selection from a related field, are the same as for the A.B.; but the specific mathematical requirements are greater: the prerequisites are Mathematics 171, 172, 173, and 174, and the concentration consists of Mathematics 237, 247, 271, 276, 297, and one to three additional courses in mathematics numbered 200 or higher. Some of the requirements may be waived in special cases with the consent of the department.

Considerable flexibility is possible in the choice of upper level courses. Students who plan to teach mathematics in the secondary schools are advised to include Mathematics 100, 200, 210, 230, and 250. Students planning to work as mathematicians in industry should take Mathematics 135, 200, 210, 261, 276, and 280. All students who hope to continue with graduate work in mathematics are advised to study two of the three languages: French, German, Russian.

Any prerequisite listed in the course descriptions may be waived with the consent of the department.

100. ***Finite Mathematics.*** An introduction to several topics independent of the calculus: logic and the algebra of sets; partitions; combinatorial probability; vectors and matrices; linear programming and the theory of games.

135. ***Vectors and Matrices.*** Basic properties of vectors and matrices, with emphasis on applications: solutions of linear equations, bilinear and quadratic forms, eigenvalues and eigenvectors, diagonalization of matrices. Prerequisite: Math. 162 or 172.

161. ***Analysis I: Introduction to Calculus.*** Rectangular coordinates, equations of the line; sets, functions; limits; derivatives of algebraic and elementary transcendental functions, with applications; introduction to the definite integral.

162. ***Analysis II: Analytic Geometry and Integral Calculus.*** Conic sections; methods of integration; vector notation, polar coordinates; solid analytic geometry. Prerequisite: Math. 161 or 171.

163. ***Analysis III: Calculus of Several Variables.*** Multiple integrals; partial derivatives; line integrals; approximations; infinite series. Prerequisite: Math. 162 or 172.

164. ***Analysis IV: Differential Equations.*** Applications and methods of solution of ordinary differential equations, especially linear or of first order; introduction to partial differential equations; Laplace transform; Fourier series; special functions, such as Bessel's and Legendre's. Prerequisite: Math. 163 or 173.

171. ***Analysis Ia.*** Math. 161 studied more deeply and with additional theoretical material. Consent of the department required.

172. ***Analysis IIa.*** Math. 162 studied more deeply and with additional theoretical material. Prerequisite: Math. 171 or, with the consent of the department, Math. 161.

173. ***Analysis IIIa.*** Math. 163 studied more deeply and with additional theoretical material. Prerequisite: Math. 172 or, with the consent of the department, Math. 162.

174. ***Analysis IVa.*** Math. 164 studied more deeply and with additional theoretical material. Prerequisite: Math. 173 or, with the consent of the department, Math. 163.

200. ***Probability.*** Random variables; binomial, Poisson, and normal distributions; mathematical expectation, law of large numbers; some discussion of the central limit theorem; Markov chains. Prerequisite: Math. 163 or 173.

210. ***Statistical Inference.*** Sample space; estimation; testing of hypotheses. Prerequisite: Math. 163 or 173.

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 ϕ-function; quadratic residues and quadratic reciprocity; Gaussian integers and other 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 structures: rings, fields, polynomial domains, groups, vector spaces, modules.

247. ***Set Theory and the Real Number System.*** Sets, relations, functions; ordered sets; cardinals, ordinals, transfinite methods; construction of the real number system; elementary topology of metric spaces, compactness, continuity. This course is prerequisite for all advanced work in mathematics. Prerequisite: Math. 163 or 173.

250. ***Higher Geometry.*** Foundations of projective geometry, theory of conics, introduction of coordinate systems, affine and euclidean geometry.

261. ***Advanced Calculus.*** Differentials; implicit functions, functional dependence; transformations of multiple integrals; arc length, surface area; differential forms, vector analysis. Prerequisite: Math. 163 or 173.

271. ***Functions of a Real Variable.*** Uniform continuity; derivatives, mean value theorems; functions of bounded variation; the Riemann-Stieltjes integral; infinite series, uniform convergence, improper integrals. Prerequisite: Math. 247.

276. ***Functions of a Complex Variable.*** Cauchy theorems, Taylor and Laurent series, residues, conformal mapping, entire and meromorphic functions. Prerequisite: Math. 247.

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 (or 174), and Math. 135 or 235.

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

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

Music

COLLEGE OF ARTS AND SCIENCE

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

EASTMAN SCHOOL OF MUSIC

Thomas Canning ..... Theory & Composition
Charles W. Fox, PH.D. ..... History of Music & Musicology
Louis Mennini, PH.D. ..... Composition & Orchestration
Lyndol Mitchell, A.M.D. ..... Theory
Robert V. Sutton, PH.D. ..... Theory & Counterpoint
Verne Thompson, PH.D. ..... History of Music
William Cerny ..... History of Music
Paul White ..... Conducting
Elvera Wonderlich ..... 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 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. 113 Applied Music
2. 100 Theory
3. 101 English
4. Group III (Lab)
   Physical Education

1. 114 Applied Music
2. 101 Theory
3. Group I (Foreign Language)
4. Group III (Lab)
   Physical Education

SECOND YEAR

1. 123 Applied Music
2. 102 Theory
3. Group II
4. Group III
   Physical Education

1. 124 Applied Music
2. 102 Theory
3. Group II
4. Group III
   Physical Education

THIRD YEAR

1. 133 Applied Music
2. Music Elective
3. Group II
4. Elective (CAS)

1. 134 Applied Music
2. Music Elective
3. Group II
4. Elective (CAS)

FOURTH YEAR

1. 143 Applied Music
2. Theory Elective
3. Elective (CAS)
4. Elective (CAS)

1. 144 Applied Music
2. Theory Elective
3. 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.

OFFERED BY THE COLLEGE OF ARTS AND SCIENCE

Music 101. ***Fundamentals of Music.*** A course designed to introduce basic aspects of the theory of music to the student who is not concentrating in music. Elementary ear-training is given as well as practice in writing simple exercises in harmony. Special emphasis will be 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.

Three class hours a week plus one hour lab work.

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.

Three class hours a week plus one hour lab work.

Music 104. ***Introduction to the Literature of Music II.*** This course is concerned with the development of music during the Romantic and Modern periods. Correlation between music and the other arts is given special consideration.

Three class hours a week plus one hour lab work.

OFFERED BY THE EASTMAN SCHOOL OF MUSIC

Theory 100, 101. ***First-Year Theory.*** This course is designed to give a thorough training in the melodic, harmonic, and rhythmic elements of music. The first semester is devoted to the study of the four types of triads, intervals, keys, scales, cadences, notation, rhythmic reading, sight-singing, melodic dictation, and harmonic dictation. New material in the second semester consists of the dominant and supertonic seventh chords, modal scales, key relationships, modulations, transposition by clef, four-part writing, and two-part counterpoint.

Five hours a week.

Theory 102, 103. ***Second-Year Theory.*** In this course, based on the two-part, three-part, and four-part music of J. S. Bach and his contemporaries, emphasis is placed on analysis, part-writing, practical application at the piano, and on dictation. Harmonic and formal analysis is made of music by K. P. E. Bach, Haydn, Mozart, and Beethoven. Writing includes choral harmonizations, chorale preludes, an invention in two parts, recitatives, piano accompaniments for folk songs, and three-part and four-part vocal arrangements. Prerequisite: Theory 100, 101. Required of music majors; open to other majors with the permission of the instructor.

Five hours a week.

Theory 130, 131. ***Contemporary Styles.*** During the first semester, a technical analysis of the late eighteenth and nineteenth century composers with written assignments in the styles under consideration. During the second semester, styles of twentieth century American and European composers.

Counterpoint 100, 101. ***Modal Counterpoint.*** Modal counterpoint of the sixteenth century; the Motet and the Mass. Writing in three, four, and five voices.

Orchestration 200, 201. ***Fundamentals.*** Instruments of the orchestra; practical scoring for individual choirs, chamber and full orchestra. Prerequisite: Theory 103.

Two hours a week.

History 100, 101. ***Historical Survey.*** A study of the history of music with emphasis on the cultural and general historical background.

Music Literature 210, 211. ***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 class for the study of *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

Cornelius P. Callahan, Jr., CAPT. (USN), B.S. (Naval Aacdemy).....Professor of Naval Science and *Chairman of the Department*

Robert F. Prouhet, LT. COMDR., A.B. (Missouri).....Associate Professor of Naval Science

Charles E. Brown, LT. (USN), B.S. (New York State Marine College)....
....Assistant Professor of Naval Science

Robert H. Conn, LT. COMDR. (USN), B.B.A. (Mississippi)..... .Assistant Professor of Naval Science

Joseph M. Culbert, Jr., LT. (USN), A.B. (Alabama Polytechnic Institute)....
....Assistant Professor of Naval Science

John R. Lewis, Jr., LTJG. (USNR), B.S. (California).....Assistant Professor of Naval Science

Victor Ohanesian, MAJ., (USMC), B.S. (Springfield College)....Assistant Professor of Naval Science

William L. Estes, QM1, (USN).....Instructor in Naval Science

David Floyd, GMC (USN).....Instructor in Naval Science

Edward Garr, GY/SGT. (USN).....Instructor in Naval Science

William M. Laufenberg, SKCM (USN).....Instructor in Naval Science

John W. Luksich, YNCS (USN).....Instructor in Naval Science

J. Ownby, FTCA (USN).....Instructor in Naval Science

THE NAVAL SCIENCE SEQUENCE consists of work in each of the eight undergraduate terms. The College grants three courses of credit for work in Naval Science toward the A.B. and the B.S. If the student carriers the full Naval Science program, he may, in his third, fifth, and seventh semesters reduce his program of civilian courses by one. The additional course will be made up of credited Naval Science courses.

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 the functions of the Naval Establishment and its components in the defense of the nation; an introduction to 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.*** A study of the 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.*** The development of an understanding of the 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. ***Naval Machinery Nuclear Power and Ship Stability.*** Basic principles relating to the transformation of energy from fuel, including nuclear fuel, to heat to power. The application of steam, internal combustion and other prime movers to propulsion and auxiliary uses in Naval vessels and aircraft. A study of the 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.

222. ***Navigation.*** A study of the 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.

231. ***Naval Operations.*** A study of naval operations in general at the junior watch officer level, including rules of the nautical road, OOD and CIC operational duties, and maneuvering board. Capabilities, restrictions, and security of naval communications. Radar navigation, polar operations and operational meteorology.
Three lecture-recitations.
One two-hour practical instruction period a week.

232. ***Principles and Problems of Naval Leadership.*** A study of the principles and problems of human relations, the principles of management, and the responsibilities of the junior officer in his role as a Division Officer. This course includes such topics as 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.*** This course is open only to juniors majoring in engineering. The course is designed to apply the principles of engineering to the main propulsion plants of naval vessels. A study of nuclear power is included. In addition the course covers 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.*** A study of the 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.*** A study of the concept, history, development and techniques of amphibious warfare, including a 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.

Non-Western Civilization

THE NON-WESTERN CIVILIZATIONS PROGRAM offers work leading to a concentration for the A.B. degree.

Non-Western Civilizations 201, 202 are a prerequisite to all other courses in the concentration; exceptions to this regulation can be made by the program counsellor.

A program of concentration for the A.B. degree will normally consist of ten courses dealing with Non-Western areas. A student will be expected to take the following courses: (1) *five* courses covering *four* geographic areas (Russia, China, Japan, the Middle East, Africa, or India); (2) World Communism (History 281); (3) *one* course in economics; (4) Geography of Asia; (5) *one* course in anthropology, or history of religions; and (6) Oriental Humanities (Non-Western 203). The student has a choice of five honors seminars in Political Science, History, and Economics.

201. ***Non-Western Civilizations I.***[1] Survey of political, economic and social developments in the Middle East, India and Pakistan, China, Japan, Africa and Latin America, within the framework of their history, compared and contrasted with those of Western areas.

202. ***Non-Western Civlizations II.***[1] Problems of non-Western countries: creation of new political institutions; land reforms; economic developments; social changes; adjustments to modern technology; relations with Western nations and the United Nations.

203. ***Oriental Humanities.*** A selective survey of the arts, literature, and philosophies of India, China and Japan. This course is 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 world today.

[1]These courses will be open to freshmen with the consent of the instructor.

Philosophy

Lewis White Beck, PH.D. (Duke).....Professor of Philosophy and *Chairman of the Department*

***Harmon Holcomb**.....Professor of Philosophy

Murray Jerome Stolnitz, PH.D. (Harvard).....Associate Professor of Philosophy
Colin Murray Turbayne, PH.D. (Pennsylvania).....Associate Professor of Philosophy
Peter Winch, B.PHIL. (Oxford).....Visiting Associate 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 Languages, History, Political Science, Anthropology, Economics, Biology, Physics, Psychology, and Mathematics are the related fields most often chosen.)

Colloquia for all students 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. Either 252 or 282 must be taken by students in the General Science Curriculum.

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. Such topics as: 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 A.D., and of their significance for the problems of today. Readings in the Pre-Socrates, Plato, Aristotle, the Stoics, and the Epicureans.

104. ***History of Modern Philosophy.*** An introduction to modern philosophy through a study of important philosophers from the seventeenth to the nineteenth centuries, and of their position in the cultural history of the West.

107. ***Logic.*** An investigation of arguments and common fallacies with the purpose of

*Part-time.

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.

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 101 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 will be discussed. Prerequisite: Philosophy 107 or permission of the instructor.

221. ***Ethics and Society.*** The application of ethical theory to concrete problems of moral choice in society. The relation between morality and the law, the theory of punishment, the nature of human "rights". Moral analysis of specific decisions in government and the law which have been of historic importance. Prerequisite: Philosophy 102.

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? The distinction between "fact" and "value" in social and political discussion and the idea of a philosophical "justification" of particular forms of government are dealt with.

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 will be placed on actual scientific systems in both the physical sciences and the social sciences.

Mathematical Logic. (See Mathematics 220)

282. ***The Organization of Knowledge.*** A study, both historical and philosophical, 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.

291. ***Reading Course.*** The reading of philosophical literature under guidance. This course is planned primarily in the interest of seniors majoring in philosophy, and other students may register only with the consent of the chairman of the Department of Philosophy.

Physical Education for Men

Louis Albion Alexander, Sr., A.M. (Columbia).....Professor of Physical Education and *Chairman of the Department*

Paul Edward Bitgood, M.ED. (Springfield).....Professor of Physical Education
Roman Leo Speegle, M.A. (Columbia).....Professor of Physical Education

Lyle Duane Brown, M.S. (Ithaca).....Associate Professor of Physical Education

Clarence Aikey, M.S. (Ithaca).....Assistant Professor of Physical Education
Donald C. Smith, M.ED. (Springfield).....Assistant Professor of Physical Education

David Ocorr, M.A. (Columbia).....Instructor in Physical Education
Everett J. Phillips, B.S. (Springfield).....Instructor in Physical Education

Elmer H. Burnham, B.S.P.E. (Notre Dame).....Professor Emeritus of Physical Education
Walter Campbell, M.ED. (Springfield).....Associate 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, wrestling, soccer, tumbling, and apparatus.

No credit.

13. ***Physical Education II.*** A continuation of Physical Education II.

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, wrestling, 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 Kernes, 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 I, Winter II, and Spring.

12. ***Physical Education I.*** Each girl is required to take a season of fundamentals of movement or an introductory course in rhythm; a safety proficiency swimming test is given. Those who do not qualify are expected to enroll for one season of swimming. Activities for remaining seasons are elective.
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. Activities for the remaining seasons are elected from the following:
Fall: Archery, field hockey, modern dance, soccer, swimming, tennis.
Winter: Badminton, basketball, diving, modern dance, skiing, swimming, trampoline, volleyball.
Red Cross Life Saving is offered.
No credit.

24. ***Physical Education II.*** A continuation of 22.
Spring: Archery, diving, golf, Lacrosse, modern dance, softball, swimming, tennis.
Water Safety Instructor's Course is offered.
No credit.

Physics and Astronomy

Sidney Willson Barnes, PH.D. (Cornell)..Professor of Physics, Administrator of the 130" Cyclotron
****David L. Dexter,*** PH.D. (Wisconsin).....Professor of Physics
James Bruce French, PH.D. (Massachusetts Institute of Technology).....Professor of Physics
Harry Wilks Fulbright, PH.D. (Washington).....Professor of Physics
Morton Fischel Kaplon, PH.D. (Rochester).....Professor of Physics
Robert Eugene Marshak, PH.D. (Cornell)..Professor of Physics and *Chairman of the Department*
Emil Wolf, D.SC. (Edinburgh).....Professor of Physics

W. Parker Alford, PH.D. (Princeton).....Associate Professor of Physics
Herbert Rollin Childs, A.B. (Rochester).....Associate Professor of Physics
Everett Mark Hafner, PH.D. (Rochester).....Associate Professor of Physics
Marcolm Paul Savedoff, PH.D. (Princeton).....Associate Professor of Physics
E. C. G. Sudarshan, PH.D. (Rochester).....Associate Professor of Physics
John Hughes Tinlot, PH.D. (Massachusetts Institute of Technology)....
.....Associate Professor of Physics
Gideon Yekutieli, PH.D. (Bristol).....Visiting Associate Professor of Physics

Carroll O. Alley, Jr., PH.D. (Princeton).....Assistant Professor of Physics
Olexa-Ymron Bilaniuk, PH.D. (Michigan).....Assistant Professor of Physics
Giovanni G. Fazio, PH.D. (Massachusetts Institute of Technology)..Assistant Professor of Physics
H. Lawrence Helfer, PH.D. (Chicago).....Assistant Professor of Astronomy
Robert Knox, PH.D. (Rochester).....Assistant Professor of Physics
Malcolm Macfarlane, PH.D. (Rochester).....Visiting Assistant Professor of Physics
Adrian C. Melissinos, PH.D. (Massachusetts Institute of Technology)....
....Assistant Professor of Physics
Edward Thorndike, PH.D. (Harvard).....Assistant Professor of Physics

Susumu Okubu, PH.D. (Rochester).....Senior Research Associate in Physics
Iwo Bialynicki-Birula, PH.D. (Warsaw)....Research Associate and *Assistant Professor in Physics

*Part-time.

Peter Cziffra, PH.D. (California).....Research Associate in Physics
Joseph G. M. Duthie, PH.D. (Bristol).....Research Associate in Physics
Kazuo Gotow, PH.D. (Rochester).....Research Associate in Physics
Bohdan Karczewski, Magister (Warsaw).....Visiting Research Associate in Physics
Bedrick Lobkowicz, PH.D. (Edg. Tech Hochschule Zurich) .....Research Associate in Physics
Emery Nordberg, PH.D. (California Institute of Technology).....Research Associate in Physics
Neville W. Reay, PH.D. (Minnesota).....Research Associate in Physics
Taiju Yamanouchi, PH.D. (Rochester).....Research Associate in Physics

Arthur K. Hamann, E.E. (Munich).....Technical Associate in Physics
Roman A. Hawrylak, DIPLOM-INGENIEUR (Munich).....Technical Associate in Physics
Richard Walter Mortenson, B. OF M.E. (Clarkson).....Technical Associate in Physics and Director of Research Budgets and Services
William Stinson, DIPLOMA (Oswego).....Technical Associate in Physics

THE DEPARTMENT OF PHYSICS AND ASTRONOMY offers programs leading to the A.B., B.S., A.M., M.S., and Ph.D. in the fields of physics and astrophysics. The following description refers particularly to A.B. and B.S. programs in physics; the corresponding astrophysics programs are described on page 145. Either the A.B. or the B.S. degree provides adequate preparation for graduate study, but a student holding the A.B. degree can expect to have to make up a deficiency in preparation if he enters one of the better graduate schools.

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 107–108, 117–118. In exceptional cases, a student who is unprepared for this sequence may be permitted to replace it entirely or in part with Physics 101–102, 111–112. 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 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.

In addition to Physics 101–102 and 111–112, the following courses taught by the Department are normally not counted toward a physics concentration: Physics 114 and Physics 213.

A.B. Program

Aside from the introductory sequence, at least five advanced courses in physics are required for an A.B. concentration. The Department recommends Physics 161, 224, 230, and 241–242 and Electrical Engineering 221 as the minimum program. Substitution 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 sub-

stitutions 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 Senior Laboratory.

FIRST YEAR

1. Phys. 107 Physics I	1. Phys. 108 Physics I
2. Math. 161 Analysis I	2. Math. 162 Analysis II
3. Engl. 101 English Composition	3. English
4. Group III	4. Group III
Physical Education	Physical Education

SECOND YEAR

1. Phys. 117 Physics II	1. Phys. 118 Physics II
2. Math. 163 Analysis III	2. Math. 164 Analysis IV
3. Foreign Language (Group I)*	3. Phys. 230 Thermodynamics
4. Group II	4. Group II
Physical Education	Physical Education

THIRD YEAR

1. Phys. 221 Elect. and Magnetism	1. Phys. 222 Elect. and Magnetism
2. Math.	2. Math.
3. Group I	3. Phys. 162 Phys. Optics I
4. Group II	4. Group III
5. EE 221	5. Elective

FOURTH YEAR

1. Phys. 231 Classical Physics	1. Phys. 232 Classical Physics
2. Phys. 241 Modern Physics	2. Phys. 242 Modern Physics
3. Phys. 283 Senior Laboratory	3. Phys. 283 Senior Laboratory
4. Group III	4. Group III
5. Elective	5. Elective

The Department is currently offering part-time research assistantships to a limited number of qualified undergraduates during the academic year. Fulll-time summer assistantships are also available.

Astrophysics

The description of programs in physics on page 143 generally applies as well to the program in astrophysics. Astronomy 101–2 is recommended for those students without extensive prior knowledge of elementary astronomy. Aside from the introductory 4–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 201–2. Physics 213 is allowed as a course within the concentration; Physics 114 is not. In both the A.B. and B.S. programs, the chosen program of Group III electives must be approved by the Department chairman or his representative. A synopsis of the program leading to the B.S. degree is given below. Students planning to pursue graduate study in astronomy should elect the B.S. program, modified by replacing Physics 161 with Physics 221–2 and Physics 213 with Physics 241–2. They should also elect Physics 230 and Physics 162. Students are encouraged to take advantage of

*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.

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. Phys. 107 Physics I	1. Phys. 108 Physics I
2. Math. 161 Analysis I	2. Math. 162 Analysis II
3. Engl. 101 English Composition	3. English
4. Ast. 101*	4. Ast. 102*
Physical Education	Physical Education

SECOND YEAR

1. Phys. 117 Physics II	1. Phys. 118 Physics II
2. Foreign Language (Group I) **	2. Group III or Phys. 230
3. Math. 163 Analysis III	3. Math. 164 Analysis IV
4. Group II	4. Group II
Physical Education	Physical Education

THIRD YEAR

1. Phys. 161 Electromagnetic Waves	1. Group III
2. Math.	2. Math.
3. Group I	3. Group I or II
4. Group II	4. Group III
5. Group III	5. Group III

FOURTH YEAR

1. Astr. 201 Interm. Astrophysics & Astro.	1. Astr. 202 Interm. Astrophysics & Astro.
2. Phys. 231 Int. to Class. Physics	2. Phys. 232 Int. to Class. Physics
3. Phys. 213 Atomic Physics	3. Group III
4. Elective	4. Elective
5. Group III	5. Group III

*Students with a prior knowledge of astronomy may substitute a Group III elective.

**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.

Physics

101–102. ***General Physics A.*** An introduction to the primary phenomena and fundamental concepts of physics. The concepts are developed as logical conclusions from observations of pertinent lecture demonstrations. Calculus is not required. The subjects covered in the lectures are Mechanics, Heat, Sound, Electricity and Magnetism, Light, and Atomic and Nuclear Physics. The laboratory experiments illustrate various major principles characteristic of all but the last of the above fields.

Two lectures, one recitation, one lab a week.

107–108. ***Physics I.*** A rigorous and intensive introductory course, covering topics in mechanics, wave motion, and thermodynamics. The lectures provide demonstrations of fundamental phenomena in physics, but emphasis is placed on the theoretical development of ideas. Frequent use is made of vector analysis and elementary differential and integral calculus. The laboratory problems require thoughtful and independent work; there may be opportunities for exceptional students to carry out original projects. High school physics is prerequisite; Mathematics 161, 162 to be taken concurrently. Students electing this course must be planning to take Physics 117–118 in a subsequent year.

Three lectures, one recitation a week. One lab, one problem session in alternate weeks.

111–112. ***General Physics B.*** An extension of general physics for students who have completed Physics 101–102 and who desire further training in physics. The topics emphasized are statics, dynamics, thermodynamics and electromagnetism. Elementary calculus is used throughout; students should be taking Mathematics 163, 164 concurrently. The laboratory work can be omitted from the course, with reduction of credit to six hours.

Two lectures, one recitation, one lab per week.

117–118. ***Physics II.*** A continuation of physics 107–108, covering topics in electromagnetism, optics, special relativity, and quantum physics. The mathematical level of the discussion is designed to keep pace with the student's development; it is required that he be taking Mathematics 163, 164 concurrently. Laboratory work is carried out in the same spirit as in 107–108, but the experiments are more sophisticated. Admission to this course is contingent upon satisfactory performance in Physics 107–108.

Three lectures, one recitation, one lab a week.

161. ***Electromagnetic Waves.*** The equations which describe the propagation of light and other electromagnetic radiation are derived from the basic laws of electricity and magnetism. A mathematical treatment is given to the behavior of light waves. Physics 111–112 is prerequisite.

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

213. ***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 applications to the phenomena of atomic and nuclear physics. The course develops the Schroedinger equation as an experimental law, after reviewing the history of crucial experiments that demonstrate the inadequacy of Newtonian physics. The equation is solved for simple systems and applied to typical problems in spectroscopy, molecular structure, solid state, and nuclear phenomena. Prerequisites are a course in elementary physics, and courses in calculus and differential equations.

221–222. ***Electricity and Magnetism.*** An advanced course in electromagnetic theory emphasizing the field point of view. Calculation of electric and magnetic fields; Maxwell's equations and electromagnetic waves; elementary radiation theory; the motion of charged particles in electric and magnetic fields. The application of classical electromagnetism to current problems in physics is discussed insofar as time permits. Physics 117–118 is prerequisite, or Physics 111–112 with consent of the instructor. Mathematics 261 is recommended, and may be taken concurrently.

223. ***Electronic Properties of Solids.*** Selected topics in solid-state physics and physical electronics. The subjects considered include energy band theory of solids, conduction in solids, thermionic and photoelectric emission, gaseous electronic conduction, semiconductors, dielectrics, crystalline imperfections, luminescence, photoconductivity, and others. Physics 213 or Physics 241 is prerequisite. Taught by the Institute of Optics.

225. ***Introduction to the Theory of the Solid State.*** The purpose of the course is to introduce the fundamental concepts of solid state physics and acquaint the student with the terminology employed in this important branch of physics. The mathematical details will be kept to a minimum. Particular attention will be given to the electron motions in the solid and the effect of these motions on the physical properties of the solid. Special emphasis will be given to the optical properties of solids. Two years college physics and two years college mathematics are prerequisite. Taught by the Institute of Optics.

Three lectures a week.

230. ***Thermodynamics.*** A survey of thermodynamics, both from the classical and the statistical point of view. Topics covered include the concept of temperature, the three laws of thermodynamics and some of their consequences, followed by an introduction to statistical mechanics. Physics 107–108 or 111–112 is prerequisite, and students must have a prior knowledge of partial derivatives and multiple integrals.

Three lectures a week.

231–232. ***Classical Mechanics.*** Dynamics of systems of particles; Lagrange's equations; theory of rigid bodies; coordinate transformations; special relativity; theory of small vibrations; elasticity; hydro-dynamics. Physics 107–108 and Mathematics 261 prerequisite. May be taken concurrently with the consent of the instructor.

Three lectures a week.

241–242. ***Modern Physics.*** The concepts and phenomena of atomic and nuclear physics are studied, following an introduction to elementary wave mechanics. Physics 221–222 and Mathematics 261 are prerequisite.

Three lectures a week.

261. ***Physical Optics II.*** (See Optics 261)

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

283. ***Senior Laboratory I.*** An experimental course in atomic and nuclear physics, designed as an introduction to the most important techniques of modern research. Such experiments as beta and gamma spectroscopy and absorption, mass spectroscopy, X-ray diffraction, detection of nuclear particles, magnetic resonance, and measurements of atomic constants are performed with equipment of high calibre. Emphasis is placed on the planning and interpretation of the measurements rather than on the construction of equipment. The recitations provide an opportunity for the student to report on individual experiments and improve his understanding of the theoretical basis for the work.

One recitation and two labs a week.

284. ***Senior Laboratory II.*** A continuation of Physics 283.

One recitation and two labs a week.

293–294. ***Research Problems in Physics.*** Normally open to seniors majoring in physics.

Astronomy

101–102. ***Elementary Astronomy.*** Primarily a descriptive course designed to provide the student with a general knowledge of the universe as well as some understanding of the techniques and logical methods by which such knowledge is obtained. Beginning in 1962–63, the laboratory exercises will include telescopic observation.

201–202. ***Intermediate Astronomy and Astrophysics.*** A senior course in astronomy and astrophysics. Astronomical knowledge is examined using principles of modern physics and calculus. Some topics included are: the earth as an astronomical body; the solar system including elementary celestial mechanics; physical conditions in the solar system; origin of the solar system; positions, distances, and luminosity at the stars; stellar motions; the relation of stellar motions to stellar structure; stellar systems, inter-stellar gas and dust; radio astronomy; external galaxies; cosmological problems; origin of star systems; stars as physical entities including energy sources, stellar spectra and stellar evolution. Prerequisites: Physics 111–112 or 117–118, Math. 163, 164. Astronomy 101–102 is recommended but not required.

295. ***Reading or Research in Astronomy.*** Normally open to seniors majoring in physics and astronomy.

Political Science

Vera Micheles Dean, PH.D. (Radcliffe) ..... Professor of Political Science and Education and Director of the Non-Western Civilizations Program

William Edwin Diez, PH.D. (Chicago) ..... Professor of Political Science

Glenn Gordon Wiltsey, PH.D. (Chicago) ..... Professor of Political Science and *Chairman of the Department*

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

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

Seymour Scher, PH.D. (Chicago) ..... Assistant Professor of 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. degree.

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 two must be chosen from group B, and at least one from each of groups A and C.

The remaining three courses to make up the ten in the concentration will be chosen from among advanced course offerings in one of the following related fields. Anthropology, Economics, Geography, History, Philosophy, and Psychology. A student interested in a related field not here listed should consult the 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 characteristic of international politics. Prerequisite: Political Science 251.

253. *Contemporary India and Its Role in World Affairs.* A consideration of the emergence of independent India from centuries of historical struggle to achieve a united country, beginning with earliest times. Political, economic, social, and cultural developments in contemporary India, and the effect of these developments on India's foreign policy.

260. *Government and Politics in Contemporary Africa.* An examination and analysis of selected political, economic, and social problems in Africa south of the Sahara.

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.

271. *The Politics of Administration.* A study of the decision-making process in American public agencies. The internal power relations and the primary external sources of influence—political parties, legislatures, pressure groups, elected executives, and courts —are considered.

273. *The American Regulatory Process.* An analysis of the work of administrative agencies that have power to affect private rights. Emphasis will be placed on goals, powers, and procedures of administrative action and the pattern of restraints imposed through judicial review.

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. *Systematic Political Theory.* A study of systematic political theories from Plato to Lasswell. Emphasis is placed upon 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.

287. *Theories of Peace and Freedom.* An examination of the ideals of peace and freedom and their psychological and institutional

foundations in some classic works of Western political theory.

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
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 D. 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) ..... Assistant Professor of Psychology

****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 State) ..... Clinical Associate in Psychology
****Howard Friedman,*** PH.D. (Clark) ..... Clinical Associate in Psychology
****Robert H. Goldstein,*** PH.D. ..... Clinical Associate in Psychology
****Robert Granville Harlow,*** PH.D. (Clark) ..... Clinical Associate in Psychology
****Norman Harway,*** PH.D. (Rochester) ..... Clinical Associate in Psychology
****Wilson Hess*** ..... 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

*Part-time.

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.....Research Associate in Psychology
Donald W. DeMott, PH.D. (Rochester).....Research Associate in Psychology
**Howard P. Iker,* PH.D. (Rochester).....Research Associate in Psychology
Judith Onley, PH.D. (Rochester).....Research Associate and *Assistant Professor of Psychology
**Sidney Merritt Newhall,* PH.D. (Columbia).....Research Associate in Psychology
**Gunars Reimanus,* PH.D. (Rochester).....Research Associate in Psychology
**Alvin L. Ureles,* M.D. (Rochester).....Research Associate in Psychology

Priscilla Specht, B.A. (Cornell).....Technical Associate in Psychology

Elmer Augustin Kurtz Culler, PH.D. (Chicago).....Professor Emeritus of Psychology

*Part-time.

THE DEPARTMENT OF PSYCHOLOGY offers programs of study leading to the A.B. degree and, in graduate studies, to the A.M. and PH.D. degree.

Psychology 101 is prerequisite for all other courses in Psychology. Psychology 209 and 201–202 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 209 in the sophomore year, and Experimental Psychology (201–202) in the junior year. Psychology 210, 213, 220, 242, and 247 are appropriate for upper classmen who have had Psychology 101. Psychology 203 and 205 require previous completion of introductory courses in both Psychology and Biology, while Psychology 201–202, 207, 211 and 214 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 advisor 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 the illustrations of the applications presented 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.*** A consideration of the development of the child in the periods before and immediately after birth, during infancy, and adolescence. Special attention will be given to the development of socialization, personality, emotion, language. Class lectures will be supplemented by demonstration films. Psychology 101 prerequisite.

212. ***Social Psychology.*** A study of 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. An 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.*** The applications of psychological findings and methods to problems encountered in business, industry and the professions. Topics include the following: 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.*** A consideration of the 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. This course deals with the evolution of behavior and intelligence, the receptor control of activity, periodicity in behavior, and higher mental processes in animals. Psychology 101 prerequisite.

260. ***Junior Seminar.*** Designed to afford an opportunity to become more familiar 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.

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 Bulletin of the Graduate School.

Religion

**Vinjamuri Everett Devadutt,* TH.D. (Toronto).....Visiting 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

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.

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*Part-time.

The College of
Business Administration

The College of Business Administration was established in 1958 to administer and further develop the professional degree programs in business administration introduced in 1945–46 in the College of Arts and Science and in the University School by the former Department of Economics and Business Administration. Particularly since World War II, growing interest has been shown in education leading to improved understanding of business and industry as well as to preparation for professional competency at the administrative level. The College seeks to provide business, industry and government with a strong and growing source of future managers, and also to qualify employed managers for enlarged responsibilities.

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 executive in business, and the forces and relationships conditioning their performance; and 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.

DEGREE PROGRAMS OFFERED

The College administers programs of study leading to the degree Bachelor of Science, with majors in Acccounting, Business Administration and Industrial Management, and to the degrees Master of Science with a major in Business Administration and 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 Office of Instruction 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 sciences 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.

The synopsis of the requirements for the Bachelor of Science degree with a major in Business Administration follows:

I. Minimum Study in Business Administration*		**12 courses**
A. Preprofessional courses		
GBA 157, Fundamentals of Bus. Admin.	1 course	
ACC 153, Principles of Accounting	1 course	
B. Required Core Courses		
ACC 209, Managerial Cost Accounting	1 course	
LAW 203, Contracts I	½ course	
LAW 204, Contracts II	½ course	
IHR 205, Human Resources in Organizations	1 course	
QNT 205, Elementary Business Statistics	1 course	
FIN 205, Financial Management	1 course	
MKT 203, Marketing	1 course	
PRD 208, Production Management	1 course	
GBA 251, Administrative Principles & Practices	1 course	
GBA 282, Business Policy	1 course	
C. Business Administration Electives	1 course	
II. Minimum Study in Economics		**3 courses**
ECO 101, Principles of Economics	1 course	
Economics Electives	2 courses	
III. Minimum Study in Liberal Arts & Science		**15 courses**
ENG 101, English Composition	1 course	
ENG 102, Intro. to Literature	1 course	
ENG 103, Continental Masterpieces	1 course	
ENG 104, Eng. & Amer. Masterpieces	1 course	
Group I Elective (Humanities)	2 courses	
Laboratory Science	2 courses	
Mathematics	2 courses	
History & Political Science Electives	3 courses	
Liberal Arts & Science Electives**	2 courses	
IV. General Electives (at least 2 courses must be in fields other than Business Administration)**		**4 courses**
V. Physical Education		
Total Required		**34 courses**

*See Admission Requirements, p. 158.

**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.

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.

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 Board in their own state 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.

Student 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.

The synopsis of the requirements for the Bachelor of Science degree with a major in Accounting follows:

I. Minimum Study in Accounting*	**15 courses**
A. Preprofessional courses	
GBA 157, Fundamentals of Bus. Admin.	1 course
ACC 153, Principles of Accounting	1 course
B. Required Core Courses	
ACC 221, Cost Accounting	1 course
ACC 233, Intermediate Accounting	1 course
ACC 236, Advanced Accounting	1 course
ACC 261, Auditing I	1 course
ACC 275, Income Tax Accounting I	1 course
LAW 203, Contracts I	½ course
LAW 204, Contracts II	½ course
LAW 223, Law of Sales & Negot. Instr.	½ course
LAW 226, Agency Partnerships & Corp.	½ course
IHR 205, Human Resources in Organizations	1 course
QNT 205, Elementary Business Statistics	1 course
FIN 205, Financial Management	1 course
MKT 203, Marketing	1 course
PRD 208, Production Management	1 course
GBA 282, Business Policy	1 course
II. Minimum Study in Economics	**4 courses**
ECO 101, Principles of Economics	1 course
ECO 211, Money, Credit and Banking	1 course
Economics electives	2 courses
III. Minimum Study in Liberal Arts and Science	**13 courses**
ENG 101, English Composition	1 course
ENG 102, Intro. to Literature	1 course
ENG 103, Continental Masterpieces	1 course
ENG 104, Eng. & Amer. Masterpieces	1 course
Group I Elective	1 course
Laboratory Science	2 courses
Mathematics	2 courses
History & Political Science Electives**	2 courses
Liberal Arts & Science Electives	2 courses
IV. General Electives**	**2 courses**
V. Physical Education	
Total Minimum Required	**34 courses**

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.

The curriculum provides a broad base constituting a third of the total program in arts, sciences and humanities. Approximately half of the program is devoted to professional courses in industrial management and to basic and applied mathematics; unrestricted electives assure the student further development either in professional or liberal arts subjects.

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*See Admission Requirements, p. 158.

**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.

The degree requirements outlined below apply to students admitted to the University September, 1961. Those already matriculated in the Industrial Management program will be permitted to continue with that earlier curriculum until graduation.

The synopsis of the requirements for the Bachelor of Science degree with a major in Industrial Management follows:

I. Minimum Study in Business Administration*		**12 courses**
A. Preprofessional courses		
PRD 208, Production Management	1 course	
PRD 220, Production Facilities & Standards	1 course	
ACC 153, Principles of Accounting	1 course	
B. Required Core Courses		
PRD 225, Manufacturing Control	1 course	
PRD 230, Operations Research I	1 course	
PRD 231, Operations Research II	1 course	
ACC 209, Managerial Cost Accounting	1 course	
QNT 205, Elementary Business Statistics	1 course	
FIN 205, Financial Management	1 course	
MKT 203, Marketing	1 course	
IHR 205, Human Resources in Organizations	1 course	
GBA 251, Administrative Principles & Practices	1 course	
II. Minimum Study in Economics		**3 courses**
ECO 101, Principles of Economics	1 course	
Economics Electives	2 courses	
III. Minimum Study in Liberal Arts and Science		**15 courses**
ENG 101, English Composition	1 course	
ENG 102, Intro. to Literature	1 course	
ENG 103, Continental Masterpieces	1 course	
ENG 104, Eng. & Amer. Masterpieces	1 course	
MTH 161, Intro. to Calculus	1 course	
MTH 162, Analytic Geom. & Int. Calculus	1 course	
MTH 100, Finite Mathematics	1 course	
MTH 200, Probability	1 course	
PHY 101, 102, General Physics	2 courses	
CHM 121, 122, General Chemistry	2 courses	
History & Political Science Electives**	3 courses	
IV. General Electives**		**4 courses**
V. Physical Education		
Total Minimum Required		**34 courses**

*See Admission Requirements below.
**See footnote on p. 157.

ADMISSION REQUIREMENTS

Students are admitted to the College of Business Administration at the beginning of their junior year. Due to limited housing facilities on campus, students with two or more full years of college work elsewhere are encouraged to apply provided their residences are within commuting distance of the university.

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:

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 102, Intro. to Literature	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	2 courses	
History and Political Science Electives	2 courses	
Group I Elective	1 course	
III. Additional Liberal Arts and Science Electives		**2 courses**
(Business Administration majors should elect one course from Group I.)		
TOTAL		**16 courses**

Majors in Industrial Management

I. Preprofessional Study in Business Administration		**3 courses**
ACC 153, Principles of Accounting	1 course	
PRD 208, Production Management	1 course	
PRD 220, Production Facilities & Standards	1 course	
II. Minimum Study in Liberal Arts and Science		**13 courses**
ENG 101, English Composition	1 course	
ENG 102, Intro. to Literature	1 course	
ENG 103, Continental Masterpieces	1 course	
ENG 104, Eng. & Amer. Masterpieces	1 course	
ECO 101, Principles of Economics	1 course	
MTH 161, Intro. to Calculus	1 course	
MTH 162, Analytic Geom. & Interm. Calculus	1 course	
MTH 100, Finite Mathematics	1 course	
PHY 101, 102, General Physics	2 courses	
CHM 121, 122, General Chemistry	2 courses	
History 101–102	2 courses	
TOTAL		**17 courses**

Some deviation from the above specific distributions of courses may be permitted if it can be demonstrated that the student still 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 1.5, when such grades are recognized as part of the granting institution's official grading system.

In addition to this evidence of over-all academic ability, he must have demonstrated satisfactory achievement in all business administration and economics courses completed prior to admission to the College of Business Administration.

Faculty

(1960–61)

COLLEGE OF BUSINESS ADMINISTRATION

John M. Brophy, PH.D. ..... Dean of the College
Herman F. Brause, M.ED. ..... Coordinator, Office of Instruction
Milton C. Cherkasky, M.S. ..... Evening Academic Counselor

Donald E. Ackerman, D.SC. (M.I.T.) ..... Professor of Business Administration
John M. Brophy, PH.D. (Cornell) ..... Professor of Business Administration
Murray E. Polakoff, PH.D. (Columbia) ..... Professor of Business Administration
Allen R. Solem, PH.D. (Michigan) ..... Professor of Business Administration
Eric C. Vance, M.A. (Columbia) ..... Professor of Business Administration

Jack H. Matthews, D.B.A. (Indiana), C.P.A. New York ..... Associate Professor of Business Administration
John D. Stanley, D.B.A. (Indiana) ..... Associate Professor of Business Administration

Richard W. Fortner, M.B.A. (Indiana), C.P.A. Indiana ..... Assistant Professor of Business Administration
Bertrand N. Horwitz, M.A. (Chicago) ..... Assistant Professor of Business Administration
Richard R. Schulz, M.B.A. (Syracuse) ..... Assistant Professor of Business Administration
George Schwartz, PH.D. (Pennsylvania) ..... Assistant Professor of Business Administration

John F. Bush, A.B. (Rochester) ..... Senior Faculty Associate

EVENING SESSION FACULTY

Joseph N. Freudenberger, A.M. (Missouri) ..... Lecturer
William H. Hallock, A.B. (Rochester) ..... Lecturer
N. Joseph Houghton, M.B.A. (Harvard) ..... Lecturer
Leslie J. Knox, M.B.A. (Syracuse) ..... Lecturer
Stewart D. Moot, LL.B. (Virginia) ..... Lecturer
Douglas R. Nicholson, M.S. (Rochester), C.P.A. New York ..... Lecturer
Richard K. Schalk, B.S. (Iowa State) ..... Lecturer
Charles H. Schwartz, B.A. (Niagara) ..... Lecturer

Jack H. Benard, B.S. (Illinois) ..... Associate Lecturer
James C. Duffus, B.A. (Yale), C.P.C.U. ..... Associate Lecturer
Richard L. Epstein, LL.B. ..... Associate Lecturer
James T. Henderson, A.B. (Rochester) ..... Associate Lecturer
Eugene Kozik, PH.D. (Pittsburgh) ..... Associate Lecturer
Robert E. Nier, LL.B. (Albany) ..... Associate Lecturer
George W. Petersen, LL.B. (Akron) ..... Associate Lecturer
John E. Swett, LL.B. (Harvard) ..... Associate Lecturer
Gordon A. Trumbauer, M.S. (Michigan) ..... Associate Lecturer
Charles P. Wolfe, B.S. (Rochester), C.P.A. New York ..... Associate Lecturer

Minor P. Avery, E.E. (Syracuse) ..... Assistant Lecturer
William F. Bergin, B.B.A. (Niagara) ..... Assistant Lecturer

Wiles E. Converse, M.B.A. (Pennsylvania) ..... Assistant Lecturer
A. Wayne Corcoran, M.S. (Rochester) ..... Assistant Lecturer
George F. Frank, M.I.A.-S.R.A. ..... Assistant Lecturer
Robert S. Hager, M.B.A. (Syracuse) ..... Assistant Lecturer
Frank P. Hart, M.B.A. (Detroit), C.P.A. Illinois ..... Assistant Lecturer
Albert Kasdin, M.B.A. (Pennsylvania), C.P.A. New York ..... Assistant Lecturer
Richard C. Legge, M.B.A. (Syracuse) ..... Assistant Lecturer
Laurance G. Locke, B.A. (George Washington) ..... Assistant Lecturer
James R. Mills, M.S. (Columbia) ..... Assistant Lecturer
Joseph W. O'Neill, B.S. (Rochester) ..... Assistant Lecturer
Stephen B. Oresman, M.B.A. (Harvard) ..... Assistant Lecturer
George Schatzel, M.B.A. (Michigan) ..... Assistant Lecturer
Donald J. Statt, B.B.A. (Niagara) ..... Assistant Lecturer
Martin L. Suter, B.S. (Rochester) ..... Assistant Lecturer

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.

GENERAL BUSINESS ADMINISTRATION

GBA119. ***Business Organizations, Concepts and Opportunities.*** *(Fall)* Designed for those interested but not majoring in Business Administration, this course involves a study of factors important to business and industrial growth, location, organization, technology, and community relationships. Trends in career prospects as they are affected by industrial and governmental manpower policies are given special emphasis. Visits to selected industries, case discussions and reports, and occasional evening conferences with business and industrial executives are included in the course work.

GBA157. ***Fundamentals of Business Administration I.*** *(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, both for illustrative purposes and to introduce the student to the methods of business problem analysis.

GBA251. ***Administrative Principles and Practices.*** *(Fall)* By means of the case method, this course deals with the administrative functions of organization, direction and control, emphasizing the human problems involved in getting things done through group effort. Topics include the role of formal and informal organization, maintenance of channels of communications, executive leadership, employee motivation, and morale. Class discussion of concrete business situations serves to create a keener awareness of the attitudes, actions, conflicting values, and relationships of the individuals with whom the administrator must work, and thus to develop a work-

able attitude and approach to administrative problems. Prerequisites: FIN205, MKT203, and PRD208.

GBA282. ***Business Policy.*** *(Spring)* This course serves to integrate the student's previous studies and further develop his ability to deal effectively with business problems. It comprises a series of cases on policy formulation and administration, involving the functions of purchasing, production, personnel marketing, finance and accounting. These cases deal with such problems as promotion, expansion, reorganization, and adjustment to changing economic conditions and social forces. During the term, business executives are invited to present and discuss cases developed from their own experience. Prerequisites: FIN205, MKT203, PRD208, and QNT205.

GBA421. ***Research and Report Writing.*** *(Fall)* Review of basic principles of composition particularly as applied to present-day industrial communications. Preparation for required Master's report. Study of trends in business ideas-communication.

ACCOUNTING

ACC63. ***Public Accounting Internship.*** By special arrangements between the University and various public accounting firms, local and national, an internship program has been established which enables the students to work full time with the firms for a period of three to six weeks during their senior year. The students are given an opportunity to perform the general tasks of a junior under the supervision of a senior accountant. The 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.

Three to six weeks a semester.
No credit.

ACC153. ***Principles of Accounting I.*** *(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 Acounting.*** *(F & S)* 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, GNT205.

ACC233. ***Intermediate Accounting.*** *(Fall)* An analysis of the accounting theory underlying the preparation of financial statements. Topics treated 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 treated include partnerships, consignments, installment sales, accounting for businesses in financial difficulty, trusts and estates, consolidated statements, foreign exchange and governmental accounting. Prerequisite: ACC233.

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 is drawn to a great extent from actual C.P.A. Examination questions and includes analysis and revision of financial statements, partnerships, receiver's statements, consolidated statements, cost accounting, and other accounting problems. Prerequisites: ACC221, ACC239, and ACC261.

Credit—three hours.

ACC403. ***Accounting Concepts.*** A broad survey of financial and cost accounting with emphasis upon the development of a logical framework of underlying concepts and standards upon which accounting practices and procedures are based. The course stesses principles and theories and notes the procedures employed in analyzing business transactions, recording their financial effects, summarizing them in financial statements, and interpreting these statements.

FINANCE

FIN118. ***Credit and Collection Principles.*** *(Spring)* A basic course providing a working knowledge of credits and collections. It 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 the course Credit and Collection Principles 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)* This course is designed to provide the student with a working knowledge of credit management and control. A series of 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: FIN119.

Half course.

FIN131. ***General Insurance I.***[1] *(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 and marine. Useful to the general business or economic student and prerequisite to FIN134.

FIN134. ***General Insurance II.***[1] *(Spring)* A continuation of FIN131 studying all of the common casualty insurance contracts, with extended study of public liability, automobile, 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.

FIN205. ***Financial Management.*** *(Fall)* A study of the financial policies and practices essential to effective business administration with major emphasis on corporation finance. Topics treated include corporation securities, capital budgeting, long-term financing, short-term financing, administration of funds, administration of income, expansion, and reorganization. Emphasized throughout is the adaptation of financial principles to specific business situations. Prerequisites: GBA157 and ACC153.

FIN246. ***Investment Management.*** *(Fall)* The general principles of successful investment, as applied to the management of individual and institutional investors' funds. Topics studied include determining investment objectives, formulating general investment policies, classifying investment media, interpreting and forecasting general market trends, analyzing leading industries, and the de-

[1]FIN131 and FIN134 prepare the student for the A,B,C, examinations given by the Insurance Institute of America and for examinations for agent's and broker's licenses under Sections 115 and 119 of the New York State Insurance Law.

veloping criteria for the selection of individual security issues. Prerequisites: ECO101 and GBA157.

FIN256. ***Financial Analysis.*** *(Spring)* The analysis of corporation and other financial reports, from the standpoints of investors, short-term creditors, and management. Primary emphasis is placed 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.

FIN405. ***Financial Management.*** *(Spring)* This course, designed for college graduates with no previous formal training in corporation finance, analyzes the policies and practices required for effectively planning and controlling the finances of corporations and other businesses. Topics include corporation securities, promotion, capital budgeting, long-term financing, short-term financing, administration of funds, administration of income, expansion and reorganization. Emphasized throughout is the adaptation of financial principles to specific business situations. Prerequisites: ACC153 or ACC403, and at least one course in Marketing, Production Management or Fundamentals of Business Administration.

INDUSTRIAL & HUMAN RELATIONS

IHR140. ***Personnel Relations.*** *(Spring)* Primarily for non-majors in Business Administration, this course centers upon an analysis of relationships, procedures, and techniques employed in mobilizing human resources. Topics include employee selection, development compensation; employee participation in decision-making and the issues involved in extending employee benefit and service programs. Consideration will also be given to labor mobility. A limited number of field studies will be made.

Credit—three hours.

IHR205. ***Human Resources in Organizations.*** Emphasis will be given to experimentally derived approaches for capitalizing on undeveloped and unused potential and other asset values of individuals and groups as avenues toward more effective work performance. Approximately one half of the course will be devoted to illustrative laboratory problems.

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.

IHR244. ***Human Relations in Industry.*** *(Spring)* A study of the factors related to establishing effective human relationships in industrial and business organizations. Topics to be included are employee motivation, employee morale, developing effective channels of communication, and factors related to leadership and supervisory skills. The course is designed to augment IHR241—Fundamentals of Personnel Administration.

IHR262. ***Management-Union Relationships and Public Control.*** *(Spring)* A study of the 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.

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.

MARKETING

MKT203. ***Marketing.*** *(Fall and Spring)* A study of the problems involved in the movement of goods from producers to consumers and industrial users through the different channels of distribution. An analysis of the marketing functions performed by manufacturers, wholesalers, retailers, agent middlemen, and market exchanges. Major marketing policies are critically analyzed and evaluated including such topics as pricing, branding, choice of distribution channels, selective selling, and the planning and administration of sales programs.

MKT221. ***Advertising.*** *(Fall)* The objective of this course is to develop an understanding of and ability to appraise advertising as a part of the selling program. After surveying the social and economic aspects of advertising, a critical examination is made of the principles and techniques involved in developing good copy, making layouts, and reproducing the advertisement. Topics treated 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.*** The objective of this course is to develop the 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 discussed 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 studied 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. It is recommended that students take a basic course in statistical methods 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 also be utilized, which

will deal with specific situations requiring decisions and recommended courses of action.

MKT403. ***Managerial Marketing.*** *(Fall)* Designed for college graduates without previous formal study in Marketing Management, this course analyzes the theory and practice in planning, organizing and controlling marketing activities from the marketing executive's viewpoint. Topics covered include integration of major tasks and decisions involved in developing and marketing products, marketing planning, selection of channels of distribution, study of the market structure and forces within the business firm which influence the competitive character of marketing effort, legal restrictions affecting distribution, and theoretical aspects of marketing. Special reports and case materials are emphasized.

PRODUCTION

PRD208. ***Production Management.*** *(Fall and Spring)* A study of the issues, concepts and practices encountered in effectively managing the production function. Topics covered 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.

PRD220. ***Production Facilities and Standards.*** Analysis of characteristics and requirements of process, product and operations into a total production system. Study of work simplification, standardization, measurement and compensation. Prerequisite: PRD208 or permission of the instructor.

PRD225. ***Manufacturing Control.*** *(Fall)* A study of the 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.

PRD230. ***Operations Research I.*** *(Fall)* A course in which the student learns to apply his knowledge of mathematics and business administration to the quantitative analysis of business situations. The topics covered include the various methods of quantitative analysis, their application to problems of industrial management, and the application of such methods to problems in other management areas is discussed. Prerequisites: MTH162, 100, 200; QNT205 or the permission of the instructor.

PRD231. ***Operations Research II.*** *(Spring)* Continuation of the above. Prerequisite: PRD230.

PRD234. ***Problems in Production Management.*** Through specific cases and supporting investigations, consideration is given to issues and problems in production management at the corporation level. Topics include manufacturing policy development, short and long-run objectives, plans and programs; development and establishment of production schedules; selection and utilization of plant and equipment, material and supplies; control and reduction of costs; inventories; warehousing; research projects; interrelationships with financial, personnel, safety, legal, tax, technical, and other control programs; and the coordination and collaboration needed in carrying out executive responsibilities. Prerequisite: PRD208 or both PRD223 and PRD226.

PRD408. ***Production Management.*** *(Fall)* Theory and practice in planning, organizing, directing and controlling production activities are considered from the production executive's viewpoint. Topics covered include analysis of facilities; research and product development; planning, organizing and controlling characteristics of the production processes; control of quality, quantity and cost; consideration of increased automation; and nature and application of operations research. Special reports and case materials are emphasized. Admission restricted to graduate students who have not completed PRD208 or its equivalent.

QUANTITATIVE METHODS

QNT205. ***Business Statistics.*** An introduction to the methods of collection, presentation, analysis, and interpretation of quantitative data commonly associated with business operations. Typical topics include sampling, probability, descriptive values, statistical inference, correlation and time series. Prerequisite: Intermediate Algebra.

QNT222. ***Advanced Business Statistics.*** *(Spring)* A course in the development and application of the more advanced techniques of statistical analysis common to business research. Typical topics include 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.

QNT231. ***Electronic Data Processing.*** *(Fall)* A first course in the preparation of data and the use of electronic machines to provide information needed for executive decision. The course will include 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.

QNT405. ***Managerial Statistics.*** An introduction to the use of probability and statistics in the analysis of business problems where a decision must be made under uncertainty. The course develops the basic concepts of statistical methods, such as regression and statistical inference, with the view of obtaining a maximum amount of information from available data such as a time series to select the best among alternative actions. Prerequisite: Intermediate Algebra.

REAL ESTATE

R-E121. ***Fundamentals of Real Estate.*** Introductory study of technical, legal and economic phases of real estate business. Topics covered 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.*** *(Fall)* A study of 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 is 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.*** *(Spring)* A study of the 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 are also considered, with special reference to population and land value studies, architecture and construction, condemnation and eminent domain, growth and re-development. Emphasis is on developing ability to select value evidences and to calculate and apply legal principles as well as administrative standards.

TRANSPORTATION

TRP227. ***Principles of Transportation Management.*** A course of study which deals with the economic aspects of the transportations system in the United States from the era of railroad building to the present day. It provides an 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.

TRP232. ***ICC Law and Regulations.*** *(Fall)* 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: TRP227.

TRP257. ***Transportation Management.*** *(Spring)* Problems of transportation, forming an extension of materials introduced in TRP227 and TRP232. 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: TRP232.

College of EDUCATION

William A. Fullagar, ED.D. ..... Dean
24 Taylor Hall

Robert B. Howsam, ED.D. ..... Associate Dean for Graduate Studies
20 Taylor Hall

Glenn N. Hontz, ED.D. ..... Director of Student Teaching
2 Taylor Hall

Donald H. Smith, A.M. ..... Counselor of Students
16 Taylor Hall

Sylvia Grossman ..... Administrative Assistant to the Dean
22 Taylor Hall

Faculty

Vera M. Dean, PH.D. (Radcliffe) ..... Professor of Education
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
Byron B. Williams, PH.D. (Ohio State) ..... Professor of Education

Max G. Abbott, PH.D. (Chicago) ..... Associate 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 Associate Professor of Modern Languages
Joseph W. Cole, ED.D. (Harvard) ..... Associate Professor of Education
Norman G. Gunderson, PH.D (Cornell) ..... Associate Professor of Education and Associate Professor of Mathematics
Harold E. Munson, ED.D. (New York) ..... Associate Professor of Education
Milton V. Pullen, ED.M. (Rochester) ..... Associate Professor of Education
Ellsworth S. Woestehoff, PH.D. (Minnesota) ..... Associate Professor of Education

Charles H. Adair, M.A. (Miami) ..... Assistant Professor of Education
Dean Corrigan, ED.D. (Columbia) ..... Assistant Professor of Education
Kenneth N. Fishell, ED.M. (Rochester) ..... Assistant Professor of Education
Glenn N. Hontz, ED.D. (Columbia) ..... Assistant Professor of Education
Clarence J. Karier, PH.D. (Wisconsin) ..... Assistant Professor of Education
Thomas R. Knapp, ED.D. (Harvard) ..... Assistant Professor of Education

John J. Montean, PH.D. (Syracuse) ..... Assistant Professor of Education
Robert L. Osborn, M.S. (Indiana) ..... Assistant Professor of Education
John A. Schmitt, ED.D. (Cornell) ..... Assistant Professor of Education
Clarence M. Williams, A.M. (Michigan State) ..... Assistant Professor of Education

Robert M. Baker, M.S. (SUCE, Geneseo) ..... Instructor
Patricia T. Botkin, M.S. (SUCE, Brockport) ..... Instructor

**Walter W. Bennett,* ED.M. (Rochester) ..... Lecturer in Education
**Lester B. Foreman,* A.M. (Rochester) ..... Lecturer in Education
**Herman R. Goldberg,* A.M. (Columbia) ..... Lecturer in Education
**Catherine J. Sullivan,* A.M. (Columbia) ..... Lecturer in Education

**Raymond Francis,* ED.D. (Harvard) ..... Associate Lecturer in Education

**Robert P. Dye,* M.S. (St. Bonaventure) ..... Assistant Lecturer in Education
**H. Hunter Fraser,* ED.M. (Rochester) ..... Assistant Lecturer in Education
**Bernard Greenberger,* M.A. (Rochester) ..... Assistant Lecturer in Education
**Vivian T. Harway,* PH.D. (Rochester) ..... Assistant Lecturer in Education
**Paul A. Knoke,* B.S. (Wisconsin) ..... Assistant Lecturer in Education
**Calvin E. Lauder,* M.A. (Syracuse) ..... Assistant Lecturer in Education
**Jerome P. Lysaught,* M.A. (Kansas) ..... Assistant Lecturer in Education
**Edna Weeks Smith,* B.S. (New York University) ..... Assistant Lecturer in Education
**Earl Telschow,* ED.D (Columbia) ..... Assistant Lecturer in Education
**Charles E. Walker,* M.ED. (Rochester) ..... Assistant Lecturer in Education

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.

Qualified students may follow programs of study which lead to the degree of Bachelor of Science in Education—with a major in Elementary Education and permanent New York State certification for teaching in the elementary school or Bachelor of Science in Education—with a major in Secondary Education and provisional New York State certification for teaching secondary school academic subjects.

All full-time undergraduate students on the River Campus enroll in the College of Arts and Science as freshmen and continue their studies in that College for the first two years. Students who plan to major in Education and follow a career in teaching should apply for admission to the College of Education during the last semester of the second college year. During the first two years of college a prospective teacher should complete as many distribution requirements[1] as possible and should include Education 200 and Psychology 101 in his program.

Part-time undergraduate students may take courses in the University School of Liberal and Applied Studies to meet the admission requirements of the College of Education stated below.

Transfer students from other colleges who are applying for junior or senior standing may be admitted into the College of Education through the Office of Admission of the University of Rochester River Campus.

Each student in the College of Education is assigned a departmental counselor.

*Part-time.

[1]See page 89 of this Bulletin.

The requirements for admission to the undergraduate teacher education degree programs are:

a. Completion of a minimum of 60 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 strong desire to make teaching a career.
e. Satisfaction of any other admission standards and requirements established by the College of Education, and acceptance by the Committee on Admissions of the College.

Program in Elementary Education. A program[1] is planned by the student and his counselor from the general outline below. It includes during the senior year a semester of full-time student teaching in schools of the Rochester area and related activities on campus.

I. Distribution Requirements[2]		**9 courses**
A. English 101 (unless excused)	1 course	
B. Three courses from the Humanities		
English 102	1 course	
English 103, 104, or 105	1 course	
English 123	1 course	
C. Two courses from the Social Sciences		
History 101–102	2 courses	
D. Three courses from the Natural Sciences		
Psychology 101	1 course	
Two laboratory science courses	2 courses	
	9	
II. Education Requirements		**9 courses**
A. Educational Foundations		
Education 200	1 course	
B. Educational Psychology		
Education 210	1 course	
C. Elementary School Curriculum and Methods		
Education 220–221	3 courses	
D. Student Teaching		
Education 229	4 courses	
	9	
III. Required Academic Courses		**4 courses**
History 231 and 232	2 courses	
Two courses in Geography	2 courses	
	4	
IV. Group Concentration		**4 courses**
Four courses in one group		
V. Electives		**6 courses**
Total		**32 courses**

[1]This program qualifies a student for a New York State certificate for teaching in elementary schools. It does not meet certification requirements in some states. Students who wish to prepare for certification in other states should consult a counselor in the College of Education.

[2]See page 89 of this Bulletin.

Program in Secondary Education. An undergraduate student working toward a degree in the College of Education and preparing to teach an academic subject in the secondary schools, grades 7 through 12, will plan a program[1] with the aid of his counselor according to the general outline below. This program requires that a student spend a large part of each day for a semester of his senior year in student teaching and related activities.

I. Distribution Requirements[2]		**10 courses**
A. English 101 (unless excused)	1 course	
B. Two courses from the Humanities		
English 102	1 course	
English 103, 104, or 105	1 course	
English 123	1 course	
C. Three courses from the Social Sciences	2 courses	
Chosen from Economics 101; History 101–102; Political Science 101, 102; Philosophy 101, 102, or Sociology 101–102		
D. Four courses from the Natural Sciences		
Psychology 101	1 course	
Two laboratory science courses	2 courses	
One course in mathematics	1 course	
	10	
II. Education Requirements		**6 courses**
A. Educational Foundations		
Education 200	1 course	
B. Educational Psychology		
Education 210	1 course	
C. Student Teaching and Secondary Methods	3 courses	
D. Education electives	1 course	
	6	
III. Teaching Field		**5-11 courses**
IV. Academic Electives to total 32 courses		**5-11 courses**
		32 courses

Students who wish to meet minimum certification requirements for secondary school teaching while earning degrees in other colleges of the River Campus should apply for admission to the Teacher Education Sequence no later than the end of the first semester of their junior year. Applications should be submitted to the College of Education office. Information concerning New York State certification requirements may be obtained from that office.

[1]This program will satisfy requirements for a New York State provisional certificate. To continue teaching academic subjects in the schools of the State a teacher must complete a fifth year of college work leading to the permanent certificate.

[2]See page 89 of this Bulletin.

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.

COURSES IN 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. This is the first course in the undergraduate sequence.

Education 210. ***Psychology for Teachers.*** Psychology of learning and teaching. Studies of growth and achievement, emotional development, simple and complex types of learning, purposive behavior, intelligence and measurement. Seeks to meet the needs and problems of the classroom teacher. Prerequisites: Psychology 101 or equivalent.

Education 211. ***Child Development.*** A study of the patterns of development of children from birth to adolescence with special emphasis on school age children. Techniques and methods of child study are reviewed.

Education 212. ***Children's Behavior Problems.*** The factors underlying behavior problems and delinquency in young children. Hereditary influences, physical conditions and handicaps, family environment, and cultural forces in the causation and determination of behavior. Appropriate methods of establishing satisfactory adjustment to people and events. Prerequisites: Psychology 101, Education 210.

Education 215. ***Introduction to Research and Statistics in Education.*** An examination of selected important research findings in the field of education. The methodological and statistical concepts necessary for the understanding of research in education will be systematically developed using examples from the field. Intended for teachers, guidance workers, supervisory personnel and administrators.

COURSES IN 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). Study of the planning of instructional activities, the measurement and evaluation of pupil progress, and the use of audio-visual methods and materials of instruction. Students observe and participate in classroom activities of area elementary schools.

Education 222. ***Principles of Elementary Education I.*** A study of the social studies and co-curricular activities (arts and crafts, music, creative dramatics, health and recreation) in elementary education. Consideration is given to methods and materials of instruction, daily and unit planning, and techniques of evaluation.

Education 223. ***Principles of Elementary Education II.*** A study of reading and language arts in elementary education. Consideration is given to methods and materials of instruction, daily and unit planning, and techniques of evaluation.

Education 224. ***Principles of Elementary Education III.*** A study of arithmetic and science in elementary education. Consideration is given to methods and materials of instruction, daily and unit planning, and techniques of evaluation.

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. 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 of materials for the teaching of 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 210 and sufficient subject matter background is a prerequisite.

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 210 and sufficient subject matter background is a prerequisite.

Education 234. ***The Teaching of Science in the Secondary School.*** Consideration of the content of the high school sciences, methods of selection and organization of curriculum materials and equipment, and procedures for teaching and evaluation. Education 210 and sufficient subject background is a prerequisite.

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 210 and sufficient subject matter background is a prerequisite.

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 210 and sufficient subject matter background is a prerequisite.

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. Prerequisites: Education 200, 210, 230 and one of the following: Education 231, 232, 234, 235, 236.

GENERAL COURSES

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

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. ..... Dean
205 Gavett Hall

Lewis Dalcin Conta, PH.D. ..... Associate Dean for Graduate Studies
204 Gavett Hall

Oscar Edward Minor, B.S. ..... Assistant to the Dean
305 Gavett Hall

Shelby Alexander Miller, PH.D. ..... Chairman of the Department of Chemical Engineering
202–B Gavett Hall

Daniel Ward Healy, Jr., PH.D. ..... Chairman of the Department of Electrical Engineering
212 Gavett Hall

Martin Lessen, SC.D. ..... Chairman of the Department of Mechanical Engineering
307–A Gavett Hall

Robert Earl Hopkins, PH.D. ..... Director of the Institute of Optics
412 Bausch & Lomb Building

Faculty

John William Graham, Jr., D.SC. (Carnegie Institute of Technology)....
....Dean of the College of Engineering

Lewis Dalcin Conta, PH.D. (Cornell).....Professor of Mechanical Engineering

Miles Parker Givens, PH.D. (Cornell).....Professor of Optics

Daniel Ward Healy, Jr., PH.D. (Harvard).....Professor of Electrical Engineering

Robert Earl Hopkins, PH.D. (Rochester) .....Professor of Optics

**Rudolph Kingslake,* D.SC. (London).....Professor of Optics

Horace William Leet, M.E. (Cornell).....Professor Emeritus of Mechanical Engineering

Martin Lessen, SC.D. (Massachusetts Institute of Technology)....
....Professor of Mechanical Engineering

**Lee Browning Lusted,* M.D. (Harvard).....Professor of Biomedical Engineering; Associate Professor of Radiology (School of Medicine and Dentistry)

Shelby Alexander Miller, PH.D. (Minnesota)..... ....Professor of Chemical Engineering

Gouq-Jen Su, SC.D. (Massachusetts Institute of Technology)...Professor of Chemical Engineering

Robert Marsh Blakney, PH.D. (Rochester).....Associate Professor of Optics

Edwin Lorenz Carstensen, PH.D. (Pennsylvania)....Associate Professor of Electrical Engineering

Gerald Howard Cohen, PH.D. (Wisconsin).....Associate Professor of Electrical Engineering

David Bellamy Dutton, PH.D. (Illinois).....Associate Professor of Optics

Richard Frederick Eisenberg, M.S. (Rochester)....Associate Professor of Mechanical Engineering

Hugh Guthrie Flynn, PH.D. (Harvard).....Associate Professor of Electrical Engineering

John A. Fox, PH.D. (Pennsylvania State).....Associate Professor of Mechanical Engineering

Richard Reist Kraybill, PH.D. (Michigan).....Associate Professor of Chemical Engineering

Gordon Gladstone Milne, PH.D. (Rochester).....Associate Professor of Optics

Oscar Edward Minor, B.S. (Rochester).....Associate Professor of Mechanical Engineering

James Charles Peskin, PH.D. (Columbia).....Associate Professor of Optics

Rubens Sette Ramalho, PH.D. (Vanderbilt).....Associate Professor of Chemical Engineering

William Richard Stroh, PH.D. (Harvard).....Associate Professor of Electrical Engineering

Harold Stanley Stewart, PH.D. (Johns Hopkins).....Associate Professor of Optics

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*Part-time

Kenneth James Teegarden, PH.D. (Illinois).....Associate Professor of Optics
Helmut Dietrich Weymann, DR.SC. (Aachen).....Associate Professor of Mechanical Engineering

Philip Werner Baumeister, PH.D. (California)..... ...Assistant Professor of Optics
James Arthur Eyer, PH.D. (Rochester).....Assistant Professor of Optics
William Frederick Halbleib, PH.D. (Cornell).....Assistant Professor of Mechanical Engineering
Stanley Middleman, D.ENG. (Johns Hopkins).....Assistant Professor of Chemical Engineering
M. V. Radha Krishna Murty, PH.D. (Rochester).....Assistant Professor of Optics
Daniel Spolane Ruchkin, PH.D. (Yale).....Assistant Professor of Electrical Engineering
†***William David Smith, Jr.,*** M.ENG. (Yale).....Assistant Professor of Chemical Engineering
Hing-Cheong So, PH.D. (Illinois).....Assistant Professor of Electrical Engineering
Herbert B. Voelcker, Jr., PH.D. (London).....Assistant Professor of Electrical Engineering

Giancarlo Baldini, PH.D. (Milano).....Research Associate in Optics
Sheng-Heng Fang, M.S. (Massachusetts Institute of Technology)....Research Associate in Optics
R. Illingworth, PH.D. expected (Birmingham).....Research Associate in Optics
N. Kristianpoller, PH.D. (Hebrew).....Research Associate in Optics

****Vance J. Carpenter,*** M.S. (Rochester).....Lecturer in Optics
****William P. Ewald,*** B.S. (Rochester).....Lecturer in Optics
****Gordon Dale Hiatt,*** PH.D. (Illinois).....Lecturer in Chemical Engineering
****Richard J. Pegis,*** M.A. (Toronto).....Lecturer in Optics
****Fordyce Tuttle,*** M.A. (Wisconsin).....Lecturer in Optics

****Burton Cosden Gibbons,*** B.S. CH.E. (Carnegie Institute of Technology)....
....Assistant Lecturer in Chemical Engineering
****David Kenneth Priest,*** PH.D. (Ohio State University)....
....Assistant Lecturer in Chemical Engineering
****James Livingston Douglas,*** M.S. (Rochester).....Assistant Lecturer in Electrical Engineering

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.

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

*Part-time.
†On Leave February 1961–January 1962

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.

Combined 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 additional 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).

Five-year, 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 the single B.S. degree plus ten courses of Arts electives in a chosen field of concentration. These combined curricula offer a worthwhile program which provides a much broader and more liberal education than is possible in the regular four-year course. The aim 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 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 an option in physical metallurgy*, in physical optics, or in other selected areas in which the University has special competencies.

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. The scientist seeks an understanding of the real or imagined world; the engineer changes that world by designing products

*Students in Chemical Engineering may follow the metallurgical or materials option by taking a four-course sequence of metallurgical and related subjects through the junior and senior years in lieu of eight hours of free elective, the senior chemical engineering elective, and ME271.

or processes which have useful applications. 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 has established a work-study program for students of the College. This plan, which has been worked up in consultation with Rochester-area 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. The Faculty is convinced that if a student will spend his four college years in this way, he will have an "ideal" preparation on graduation to begin to learn as a practicing embryo engineer. The Assistant to the 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 To be admitted to the College of Engineering, 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.

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 and optics must take the appropriate Air Science or Naval Science courses of the freshman year in addition to the regular courses listed below.

Titles of 400-level courses which are open to undergraduate students by special arrangement are included with the undergraduate course descriptions; these advanced courses are described in the Graduate Studies Bulletin.

THE COMMON FRESHMAN YEAR

1st Term

Math. 161[1]	Analysis I
Phys. 101[2]	General Physics A
Chem. 121[3]	General Chemistry I
Engl. 101	English Composition
Ph. Ed. 11	Physical Education I

[1]An alternate approved sequence is Mathematics 171, 172 for those considered eligible by the Mathematics Department. Students so approved are encouraged to elect this sequence.

[2]An alternate approved sequence is Physics 107, 108 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. Students intending to pursue the Chemical Engineering curriculum *must* take Chemistry 123, 124. Students intending to pursue the Optics curriculum may substitute a Group III elective for Chemistry 123, 124 on approval of the Faculty Adviser.

2nd Term

Math. 162[1]	Analysis II
Phys. 102[2]	General Physics A
Chem. 122[3]	General Chemistry II
Elective	Group I or II
Ph. Ed. 13	Physical Education II

CHEMICAL ENGINEERING

Sophomore Year

1st Term		*Hours*
Chem. 161	Organic Chemistry	4
Phys. 111[2,3]	General Physics B	3
*Math. 163[1]	Analysis III	4
*Ch. E. 100	Introduction to Chemical Engineering	4
Elective[4]		4
Ph. Ed. 21	Physical Education I	0
		19

2nd Term		
Chem. 162[3]	Organic Chemistry	3
Phys. 112[2,3]	General Physics B	3
*Math. 164[1]	Analysis IV	4
*Ch. E. 102	Material & Energy Balances	4
M.E. 101	Engineering Graphics	1
M.E. 105	Shop Practice	3
Ph. Ed. 23	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

*Students with a passing grade less than C may be required to repeat the course.

[1]An alternate approved sequence is Mathematics 173, 174 for those considered eligible by the Mathematics Department.

[2]An alternate approved sequence is Physics 117, 118 for those considered eligible by the Physics Department.

[3]Chemical engineering students are not required to take the laboratory.

[4]At least 20 credits (5 courses) must be selected from Groups I and II in the College of Arts and Science with the following stipulations and exceptions: at least two Group I courses; Economics 101 and at least one additional Group II course; Physics 101 may be considered as a Group II 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 group of free electives.

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	Chemical Engineering Laboratory	3

Senior Year

1st Term

M.E. 271	Engineering Metallurgy & Materials	4
Ch.E. 231	Applied Kinetics & Reactor Design	4
Ch.E. 250	Selected 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

[5]Chemical engineering electives are to be chosen from among the following: Ch.E. 211, 263, 265, 268, 278, 280, and 292; M.E. 280 and 480; selected additional courses in mechanical engineering, and in such disciplines as electrical 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 special approval of the Department Chairman and the Assistant to the Dean of Engineering.

COMBINED CHEMICAL ENGINEERING AND ROTC PROGRAM

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 overload. 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.

PROGRAM FOR STUDENTS WHO ENTERED COLLEGE IN SEPTEMBER 1958 OR EARLIER

Senior Year

	Hours	
	1st Term	*2nd Term*
Ch.E. 248	2	0
Ch.E. 231, 267	3	3
Ch.E. 242	3	0
Ch.E. 265	0	2
Ch.E. 222	0	3
Ch.E. 270	0	3
Ch.E. 290	0	3
E.E. 157, 158	3	3
M.E. 113	3	0
Elective[1]	3	0
	17	17

Faculty or departmental advisers should be consulted for information concerning combined engineering-ROTC programs.

Chemical Engineering

Professors MILLER, SU; Associate Professors KRAYBILL, RAMALHO; Assistant Professors MIDDLEMAN, SMITH; Lecturer *HIATT; Assistant Lecturers *GIBBONS *PRIEST; and Assistants.

ChE 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.

ChE 102. ***Material and Energy Balances.*** The first law of thermodynamics and the principles of equilibrium are discussed. 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.

ChE 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.

ChE 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.

ChE 222. ***Thermodynamics for Chemical Engineers.*** A treatment of thermodynamic principles with particular reference to the second and third laws. Applications are made to miscellaneous mechanical and chemical processes, special emphasis being given to gas liquefaction and chemical equilibria involving both ideal and non-ideal systems.

Credit—three hours.
Three lecture–recitations a week.

ChE 223. ***Applied Thermodynamics I.*** A study of the 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.

[1]A four-hour course may be elected if the student prefers.
*Part-time

Math. 164 and Phys. 112 or 118 prerequisite and Chem. 251 corequisite.

Credit—two hours.
Two lecture–recitations a week.

ChE 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.

ChE 231.† ***Applied Kinetics and Reactor Design.*** A 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 241 prerequisite. The principles will be illustrated in the laboratory and by means of an analog computer.

Credit—four hours.
Three lectures and one or two laboratories a week.

ChE 242. ***Unit Operations II.*** A continuation of ChE 241, studying diffusional processes of absorption and extraction, distillation, psychrometry, air conditioning, and drying.

Credit—three hours.
Three lecture–recitations a week.

ChE 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.

ChE 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.

ChE 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 are practiced. 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.

ChE 248. ***Chemical Engineering Laboratory.*** This course is similar in nature to ChE 247, except that studies in extraction, distillation, humidification, drying, absorption, and materials testing are undertaken. Must be taken with or subsequent to ChE 242.

Credit—two hours.
One three-hour laboratory per week.

ChE 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.

ChE 263. ***The Chemistry of Plastic Materials.*** The sources of chemical raw materials and the conversion of these materials to resins will be discussed. The general principles of polymer formation will be laid down. Each important class of plastic materials will be described 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.

ChE 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.

ChE 267. ***Industrial Chemical Technology.*** Analysis of industrial chemical processes with attention to chemical principles, chemical engineering practice, and economic factors. Such topics as raw materials and energy sources, water treatment, and waste processing are included, as well as selected organic and inorganic processes. Chem. 161 and 251 prerequisite.

Credit—three hours.
Three lectures a week.

†Taught for three credits, no laboratory, in 1961–62.

ChE 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.

ChE 270. ***Chemical Engineering Process Design.*** This course is essentially an opportunity for the chemical engineering senior to integrate the material he has mastered in his several previous science and engineering courses. In general, problems related to the design of chemical plants, including economic as well as technical considerations, are treated. Specifically, these problems include structural design, piping design, flow sheet layout, plant layout, economic balance, instrumentation and automatic control, and comprehensive equipment and process design. ChE 242 prerequisite.

Credit—three hours.
Three lecture–recitations a week.

ChE 271, 272. ***Chemical Engineering Process Design.*** The process design courses are essentially an opportunity for the chemical engineering senior to integrate the material he has mastered in his several previous science and engineering courses. In general, problems related to the design of chemical plants, including economic as well as technical considerations, are treated. 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.

ChE 278. ***The Chemical Industry and Its Operation.*** A brief review of the history of chemical technology and the emergence of the modern chemical industry, followed by a study of the organization, financing, and economic profile of the process industries. Special attention is given to the interplay between technical and economic factors and to the 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 will be summarized.

Credit—two hours.
Two lectures a week.

ChE 280. ***Process Control and Instrumentation.*** A review of the principles of measurement is followed by a survey of established techniques for measuring and controlling process variables. The selection and engineering of instruments for the chemical process industries are studied.

Credit—three hours.
Two lectures and one recitation or laboratory a week.

ChE 290. ***Special Topics.*** A senior seminar course in which current practices and current research developments in chemical engineering are explored. Those students who are 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 242 and 231 prerequisite.

Credit—three hours.
Two 75-minute meetings a week.

ChE 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.

ChE 294. ***Plant Visits.*** Appropriate industrial plants that illustrate chemical engineering in practice are visited. The visits are preceded by explanation and followed by discussion, and a final report is required of each student.

No credit.

ChE 411, 412. ***Analysis of Chemical Engineering Problems.***

Credit—three hours.

ChE 421. ***Advanced Chemical Engineering Thermodynamics.***

Credit—three hours.

ChE 431. ***Chemical Engineering Kinetics and Catalysis.***

Credit—three hours.

ChE 441. ***Fluid flow and Heat Transmission.***

Credit—three hours.

ChE 442. ***Diffusional Operations.***

Credit—three hours.

ChE 451. ***Filtration.***

Credit—two hours.

ChE 452. ***Agitation.***

Credit—two hours.

ChE 481. ***Corrosion.***

Credit—two hours.

ChE 482. ***Amorphous and Colloidal Materials.***

Credit—three hours.

ELECTRICAL ENGINEERING

Sophomore Year

1st Term

Math 163[1]	Analysis III
Phys. 111[2]	General Physics B
E.E. 110	Network Analysis I
**Elective	Group
Ph.Ed. 21	Physical Education I

2nd Term

Math. 164[1]	Analysis IV
Phys. 112[2]	General Physics B
E.E. 111	Network Analysis II
Elective	Group
Ph.Ed. 23	Physical Education II

Junior Year

1st Term

E.E. 201	Engineering Analysis I
E.E. 221	Electronics
Phys. 213	Introduction to Modern Physics
Elective	Group

2nd Term

E.E. 202	Engineering Analysis II
E.E. 222	Feedback Systems Analysis
Optics 223	Electronic Properties of Solids
Elective	Group

†Senior Year

1st Term

E.E. 231	Electricity and Magnetism
E.E. 241	Communication Systems
Elective[3]	Technical
Elective	Group

2nd Term

E.E. 232	Microwave Engineering
E.E. 242	Electromechanical Energy Conversion
Elective	Technical
Elective	

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[1]An alternate approved sequence is Mathematics 173, 174 for those considered eligible by the Mathematics Department.

[2]An alternate approved sequence is Physics 117, 118 for those considered eligible by the Physics Department.

**To satisfy the distribution requirements, a student must elect three Group I courses and three Group II courses.

†Especially selected students may be permitted to carry one additional elective during each term of the senior year.

[3]Technical Electives available to Electrical Engineering students include:

EE 206 Transistor Characteristics and Circuits
EE 209 Acoustics
EE 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 Engineeering field are urged to choose as electives courses in Biology, as well as Organic Chemistry.

COMBINED ELECTRICAL ENGINEERING AND ROTC PROGRAM

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 departmental counselors.

Electrical Engineering

Professors HEALY, *LUSTED; Associate Professors CARSTENSEN, COHEN, FLYNN, STROH; Assistant Professors RUCHKIN, SO, VOELCKER; and Assistants.

EE 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.

EE 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 112 and Math. 164 prerequisite.
Credit—three hours.

EE 201. ***Engineering Analysis I.*** A course in the theory and engineering applications of matrices, vectors and tensors.

EE 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.

EE 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.

EE 209. ***Acoustics.*** An introduction to acoustics. The acoustic wave equation, plane and spherical waves, radiation from sound sources, propagation in horns and tubes, electro-acoustic devices. EE 231 prerequisite.

*Part-time

EE 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.

EE 222. ***Feedback Systems Analysis.*** Theory of linear feedback systems and their analysis 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 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.

EE 232. ***Microwave Engineering.*** Theory of time varying fields with applications to transmission lines, wave guides, antennas and sources.

EE 241. ***Communication Systems.*** Statistical methods in systems analysis, modulation and coding, measures of information, system models, comparison of communication systems.

EE 242. ***Electromechanical Energy Conversion.*** An introduction to theory of electromechanical energy conversion with applications to rotating machines and incremental motion devices.

EE 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.

EE 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.

EE 401. ***Computer Electronics.***

EE 402. ***Analog and Digital Computers.***

EE 431. ***Advanced Network Analysis.***

MECHANICAL ENGINEERING

Intersession (after freshman year)

M.E. 104	Machine Shop

Sophomore Year

1st Term	
Math. 163[1]	Analysis III
Phys. 111[2]	General Physics B
M.E. 120	Mechanical Engineering Problems
**Elective	Group
Ph.Ed. 21	Physical Education 1
2nd Term	
Math. 164[1]	Analysis IV
Phys. 112[2]	General Physics B
Chem.	Physical Chemistry
Elective	Group
Ph.Ed. 23	Physical Education II

Junior Year

1st Term	
M.E. 201	Engineering Analysis I
M.E. 221	Analytical Mechanics
Physics 213	Introduction to Modern Physics
Elective	Group
2nd Term	
M.E. 202	Engineering Analysis II
M.E. 222	Continuum Mechanics
M.E. 227	Materials Science
***Elective	Group

†Senior Year

1st Term	
M.E. 223	Thermodynamics and Statistical Mechanics
M.E. 203	Linear Systems
Elective	Technical
Elective	Group
2nd Term	
M.E. 224	Classical Field Theory
M.E. 235	Mechanical Engineering Design
Elective	Technical
Elective	

[1]An alternate approved sequence is Mathematics 173, 174 for those considered eligible by the Mathematics Department.

[2]An alternate approved sequence is Physics 117, 118 for those considered eligible by the Physics Department.

**To satisfy the distribution requirements, a student must elect three Group I courses and three Group II courses.

***Students who entered college in September, 1959, will take Physical Chemistry for Engineers, in place of this Group elective.

†Especially selected students may be permitted to carry one additional technical elective during each term of the senior year.

COMBINED MECHANICAL ENGINEERING AND ROTC PROGRAM

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.

PROGRAM FOR STUDENTS WHO ENTERED COLLEGE IN SEPTEMBER 1958 OR EARLIER

Senior Year

	Hours	
	1st Term	*2nd Term*
M.E. 254	3	0
M.E. 257, 258	3	3
M.E. 242	0	3
E.E. 177	2	0
Technical Elective	3	6
Elective	4–8	4–8
	15–19	16–20

Faculty or departmental advisers should be consulted for information concerning combined engineering-ROTC programs.

Mechanical Engineering

Professors Lessen, Conta; Associate Professors Eisenberg, Fox, Minor, Weymann; Assistant Professor Halbleib; and Assistants.
Shop: Mr. Pearse, Mr. Beach.

ME 101. ***Engineering Graphics.*** For chemical engineers. A study of orthographic projection as a tool in solving problems in space, and also as the basis of communication among technically trained persons. Topics included are: graphs, sectioning, conventions, dimensions, pictorials, assemblies, intersections, developments, along with "double auxiliary" methods of graphic solutions.

Credit—three hours.

ME 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.

ME 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.

ME 112. ***Statics and Strength of Materials.*** For chemical engineers. The principles of statics are reviewed, and applied 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. Math. 163, Physics 111 prerequisite.

Credit—three hours.

ME 120. ***Mechanical Engineering Problems.*** Introduction to the engineering method. Use of analytical and graphical methods in solution of sample modern problems.

ME 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.

ME 203. ***Linear Systems.*** Development and application of integral transform techniques to solution of transients in lumped and distributed mechanical, electrical, thermal and mixed linear systems.

ME 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.

ME 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, Bernoullis theorem, parallel viscous flow, compressible flow, velocity of sound, introduction to rheology.

ME 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.

ME 224. ***Classical Field Theory.*** Electrostatics, magnetostatics, Maxwell's equations, electromagnetic potentials, boundary conditions, Poynting's theorem, the four-space field tensors, coupling with a mechanical field, energy, wave propagation.

ME 227. ***Materials Science.*** Physical properties of solids as related to atomic, molecular, crystal and polycrystalline structures.

ME 234. ***Mechanical Vibrations.*** Principles of harmonic motion; study of free, damped, and forced vibrations of single and multi-degree freedom systems; vibration theory applied to engineering problems.

Credit—three hours.

ME 235. ***Mechanical Engineering Design.*** 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 electromechancial and hydraulic systems.

ME 236. ***Advanced Mechanics of Materials.*** Beams on elastic foundations, beams with axial and lateral loads, thin plates and shells, buckling of bars, plates and shells, torsion, stress concentration and introduction to theory of elasticity with simple beam bending applications.

Credit—three hours.

ME 238, 239. ***Mechanical Design I, II.*** A study of the fundamentals underlying modern mechanical design. Topics covered will 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.

ME 242. ***Structural Design.*** A study of stresses involved in the design of trusses, girders, columns, and floor systems. Timber, steel and reinforced concrete structures are considered.

Credit—three hours.

ME 243. ***Machine Design.*** Principles of strength of materials applied to various machine elements. Consideration of loads developed in machine members, and procedures for determining sizes, shapes and assembly.

Credit—three hours.

ME 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 will be covered as needed.

ME 254. ***Energy Conversion and Transfer.*** A study of combustion and thermochemical calculations, and the transfer of heat and mass.

Credit—three hours.

ME 257, 258. ***Mechanical Engineering Laboratory.*** Laboratory experiments in fluid flow, heat transfer, and power generation. The lecture period is used to discuss and demon-

strate instrumentation, and as a preparation for the laboratory experiments. During the second term, students are expected to demonstrate initiative and originality in the organization and conduct of the experiments.

Credit—three hours each term.

ME 261. ***Gas Turbine Power Plants.*** A study of the thermodynamics of gas turbine cycles, and of the machinery necessary to carry out these cycles. Consideration will be given to design and operation of the turbines and compressors, and to the problems involved in the combustion of fuels in high velocity air streams. Although the major emphasis will be on power turbines, some time will be devoted to the jet propulsion of aircraft.

Credit—three hours.

ME 262. ***Gas Dynamics.*** The mechanics and thermodynamics of compressible flow at subsonic and supersonic velocities. Shock phenomena as well as combustion and other thermal effects will be covered. Applications to flow in ducts, nozzles, diffusers, combustors, and impellers will be studied.

Credit—three hours.

ME 270, 272. ***Physical Metallurgy.*** A study of the fundamentals of physical metallurgy. Emphasis is placed on the structure of metals, phase diagrams, physical and mechanical properties, and heat treatment. Specific metals and metallurgical processes will not be covered except as a means of illustrating the principles.

Credit—three hours each term.

ME 271. ***Engineering Metallurgy and Materials.*** Structure and properties of the metallic state, equilibrium, phase diagrams, nonequilibrium phase transformation, corrosion and high temperature behavior of metals. For Chemical Engineers. Prerequisites Chemistry 252, Physics 111–112, M.E. 112.

Credit—four hours.

ME 273. ***Ferrous Alloys.*** A detailed study of the iron carbon system, heat treatment, and the correlation of microstructures with associated properties of steels. Special purpose steels such as tool steels, stainless steels and high temperature alloys are also studied. The laboratory is devoted to metallography, heat treating and testing. Prerequisites: ME 272, 276, 277.

Credit—three hours.

ME 274. ***Non-ferrous Metals and Alloys.*** A study of non-ferrous metals and alloys, associating properties with microstructure, composition, and thermal treatments. Recent developments, including nuclear metallurgy, are also considered. The laboratory work is devoted to metallography, heat treatment, and testing. Prerequisites: ME 272, 276, 277.

Credit—three hours.

ME 275. ***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 and laboratory work. A complete engineering report will be required covering the work undertaken. ME 272 prerequisite. Students not taking the Metallurgy option must have the consent of the instructor.

Credit—three or four hours.

ME 276, 277. ***Metallurgy Laboratory.*** In the first term, the laboratory work emphasizes experimental techniques and equipment, including pyrometry, materials testing and metallography. In the second term, the emphasis is on metallurgical operations and the application of the principles of physical metallurgy to specific metals and alloys. ME 271, 272 corequisite.

ME 280. ***Introduction to Nuclear Engineering.*** An introductory course dealing briefly with a number of problems in the nuclear field. The course will draw extensively on the engineering student's earlier educational background. Topics studied are: introduction to nuclear physics; reactor components and analysis; materials of construction; power systems and controls; waste disposal and safety.

ME 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.

ME 430. ***Introduction to Elasticity and Plasticity I.***

ME 431. ***Introduction to Elasticity and Plasticity II.***

ME 436. ***Foundations of Fluid Mechanics I —Inviscid Flow.***

ME 437. ***Foundations of Fluid Mechanics II —Viscous Flows.***

ME 480. ***Nuclear Laboratory.***

OPTICS

Sophomore Year

1st Term

Math. 163[1]	Analysis III
Phys. 111[2]	General Physics B
**Elective	Group
Elective	Group
Ph.Ed. 21	Physical Education

2nd Term

Math. 164[1]	Analysis IV
Phys. 112[2]	General Physics B
Elective	Group
Elective	Group
Ph.Ed. 23	Physical Education

Junior Year

1st Term

Opt. 141	Geometrical Optics I
Opt. 161[3]	Electromagnetic Waves
Opt. 152	Physiological Optics
Elective	Group

2nd Term

Opt. 142	Geometrical Optics II
Elective	Optics or Physics
Opt. 162	Physical Optics I
Elective	

†Senior Year

Three of the following four courses

1st Term

Opt. 261	Physical Optics II
Opt. 253	Radiometry & Spectrophotometry
Opt. 241	Testing of Optical Units and Lens Systems I
Phys. 213	Introduction to Modern Physics
Elective	

Three of the following four courses

2nd Term

Opt. 262	Physical Optics III
Opt. 254	Radiometry & Spectrophotometry
Opt. 242	Testing of Optical Units and Lens Systems II
Opt. 223	Electronic Prop. of Solids
Elective	

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[1]An alternate approved sequence is Mathematics 173, 174 for those considered eligible by the Mathematics Department.

[2]An alternate approved sequence is Phys. 117, 118 for those considered eligible by the Physics Department.

[3]Students who have passed Physics 118 with a grade of B or better are permitted to substitute an elective for this course.

**To satisfy the distribution requirements, a student must elect three group I courses and three group II 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 technical elective during each term of the senior year.

COMBINED OPTICS AND ROTC PROGRAM

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.

Optics

Professors HOPKINS, GIVENS, *KINGSLAKE; Associate Professors BLAKNEY, DUTTON, MILNE, PESKIN, STEWART, TEEGARDEN; Assistant Professors BAUMEISTER, EYER, MURTY; Research Associates BALDINI, FANG, ILLINGWORTH, KRISTIANPOLLER; Lecturers *CARPENTER, *EWALD, *PEGIS, *TUTTLE

Opt. 141. ***Geometrical Optics I.*** The principles underlying the refraction, reflection, image translation and rotation, by systems of lenses and prisms, are fully discussed, and 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.

Opt. 142. ***Geometrical Optics II.*** A continuation of Optics 141.

Opt. 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. Physics 101–102 and Mathematics 100, 101 are prerequisites.

Opt. 161. ***Electromagnetic Waves.*** The equations which describe the propagation of light and other electromagnetic radiation are derived from the basic laws of electricity and magnetism. A mathematical treatment is given to the behavior of light waves. Physics 111–112 is prerequisite. Although some of the mathematical background is developed, Mathematics 150 is a prerequisite or should be taken concurrently.

Opt. 162. ***Physical Optics I.*** An introduction is given to the phenomena of image formation, interference, diffraction, polarization and scattering. Physics 111–112 or Physics 221, Optics 161 and Mathematics 150–151 are prerequisites.

Opt. 223. ***Electronic Properties of Solids.*** Selected topics in solid-state physics and physical electronics. The subjects considered include energy band theory of solids, conduction in solids, thermionic and photoelectric emission, gaseous electronic conduction, semiconductors, dielectrics, crystalline imperfections, luminescence, photoconductivity, and others. Physics 213 or Physics 241 is prerequisite.

Opt. 225. ***Introduction to the Theory of the Solid State.*** The purpose of the course is to introduce the fundamental concepts of solid state physics and acquaint the student with the terminology employed in this important branch of physics. The mathematical details will be kept to a minimum. Particular attention will be given to the electron motions in the solid and the effect of these motions on the physical properties of the solid. Special emphasis will be given to the optical properties of solids. Two years college physics and two years college mathematics are prerequisite.

Opt. 241. ***Testing of Optical Units and Lens Systems I.*** This is a purely laboratory course, intended to accompany the course on Optical Design, which will familiarize the students with the standard methods of testing optical units and measuring their properties. The experiments include the testing of surfaces, plates and prisms by Hardinger, Foucault, and interferometer methods; the lens-testing bench for the measurement of

*Part-time

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.

Opt. 242. ***Testing of Optical Units and Lens Systems II.*** A continuation of Optics 241.

Opt. 251. ***Advanced Physiological Optics.*** A detailed discussion of selected topics pertaining to the visual process. Optics 152 or permission of the instructor prerequisite.

Opt. 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 111–112 is prerequisite.

Opt 253. ***Radiometry and Spectrophotometry I.*** A course dealing with the 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. Special topics relating to radiometric and photometric problems encountered in physics and astronomy will be discussed. Physics 213 or equivalent is prerequisite.

Opt. 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.

Opt. 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.)

Opt. 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. Optics 257 is prerequisite. There is no formal laboratory, but a term paper or term project is required.

Opt. 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. Optics 162 is prerequisite.

Opt. 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. Optics 261 is prerequisite.

Opt. 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.

Opt. 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. Two years college physics prerequisite.

Opt. 283. ***Mechanical Design of Optical Instruments I.*** 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. (Two years college physics prerequisite.)

Opt. 284. ***Mechanical Design of Optical Instruments II.*** A continuation of Optics 283.

Opt. 293. ***Special Problems in Optics.*** A reading or research course open to seniors in optics by special permission.

Opt. 471, 472. ***The Design of Lenses, Prisms and Optical Systems.***

Opt. 474. ***Methods of Image Evaluation and Optical Systems.***

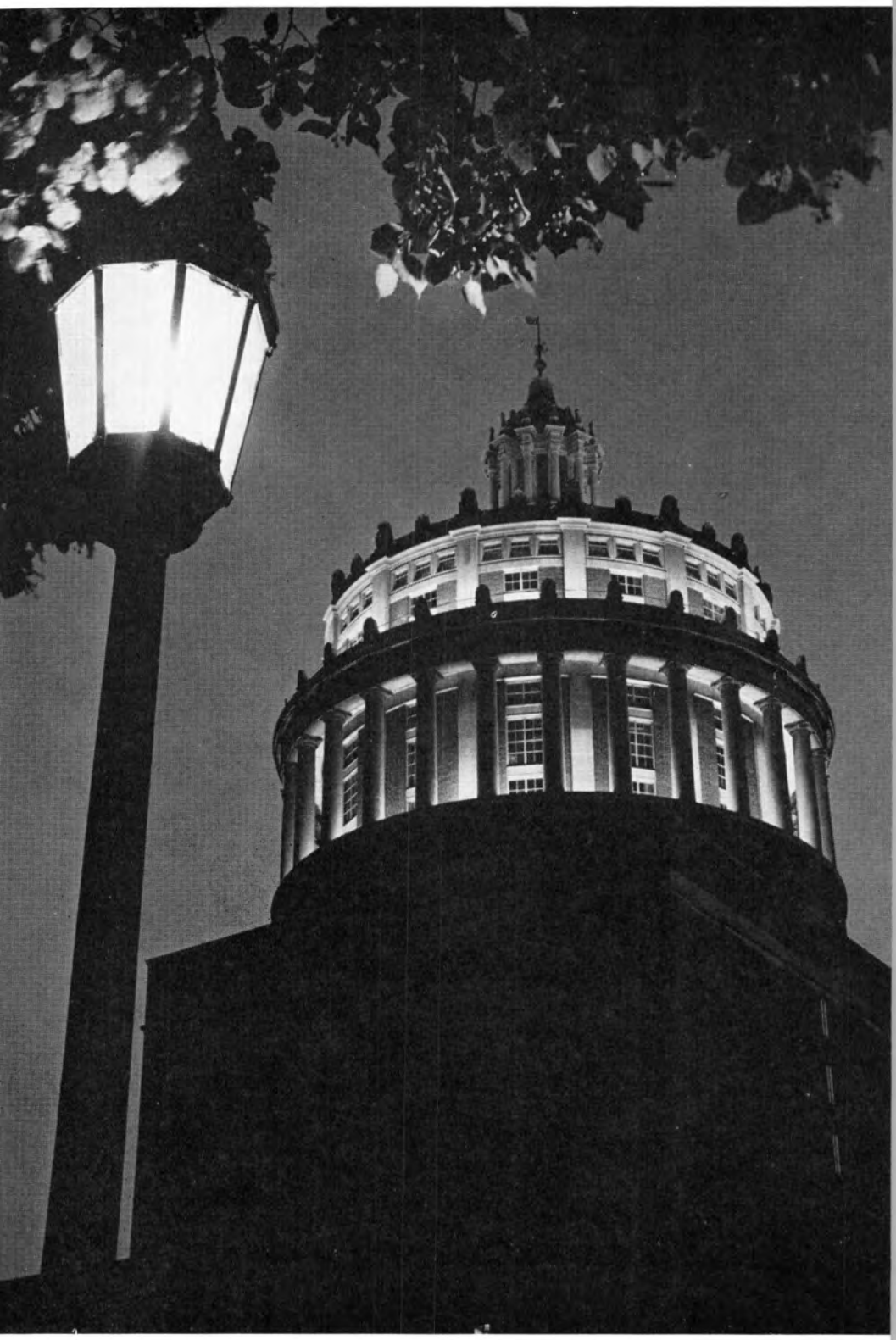
Department of Nursing

The University of Rochester has conducted educational programs in nursing since 1925. In a move to strengthen the University's offerings in nursing, the Board of Trustees voted in 1960 to unify the separate faculties in nursing which had existed in the College of Education and the Department of Nursing of the School of Medicine and Dentistry. In the summer of 1961, the unified faculty in the Department of Nursing assumed responsibility for all nursing education at both the undergraduate and graduate level.

The Department of Nursing offers programs leading to the degrees 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.

Requests for the official bulletin of the Department of Nursing should be addressed to:

Registrar
Department of Nursing
School of Medicine and Dentistry
260 Crittenden Boulevard
Rochester 20, New York



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Chairman, Department of Nursing

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Acting Administrator, Strong Memorial Hospital

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Computing Center

Thomas A. Keenan, PH.D. . . . . *Director*

Glossary

Auditor A person who visits or attends lectures but does not take examinations and therefore receives no credit or academic recognition for completing a course.

Course The ordinary unit of undergraduate instruction which is defined as consisting of a coherent body of academic material requiring approximately 25% of the student's working time during the term.

Curriculum A body of courses required for a degree or program or constituting a major field of study.

Dean's List A published list, issued at the close of each term, of undergraduate students who have achieved a term average of 3.0 with no failing grade.

Degree The title bestowed as official recognition for the completion of a curriculum. A list of degrees conferred by the University of Rochester follows:

A.B.	Bachelor of Arts
B.S.	Bachelor of Science
B.Mus.	Bachelor of Music
A.M.	Master of Arts
M.S.	Master of Science
ED.M.	Master of Education
M.Mus.	Master of Music
M.D.	Doctor of Medicine
PH.D.	Doctor of Philosophy
A.Mus.D.	Doctor of Musical Arts

Elective A course not required in the curriculum which the student is allowed to select.

Honors Program A program involving concentrated study in a major field, usually requiring the student to write a scholarly paper or submit to oral and written examinations. Generally available to senior students entitled, on the basis of their previous record, to participate more fully in the process of individual study.

Major The student's primary field of emphasis.

Orientation A process designed to help the new student become acquainted with the University—its campus, ideals, traditions. As a part of the counseling program for freshmen it is designated officially as Freshman Week, and is a period during which placement tests are given so that a student may be properly placed in the program of instruction.

Probation Students who do not make satisfactory progress towards the completion of requirements for a degree may be warned, placed on probation, or dropped from college. A student on probation may not be absent from classes, hold a class office or participate in extracurricular activities, or represent the University in any public function. He should expect dismissal at the end of the period of probation if his work has not shown marked improvement.

Registration The process by which the student is formally enrolled in classes, and collects materials which authorize him to attend the first session of each course.

Seminar A course with small enrollment. Students work informally on different aspects of the central theme, and meet for group discussion.

Transcript An unabridged, certified academic record which is prepared to communicate information from one college or university to another concerning a student.

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Official Bulletins

OF THE UNIVERSITY OF ROCHESTER

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Undergraduate Studies College of Arts and Science College of Education College of Engineering College of Business Administration	Director of Admissions 142 Administration Building University of Rochester River Campus Station Rochester 20, New York
Eastman School of Music *(Regular and Summer Sessions)*	Director of Admissions Eastman School of Music 26 Gibbs Street Rochester 4, New York
School of Medicine & Dentistry	Dean, School of Medicine & Dentistry Medical Center, The University of Rochester 260 Crittenden Blvd. Rochester 20, New York
Department of Nursing	Chairman, Department of Nursing Helen Wood Hall, The University of Rochester 260 Crittenden Blvd. Rochester 20, New York
Graduate Studies	*(Mail directly to the Associate Dean of Graduate Studies in the school or college in which you are interested.)*
University School	Dean, University School The University of Rochester River Campus Station Rochester 20, New York


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